Lex Loot Boxes

The Regulation of Gambling-like Products in Video Games

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Regulering af gambling-lignende produkter i computerspil

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Lex Loot Boxes:
The Regulation of Gambling-like Products in Video Games

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Abstract

Loot boxes are gambling-like products inside video games that players can purchase with real-world money to obtain random rewards. Most of the time, the player receives an undesirable reward and 'loses'. Occasionally, the player receives a highly sought-after prize. Such randomisation means players usually need to make repeated purchases and spend a substantial sum of money if they wish to obtain certain specific rewards. Many have argued that loot boxes are similar to traditional gambling, both structurally and psychologically. A link has also been found between spending money on loot boxes and experiencing harms from problem gambling, among other risk factors. The scientific literature requires time to develop before it can provide more definitive answers as to the potential harms of loot boxes. However, these products are of concern to players, parents, regulators, and policymakers given their resemblance to traditional gambling, coupled with their availability to young children and adults alike – without proper regulation (if any). This has led several countries to consider and adopt regulation to proactively address the problem. The video game industry has also adopted certain self-regulatory rules of limited efficacy in response to appease the public and perhaps forestall stricter and more effective regulation. Grounded in psychological and sociological findings on the potential harms of loot boxes, this thesis explores potential regulatory approaches in terms of what various countries have done or proposed to do. In accordance with the principles of open science, the thesis empirically and transparently evaluates how well various measures in different countries have been implemented in practice, *i.e.*, whether companies have complied with them. Taken together, this body of work demonstrates that compliance with loot box regulation has generally been poor across the world. The regulation of loot boxes is unsurprisingly difficult, given the massive volume of content that must be monitored. Companies should seek to better understand the rules and comply more effectively while regulators should better inform companies and more actively enforce the rules, including initially using less formal and cheaper methods of enforcement. Given the lack of government funding for regulators and how this is unlikely to change in the foreseeable future, the most effective method of enhancing and (hopefully) ensuring compliance appears to be academic advocacy research that directly impacts upon policymaking and implementation, such as this thesis.

Resumé

Loot boxes er gambling-lignende produkter i videospil, som spillere kan købe med rigtige penge for at opnå tilfældige belønninger. For det meste får spillere en uønsket belønning og 'taber'. Af og til modtager spilleren en meget eftertragtet præmie. Tilfældighedselementet betyder, at spillere normalt skal foretage gentagne køb og bruge en betydelig sum penge, hvis de ønsker at opnå bestemte belønninger. Mange har hævdet, at loot boxes er at sammenligne med traditionel gambling, både strukturelt og psykologisk. Der er også fundet en sammenhæng mellem at bruge penge på loot boxes og at opleve skader fra ludomani (eller patologisk spillelidenskab), blandt andre risikofaktorer. Den videnskabelige litteratur har brug for mere tid, før den kan give mere definitive svar på spørgsmålet om de potentielle skader ved loot boxes. Disse produkter er imidlertid årsag til bekymring for spillere, forældre, regulatorer og politiske beslutningstagere i kraft af deres lighed med traditionel gambling, kombineret med deres tilgængelighed for både små børn og voksne - uden ordentlig regulering (eller regulering overhovedet). Dette har fået flere lande til at overveje og vedtage regulering for proaktivt at imødekomme problemet. Videospilindustrien har vedtaget visse former for selvregulering, dog med begrænset effekt, for at formilde offentligheden og måske forhindre strengere og mere effektiv regulering. Med udgangspunkt i psykologiske og sociologiske resultater vedrørende de potentielle skadevirkninger ved loot boxes, undersøger denne afhandling potentielle regulatoriske tiltag i forhold til, hvad forskellige lande har gjort eller foreslået at gøre. I overensstemmelse med principperne for åben videnskab analyserer afhandlingen empirisk og gennemsigtigt, hvor godt forskellige tiltag i forskellige lande er blevet implementeret i praksis, dvs. om virksomheder har efterlevet tiltagene. Samlet set viser afhandlingen, at loot box-regulering over hele verden generelt bliver dårligt efterlevet. Reguleringen af loot boxes er ikke overraskende vanskelig i betragtning af den enorme mængde indhold, der skal overvåges. Virksomheder bør søge at forstå reglerne bedre og overholde dem mere effektivt, mens tilsynsmyndigheder bør informere virksomhederne bedre og mere aktivt håndhæve reglerne, herunder i første omgang bruge mindre formelle og billigere håndhævelsesmetoder. I lyset af af manglen på statslig finansiering til regulatorer, og det faktum at dette sandsynligvis ikke vil ændre sig i en overskuelig fremtid, ser den mest effektive metode til at forbedre og (forhåbentligt) sikre compliance ud til at være akademisk fortalervirksomhed (eller aktivisme), der direkte påvirker udviklingen af politik på området og dets implementering, såsom denne afhandling.

Positionality Statement

L.Y.X. plays and enjoys video games and broadly views the activity very positively, except for certain aspects (*e.g.*, monetisation) that he believes should be subject to more scrutiny. In terms of L.Y.X.'s personal engagement with loot boxes, he has played and continues to play video games containing loot boxes, such as *Hearthstone* (Blizzard Entertainment, 2014) until 2018 and *Genshin Impact* (miHoYo, 2020) from 2020 onwards. However, he has never purchased any loot boxes with real-world money aside from negligible spending for research purposes to confirm the presence of paid loot boxes.

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Conflict of Interest Declaration

L.Y.X. has provided paid consultancy for Public Group International Ltd (t/a PUBLIC) (Companies House number: 10608507), commissioned by the UK Department for Culture, Media and Sport (DCMS) to conduct independent research on understanding player experiences of loot box protections, since October 2024. L.Y.X. was employed by LiveMe, then a subsidiary of Cheetah Mobile (NYSE: CMCM), as an in-house counsel intern from July to August 2019 in Beijing, China. L.Y.X. was not involved with the monetisation of video games by Cheetah Mobile or its subsidiaries. L.Y.X. undertook a brief period of voluntary work experience at Wiggin LLP (Solicitors Regulation Authority number: 420659) in London, England, in August 2022. L.Y.X. has contributed to research projects enabled by data access provided by the video game industry, specifically Unity Technologies (NYSE:U) (October 2022 – August 2023). L.Y.X. has been invited to provide advice to the UK Department for Digital, Culture, Media and Sport and its successor (the Department for Culture, Media and Sport; DCMS) on the technical working group for loot boxes and the Video Games Research Framework. L.Y.X. was the (co-)recipient of three Academic Forum for the Study of Gambling (AFSG) postgraduate research support grants (March 2022, January 2023, and July 2024) and a minor exploratory research grant (May 2024) derived from 'regulatory settlements applied for socially responsible purposes' received by the UK Gambling Commission and administered by Gambling Research Exchange Ontario (GREO) and its successor (Greo Evidence Insights; Greo). L.Y.X. accepted funding to publish open-access academic papers from GREO and the AFSG that was received by the UK Gambling Commission as

Dedication

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For all video games players, young and old.

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1. Introduction

Loot boxes are products inside video games that players can purchase to obtain random rewards. These products are widely available, including in video games deemed suitable for young children by age-rating organisations (Zendle, Meyer, et al., 2020). Because this involves spending real-world money and the randomisation of potential outcomes, the public is concerned about the gambling-like nature and potential harms of loot boxes (Drummond & Sauer, 2018). These include overspending that negatively affects other aspects of life; the normalisation of gambling behaviour; the transition into traditional gambling; and the potential development of harmful gambling (Zendle & Cairns, 2018), among other things.

A body of literature investigating those potential harms has emerged in the academic discipline of psychology over the past six years and continues to better inform our understanding of this problem, *e.g.*, through longitudinal perspectives and simultaneously assessing mental health (Brooks & Clark, 2022; Etchells et al., 2022). Despite the emerging nature of the evidence base being generated by the research community, regulators and policymakers in many countries have already started regulating against these mechanics in response to public concerns. What potential regulatory approaches are available and how effectively they have been implemented in practice are questions that have hitherto not been satisfactorily answered. For this reason, I have sought to produce policy-relevant evidence on loot boxes by identifying areas of non-compliance. I have also aimed to positively influence compliance by holding regulators and companies to account.

1.1. Thesis structure

This thesis begins in Section 2 with a literature review of both the academic research on loot boxes emerging from various fields (Section 2.1) and a 2024 update on relevant regulatory developments across the world (Section 2.2). This is done because the literature review sections presented at the start of each peer-reviewed research paper appended to the end of this thesis have inevitably become at least partially outdated owing to the rapid pace at which this field advances in terms of both research and policy. Section 2 seeks to provide an up-to-date overview of both aspects. Section 3 outlines the main research questions I sought to answer along with a brief general description of the legal and empirical research methods employed. Section 4 consists of individual summaries for all nine papers appended hereto,

which collectively represent the original contributions to knowledge I have made over the past three years. This section elaborates on the methods adopted for each paper, then highlights the primary results and conclusions. Section 5 combines and discusses all of the results within the context of other works. These works include those published after a relevant paper that, as a result, could not have discussed them in context. Section 6 concludes with a summary of what we have learned followed by the bibliography, ludography, and all nine appended papers.

2. Literature Review
2.1. Overview of academic (and grey, as needed) literature
Researchers from many different fields have turned their attention to loot boxes. Perspectives have been presented from game studies to examine how loot boxes are designed and implemented in different games. Studies from psychology and sociology have considered how players (both children and adults) interact with loot box mechanics, possibly experiencing negative consequences as a result. Legal scholars have also considered how loot boxes may be regulated in different countries. Importantly, a gap is evident: very little consideration has been given to empirical evaluations of policy implementation, which is the focus of this thesis. The following section synthesises those different perspectives to provide background. Many studies in the field are inter- or multi-disciplinary, which means that they simultaneously involve, for example, both game design and legal perspectives.

In addition to the peer-reviewed literature, this thesis takes into account the so-called 'grey literature' where appropriate and necessary (R. J. Adams et al., 2017). A vast amount of highly pertinent materials for legal and policy research, such as government publications, are not technically peer-reviewed but ought to be considered. In addition, the research area moves so rapidly that failing to account for research I believe to be of sufficient quality (*e.g.*, preprints and working papers) would be failing to present a complete picture and would thereby be misleading. For example, some important data points are not otherwise available.

2.1.1. Game mechanic design: Types of loot boxes and their prevalence
We begin with an exploration of the design aspects of the loot box mechanic as this serves as a good introduction to the topic. Without knowing how they work, how they are implemented, and how often they are implemented, one cannot appreciate

why they might affect people negatively and why at least some regulation is justified.

The two requisite elements of a loot box – or more accurately, an in-game purchase mechanic involving randomisation – are: (i) the involvement of real-world money, and (ii) randomisation. As regards the first element, if the mechanic does not involve the spending of legal tender, then we are not as concerned about it because the potential harms are less obvious: one would not be able to spend large sums of real-world money on a 'free', non-paid loot box and experience harm as a result. As regards the second element, if the mechanic does not involve the randomisation of potential results (meaning that the player knows exactly what they are getting), then again, the mechanic is perceived as less harmful. Indeed, empirical research concluded that this 'combination of financial risk and randomised outcomes is most important when participants consider the potential harm of these activities' (Garrett et al., 2022, pp. 3–4).

2.1.1.1. 'Free', non-paid loot boxes: Potential harms from wasted time
Notwithstanding the above, the potential harms of mechanics that do not satisfy both aforementioned elements should be acknowledged. Both 'free' loot boxes and non-randomised, in-game purchases do pose certain risks.

Although non-paid loot boxes do not cost money, they often cost time to obtain. In some cases, they can be obtained only by taking the time to, for example, defeat monsters again and again (at least according to the game design, *e.g.*, not accounting for money paid to another player to spend their time instead, similar to so-called 'gold farming'; see Tai & Hu, 2018). The player inevitably must spend time doing so, whether or not they enjoy performing the underlying in-game activity; this can represent a particularly repetitive and boring part of the game or be referred to as 'grinding' (Karlsen, 2011, p. 197). In other cases, the same loot box may be either paid for with real-world money or 'grinded for' with time. Players must then decide how much money and time they should respectively spend and attempt to find some balance between the two after considering their current personal circumstances (Woods, 2022). That amount of time they spend grinding for loot boxes through gameplay may be viewed as 'excessive' (Karlsen, 2011) and can negatively impact other aspects of the player's life (Larche et al., 2022, p. 627). This is true regardless of

whether the player's behaviour reaches the level of so-called video game 'addiction' or 'gaming disorder' as defined by the World Health Organization (WHO) (2018, section 6C51), albeit with some controversy (*e.g.*, Aarseth et al., 2016; Király & Demetrovics, 2017). The randomisation of loot boxes and opportunity to obtain rare rewards may encourage players to spend not only more money but also more time; both of these outcomes can occur to a potentially harmful extent (Larche et al., 2022, p. 627).

2.1.1.2. Non-randomised, in-game purchases: Similar potential financial harms
Non-randomised, in-game purchases are also capable of costing players a substantial sum of money and negatively impacting other aspects of their lives, even though there is no element of chance (which could encourage even more spending, making the mechanic more problematic and potentially harmful but not necessarily representing the only cause for players to spend any money at all on the mechanic). In-game purchases in general were debated in game production studies well before the loot box debate began dominating the conversation. Debates have centred around the issues associated with so-called 'microtransactions' and 'free-to-play' games.

In the past, generally speaking, *i.e.*, excluding subscription-based models adopted by, *e.g.*, *World of Warcraft* (Blizzard Entertainment, 2004), games were sold as a product (or more accurately licensed to the player) at a known price. The point of purchase would have been the end of the transactional relationship between the game company and the player. Thereafter, the company would not do anything else for the game (*e.g.*, provide additional content updates), and the player would not need to pay any additional sums (*e.g.*, in exchange for the additional updates).

That was the practical reality decades ago, given the absence of widespread and easy Internet access to provide software updates or receive payment: it would not have been possible for companies to provide the game with additional content other than by releasing a sequel or some other new version of the game as distinct physical product, which would have been separately sold as such. This has been described as the 'game-as-a-product' model. Players know the predetermined price they must pay for the entirety of the experience and would not have opportunities to spend additional money after the initial purchase.

But in more recent years, companies started to offer games in the form of free downloads and instead asked players to spend money on virtual in-game items once they started playing. This represented a new method generating revenue (referred to as the 'free-to-play' or 'F2P' model; see Kati et al., 2014, pp. 1–3) that removed the initial barrier for entry (purchase price of the software) that might have stopped many players from trying the game. As many players as willing are invited to experience the game for free in order for the company to then entice as many of them as possible into spending money. The game is also continually maintained and updated regularly with new content to encourage further purchases. This model has been very successful particularly on mobile platforms, where games requiring an upfront purchase fee to download and play have almost entirely disappeared from the list of highest-grossing games (except for the appearance of *Minecraft* (Mojang Studios, 2011), which is one of the most popular paid games today; Xiao, Henderson, et al., 2023, p. 5).

Indeed, some paid games that had initially adopted the game-as-a-product model, such as *Team Fortress 2* (Valve Corporation, 2007) and *Rocket League* (Psyonix, 2015), converted to a free-to-play model in successful attempts to generate more revenue (Bishop, 2011; Kati et al., 2014, p. 1; Partis, 2021). Even paid games that require an upfront fee to start playing began to offer in-game purchases to generate even more revenue from their player base. This was arguably first witnessed in relation to the infamous horse armour of *The Elder Scrolls IV: Oblivion* (Bethesda, 2006). This was additional paid 'downloadable content' (DLC) sold for US$2.50 (≈DKK 17) (Surette, 2006) that provided players with the option to equip their horse with armour and cosmetically change their appearance (as an aside, user comments responding to the horse armour DLC from nearly two decades ago are still relevant to the loot box debate today; see Macey & Bujić, 2022).

This means that both paid and free-to-play games are equally capable of and often do offer in-game purchases. The transactional relationship between the player and the company is ongoing: there is an expectation that the company will continue to produce new content for the game and, at least in relation to some players, an expectation that they will continue to spend more and more money on the same game as time goes on. Such a model has been referred to as 'game-as-a-service'.

Much criticism of in-game purchases in general is applicable also to loot boxes, which are but a subcategory that involves randomisation. Here, the debate centres on whether it is problematic to generate the vast majority of revenue from a small minority of particularly high-spending players (Kati et al., 2014, p. 7; Zendle, Flick, Deterding, et al., 2023), and whether it is 'unfair' that paying players are given competitive advantages or can obtain exclusive and otherwise unobtainable items (Kati et al., 2014, p. 4). Put another way, a small minority (and not necessarily the richest) is likely to be contributing the vast majority of both loot box and non-loot box in-game purchase revenue (*e.g.*, 5% of players contributed 50% of the total revenue; see Close et al., 2021), and the ability to pay money for power in-game or to get exclusive items (viewed by some as 'predatory') may encourage players to generally make (more) in-game purchases regardless of whether that purchase is a loot box *per se* (Petrovskaya & Zendle, 2021).

So-called 'dark patterns' that might drive monetary spending in unethical manners, for instance designing some gameplay elements to be overly difficult or tedious to encourage players to spend (more) real-world money to skip them (Zagal et al., 2013, pp. 4–5), applies to both in-game purchases and loot boxes. Interestingly, Zagal et al. (2013, p. 4) actually explicitly excluded 'gambling' and 'betting' from categorisation as a dark pattern because they viewed player participation in these areas as supposedly 'informed' and 'complicit'. That position probably reflects a view on gambling participation and associated harms that has since become outdated and would be readily renounced today. Children, in particular, are unlikely to have made informed purchasing decisions in relation to loot boxes, considering how many loot boxes still do not even inform players of their likelihood of winning different items.

Put simply, players can experience financial harm from non-randomised in-game purchases. Many of the same pressures that could be used in relation to loot boxes to encourage more spending could also be used against non-randomised in-game purchases. Therefore, research should not be overly preoccupied with loot boxes and disregard other types of non-randomised in-game purchases (Petrovskaya et al., 2022) or even non-purchase-related engagement mechanics, such as the daily login rewards that Mainland China has considered banning (as briefly mentioned in

Section 2.2.1.1). Nonetheless, in-game purchases without randomisation are viewed as less problematic in ethical terms because the player knows exactly what they will be receiving in return (Neely, 2021, pp. 233–234). Such a purchase is just like any other commercial purchase and would not necessarily trigger concerns around gambling, particularly in relation to children. Hence, the public, regulators, policymakers, and researchers all tend to focus on loot boxes; indeed, this thesis does the same.

2.1.1.3. The 'isolated' and 'embedded' loot box categorisation framework
One helpful method for differentiating between various types of 'random reward mechanisms' in video games (*e.g.*, whether they require payment of real-world money to participate) was proposed by Nielsen and Grabarczyk (2019). There are technically three elements to all of these mechanics but, importantly, it is assumed that all relevant mechanics are randomised (the so-called 'random procedure'). So, only two further elements need be considered: (i) whether engagement with or activation of the mechanic (the so-called 'eligibility condition') requires real-world money, and (ii) whether the rewards obtained (the so-called 'reward' element) can be converted into and are worth real-world money (Nielsen & Grabarczyk, 2019, pp. 174–175).

When real-world money is involved for either element, that element is described as 'embedded' in the real-world economy. When real-world money is not involved, that element is described as 'isolated' from the real-world economy (Nielsen & Grabarczyk, 2019, pp. 194–197). To illustrate, a paid loot box requiring payment of real-world money to open would be 'embedded' in terms of the first eligibility condition. In contrast, free, non-paid loot boxes would be 'isolated' for the purposes of that first element. A mechanic that offers rewards that can be converted into real-world money and therefore possesses real-world monetary value would be 'embedded' as to the reward element, while those that cannot be converted would be 'isolated' for the second element. There are therefore four categories of loot boxes as per Nielsen and Grabarczyk (2019), as set out in Table 1.

Table 1
Four categories of loot boxes as per Nielsen and Grabarczyk (2019), adapted from relevant sections of Paper 1 (Xiao, Henderson, Nielsen, et al., 2022, pp. 163–165)

Category	Costs real-world money to engage?	Provides rewards possessing real-world monetary value?
Isolated–isolated	No	No
Isolated–embedded	No	Yes
Embedded–isolated	Yes	No
Embedded–embedded	Yes	Yes

Nielsen and Grabarczyk (2019, pp. 193–194) acknowledged that some rewards intended by game designers to be 'isolated' may actually become 'embedded' through player action (*e.g.*, transgressively selling in-game items in exchange for real-world money despite game rules prohibiting doing so). The boundaries between each category can thus shift depending on practice, as I have noted elsewhere (see Xiao, 2022c, pp. 449–450). Notwithstanding, this framework is useful for quickly identifying that isolated–isolated and isolated–embedded loot boxes (both of which would constitute free, non-paid loot boxes as described above) are generally not relevant for further discussion owing to the fact that neither involves the payment of real-world money to activate.

The framework further distinguishes loot boxes whose rewards either possess or do not possess real-world monetary value. As detailed below in Sections 4.3 and 4.4 discussing Papers 3 and 4, respectively, this distinction is particularly relevant for regulatory purposes because embedded–embedded loot boxes fall afoul of gambling regulation in most countries across the world (Xiao & Henderson, 2024). In contrast, embedded–isolated loot boxes do so only in very few places – Belgium is a prominent example (Xiao, 2023b).

2.1.1.4. Numerous other variations in loot box design
Unsurprisingly, there are many other aspects by which loot box design can differ. After examining 141 games, Ballou et al. (2022) comprehensively identified 32 features by which the loot boxes of different games might differ categorically. These included more well-known aspects, such as how the loot boxes of some games, *e.g.*, *Overwatch* (Blizzard Entertainment, 2016), offer rewards that are purely cosmetic; merely change the visual appearance of in-game objects; and do not confer competitive advantages. The loot box rewards of other games, *e.g.*, *Hearthstone* (Blizzard Entertainment, 2014), grant competitive advantages to players who buy and open more of them (Ballou et al., 2022, p. 8). More obscure design differences

include how different games handle duplicate rewards for which the player already possesses at least one copy. Some games do not allow this to happen at all, while other games give replacement rewards of various types or even encourage players to obtain duplicate rewards to enhance the in-game abilities of their existing copy (Ballou et al., 2022, p. 6).

Sato et al. (2024, p. 1) conducted a similar exercise (with fewer categories) but additionally compared the loot box designs of different regions with each other, concluding that loot box designs in Japan are more similar to each other owing to a relatively longer history of implementation, greater social acceptance of the mechanics, and supposedly 'robust industry-initiated self-regulation'. One finding for policy highlighted by Sato et al. (2024) is that nearly all Japanese and Chinese loot boxes disclose the probabilities of obtaining different rewards, while less than two-thirds of European and US loot boxes did so (pp. 7, 11). The disparity indicated that beyond aesthetic and commercial game design choices, regulation could also affect loot box design as the Japanese industry self-regulates by requiring probability disclosures (NHN Japan 株式会社 [NHN Japan Corporation] et al., 2012).

China, too, requires disclosure of probabilities but by law rather than through industry self-regulation, as discussed in Section 2.2.1.2. Indeed, a previous study from my own team analysed loot box design from a regulatory compliance perspective (representing the first empirical work to combine legal and game design perspectives). We found that besides the presence/absence of loot box probabilities, Chinese games also varied in terms of where probability disclosures were made and how accessible they were: most games with loot boxes failed to make visually prominent and easily accessible probability disclosures (Xiao, Henderson, et al., 2024).

2.1.1.5. 'Loot boxes' as shorthand inclusive of gacha mechanics and social casinos
Whether policymakers or parents, a stakeholder may decide that a certain aspect identified by Ballou et al. (2022) or Sato et al. (2024), for instance, is problematic. They may then decide to regulate or restrict their child's access to a certain randomised mechanic in video games on that basis. To illustrate, Australia has determined that the association of a traditional gambling motif (*e.g.*, of real-life casinos) with an interactable random reward mechanism should be regulated

regardless of whether the player is actually at risk of losing real-world money, as detailed in Section 2.2.3.2. Such choices are at the discretion of the relevant decision-makers. But for the purposes of this thesis, a 'loot box' is defined as a random reward mechanism that satisfies the two requisite elements of (i) the involvement of real-world money and (ii) randomisation, as set out in Section 2.1.1. Unless otherwise specified, 'loot box' henceforth means a mechanic satisfying this definition.

It should also be noted that the term 'loot boxes' is used as shorthand to describe a variety of different mechanics satisfying those two criteria that may not be referred to as 'loot boxes' *per se* (Xiao, 2022b; Xiao et al., 2021). This includes the so-called 'gacha' mechanics implemented in East Asian games, *e.g.*, *Genshin Impact* (miHoYo, 2020), that allow players to spend real-world money on so-called 'summoning banners' to obtain random rewards (Blom, 2023; Woods, 2022). The mechanic operates on the same principles except that visually, no 'box' is opened to reveal random prizes following payment. Loot boxes that are obtained for free but can be opened for random rewards only if the player buys a key with real-world money are also covered, *e.g.*, as implemented in *Counter-Strike 2* (Valve Corporation, 2023) and its predecessor *Counter-Strike: Global Offensive* (Valve Corporation, 2012) (Thorhauge & Nielsen, 2021, p. 59).

Similarly, the definition encompasses so-called simulated gambling or social casino games that allow players to spend real-world money to buy virtual in-game currency in order to participate in traditional gambling activities, such as playing on slot machines, *e.g.*, *Big Fish Casino* (Big Fish Games, 2011), or playing poker, *e.g.*, *Zynga Poker* (Zynga, 2010) and blackjack, *e.g.*, *Blackjackist* (KamaGames, 2015), but that do not allow players to convert any in-game currency back into real-world money even if the player wins (Derevensky & Gainsbury, 2016; Gainsbury et al., 2014). There is debate in the literature (here I mean that my team disagreed with the team led by David Zendle) as to whether it is appropriate to count social casino mechanics as loot boxes when reporting the prevalence of loot boxes (Xiao, Henderson, & Newall, 2022; cf. Zendle et al., 2022).

Regardless, people have experienced significant financial and personal harm from social casino games considerably above and beyond even the worst reported cases of

harm from loot boxes (Butler, 2022; Lohberger, 2021; MacDonald, 2021). All would agree that social casino games involving real-world money are likely to be significantly more harmful and deserving of even stricter regulation because of the combination of randomised in-game purchases and traditional gambling motifs (Zendle, Flick, Deterding, et al., 2023), as applied in Australia and detailed in Section 2.2.3. Any regulation that applies to loot boxes will by definition apply to social casino mechanics simply because the latter may be described as loot boxes with traditional gambling aesthetics. For relevant regulatory purposes, then, it is justified to count social casino mechanics as loot boxes, and this thesis proceeds on that established basis.

2.1.1.6. Prevalence of loot boxes among popular games

Many have sought to measure the popularity of loot boxes. A number of different measures are available: (i) the prevalence of the mechanic among the highest-grossing games; (ii) the amount of money generated from these mechanics; and (iii) the rate of engagement among players. These are discussed in turn.

Many studies have sought to evaluate prevalence, and their results are shown in Table 2. My team and I aimed at evaluating the situation in many different countries to inform this global debate, as loot boxes are implemented in video games regardless of geographic location. To summarise, the prevalence rate of loot boxes in Western countries appears to have steadily (as we have intervening datapoints) risen from around 60% in 2019 to about 85% in 2024.

A previous study by Zendle, Meyer, et al. (2020) was known to have underestimated prevalence owing to methodological differences as well as failure to detect some loot boxes (Xiao, Henderson, & Newall, 2022; cf. Zendle et al., 2022). Nonetheless, this increase is at least in part caused by a substantive increase in the prevalence of loot boxes: the mechanics are being implemented more widely, as at least one game, *i.e.*, *Game of Thrones: Conquest* (Warner Bros. Games, 2017), is known to have started implementing loot boxes after the conclusion of data collection for Zendle, Meyer, et al. (2020) (The GOT Conquest Team, 2020). Another noteworthy aspect is that loot box prevalence and probability disclosure compliance in Far East Asia (specifically, Mainland China and South Korea) is higher than in Western European countries. This supports the assertion of Sato et al. (2024) that loot box implementation may be

affected by variations in culture and lends credence to the recommendation that regional game studies should be encouraged (Liboriussen & Martin, 2016).

Limitations that should be highlighted include:

(i)   the absence of studies of certain important regions whose video game market is rapidly growing, such as Southeast Asia (*e.g.*, Indonesia and Malaysia; see Batchelor, 2024), the Middle East and North Africa (*e.g.*, Saudi Arabia and Egypt; see McEvoy, 2024b), and South America (*e.g.*, Brazil; see Dealessandri, 2024);

(ii)   a preoccupation with examining the iPhone platform, which has produced comparable data but has also meant that other platforms (*e.g.*, personal computers and home consoles) are largely unaccounted for;

(iii)   an exclusive focus on the loot box experience during the early stages of gameplay (*e.g.*, the first hour) for the 50 or 100 highest-grossing games, which may be justified owing to limited research resources but may have also disregarded important mechanics encountered later in gameplay;

(iv)   the fact that my team has conducted all recent studies, and involvement from other teams adopting different methodologies would make the findings more robust.

Table 2

*Loot box prevalence studies (*n = 8*), updated with published 2024 data (Xiao, 2024e)*

Study	Date of data collection	Platform	Region	Prevalence rate (%)	Probability disclosure rate
Zendle et al. (2020)	Feb 2019	iPhone	UK	59.0	Unknown
~	~	Android	~	58.0	Unknown
~	~	Steam	~	36.0	Unknown
Rockloff et al. (2020)	Aug – Oct 2019	Various	Australia	62.0	Unknown
Xiao et al. (2024)	Jun 2020	iPhone	Mainland China	91.0	95.6%
Xiao et al. (2023)	Jun 2021	iPhone	UK	77.0	64.0%
Xiao (2023b)	Jun 2022	iPhone	Belgium	82.0	Unknown
Xiao (2024e)	Jan – Mar 2024	iPhone	Mainland China	97.0	96.9%
Xiao & Park (2024)	Mar – Apr 2024	iPhone	South Korea	90.0	84.4%
Xiao (2024a)	Apr 2024	iPhone	Netherlands	86.0	34.9%

2.1.1.7. Monetary spending on loot boxes: Industry-wide and individual

Accurate data for total spending on loot boxes are unavailable. A report from an analytics firm (whose methodologies have not been disclosed) claimed that global loot box spending was estimated at US$15 billion (≈DKK 103 billion) in 2020, and

expected to rise and exceed US$20 billion (≈DKK 137 billion) by 2025 (Juniper Research et al., 2021). It is difficult to justify reliance on such data. For a better alternative, the popular football simulation games produced annually by Electronic Arts (previously, the *FIFA* series and now, the *EA Sports FC* series) require the player to purchase a copy of the software; they also sell optional in-game purchases and loot boxes. Other games offered by Electronic Arts, such as the *Madden NFL* series, also monetise in both ways. In its financial report, the company stated that loot box revenue represented 29% of their total revenue for fiscal year 2021 (1 April 2020 – 31 March 2021) (Electronic Arts, 2021, Appendix 1, p. 4). When duly calculated, the company made US$1.6 billion (≈DKK 11 billion) that year from loot boxes in the various games within its portfolio (Xiao & Declerck, 2023).

Such data are much more reliable as Electronic Arts is expected to provide accurate information in its disclosures to shareholders. Notably, the reports for fiscal year 2022 onwards stopped specifically sharing data on loot box spending (*e.g.,* Electronic Arts, 2022, 2024), although they do state that 'live services and other net revenue' (which includes, *inter alia*, microtransactions, licensing activities, subscriptions, advertising; see Electronic Arts, 2024, Appendix 1, p. 26) represented 73% of net revenue in fiscal year 2024, for example (Electronic Arts, 2024, Appendix 1, p. 3). This far outweighs the sale of either digital downloads or physical copies of game titles, which represented just 27% of net revenue (Electronic Arts, 2024, Appendix 1, p. 26).

It is not just one company that has reported making over US$1.6 billion annually from loot boxes. Very popular games on mobile platforms whose main monetisation method is the sale of loot boxes, such as *Genshin Impact*, have reportedly generated over US$6.3 billion in four years from mobile platforms alone (Astle, 2024). (*Genshin Impact* is also available on other hardware platforms, such as consoles and personal computers, and the previously quoted figure for mobile revenue does not account for spending on those other platforms.) A significant sum of money is thus undoubtedly spent on loot boxes by many players around the world and across a diverse range of games.

The media has highlighted relatively extreme cases of individual spending on loot boxes, such as one player who reported spending £700 (≈DKK 6,250) in a month

(Thomas & Young, 2019, p. 700) and another who spent over US$10,000 (≈DKK 68,450) in the *FIFA* football simulation series, as evidenced by data provided by the game company on demand from the player (Yin-Poole, 2018). In particular, many young people have used their parents' money (often through a pre-authorised payment card bound to a device) without permission to purchase loot boxes, such as one Singaporean daughter who used her father's card 89 times to spend about SG$20,000 (≈DKK 104,600) on *Genshin Impact* (Chia, 2022). Emerging young adults seem particularly vulnerable as they gain financial independence for the first time (Felicity & Andrews, 2020). Cases of extreme spending on simulated gambling in social casino games are even more concerning than those of loot box spending: over a three-and-a-half year period, one Australian player, since diagnosed with gambling disorder, stole AU$940,000 (≈DKK 4.3 million) from her employer to play *Heart of Vegas* (Aristocrat Leisure, 2015), a simulated slots game (Butler, 2022; Lohberger, 2021; MacDonald, 2021).

2.1.1.8. Participation in loot box purchasing

Different sources have sought to measure the participation or engagement rate of loot boxes. However, loot boxes are often bought through an in-game virtual currency rather than directly with real-world money (Sato et al. 2024, p. 7). Virtual currency obtained through payment is often mixed together with virtual currency obtained through gameplay without payment, then both are used together to purchase loot boxes (*e.g.*, the 'Primogems' in *Genshin Impact*). This makes it difficult to phrase survey questions in a manner that accounts for all monetary spending while also focuses exclusively on engagement with paid loot boxes. Depending on the phrasing of survey questions, the results can either underestimate or overestimate participation/engagement rates. In fact, aside from player data obtained directly from the game company through a data access request (see Yin-Poole, 2018), any self-reported data on loot box spending is inaccurate to a certain degree.

Based on research conducted by Ipsos, a leading market research firm, the UK Gambling Commission (2022, 2023), which is the national gambling regulator, has reported that over 20% of 11- to 16-year-olds 'paid' to open loot boxes with 'money or virtual currency'. However, this percentage may have been an overestimate because it also accounted for payments with earned (rather than exclusively paid)

virtual currency. A survey conducted in Northern Ireland whose question was better phrased revealed that 21.4% of 11- to 16-year-olds 'paid money to open loot boxes/packs/chests' (Department for Communities, 2023), which suggests that differences in phrasing did not significantly impact the survey results. At the same time, the average participation rate among the whole sample is somewhat misleading when viewed in isolation: the purchase rate of 15- to 16-year-olds (24.7%) was nearly double that of 11- to 12-year-olds (13.9%); and the rate for boys (33.2%) was more than triple that of girls (9.5%) (Department for Communities, 2023).

In Denmark, about 20% of 12- to 16-year-olds reported buying loot boxes or keys to unlock loot boxes in an academic study, which also found stark differences between engagement by boys (32.9%) and girls (3.5%) (Kristiansen & Severin, 2019, p. 3). Although girls may be participating less, I am concerned about whether they might have been underreporting their participation because they engaged instead with, for example, gacha mechanics that are not called 'loot boxes' *per se* and thus did not identify themselves in the surveys as having engaged with loot boxes even though they still spent money on a gambling-like mechanic that the public is concerned about.

In contrast, another study also by Ipsos commissioned by the European video game industry trade body reported that only 3.8% of 11- to 64-year-olds spent real-world money to buy loot boxes (Video Games Europe, 2023, p. 13). The UK Gambling Commission and Northern Irish studies focused on children, while the Video Games Europe study did not break down the participation rate by age group (and refused to do so upon my personal request). However, they did report a separate survey that found that 23% of parents reported their child as having spent money on in-game purchases offering 'unknown rewards' (*e.g.*, loot boxes; see Video Games Europe, 2023, p. 5).

The Spanish gambling regulator's gambling prevalence study on people over the age of 15 years (and, importantly, not younger children), which also asked whether they spent money on loot boxes in video games, sheds some light on this matter: 15- to 17-year-olds reported a purchase rate of 23.7%; 18- to 25-year-olds reported 13.8%; 26- to 35-year-olds reported 5.6%; 36- to 45-year-olds reported 2.8%; 46- to 55-year-olds reported 1.6%; 56- to 65-year-olds reported 0.3%; and people older than 65 years

reported 0.4% (although caution was urged when interpreting this last datapoint; see Dirección General de Ordenación del Juego [Directorate General for the Regulation of Gambling], 2023, p. 25). These data suggest that significantly more younger people than older people are purchasing loot boxes, although nothing is known about children below the age of 15 years.

However, I am concerned that older people (as with girls in the surveys discussed above) responding to the survey question may have failed to fully appreciate the meaning of the Spanish word for loot boxes, *cajas botín*. They may not have understood the term at all (very possible for a 65-year-old respondent, for example) and even if they did understand the term, they may have applied a limited definition for the word that did not include, for example, gacha mechanics or, more relevantly for older people, social casino games and certain less obvious, paid randomised mechanics in games such as *Project Makeover* (Magic Tavern, 2020), *Matchington Mansion* (Magic Tavern, 2017), *Merge Mansion* (Metacore Games, 2020), and *Gardenscapes* (Playrix, 2016) that are more popular with older people and women in particular (Alha, 2024, pp. 117, 140).

Overall, the aforementioned studies suggest that about 20% of *all* children and young adults are purchasing loot boxes, and that the participation rate among older adults is significantly lower (less than 10%) (Montiel et al., 2022, pp. 15–16). Still, older adults probably have more money to spend and may have significantly underreported their participation just as they might underreport being a 'video game player' despite regularly enjoying 'casual' games on their phone, such as *Candy Crush Saga* (King, 2012) (Juul, 2009; Nieborg, 2015). Indeed, academic studies have reported high loot box purchase rates of between 40% and 60% among all adult video game players (Brooks & Clark, 2019, p. 28; Li et al., 2019, p. 30; Xiao, Fraser, et al., 2024, p. 5). There are also valid concerns as to whether some demographics (girls, women, and older people) are underreporting their participation owing to insufficiently inclusive survey questions.

Further, most data came from Western, and indeed English-speaking, countries. A few studies have examined Chinese mainlanders (Xiao, Fraser, et al., 2023, 2024), Hong Kongers (Tang et al., 2022), and Pasifika New Zealanders (Gentles et al., 2022). Given that loot boxes are implemented worldwide, non-'WEIRD' (Western,

Educated, Industrialised, Rich, and Democratic) studies on participation, such as product prevalence studies, should be conducted (see Ghai, 2021; Henrich et al., 2010), *e.g.*, in Southeast Asia, the Middle East/North African region, and South America.

As with spending data, it is difficult to get accurate participation data because both ultimately rely on people accurately and consistently reporting the same underlying behaviour. The latter deals with absence/presence (for which underreporting is more likely), while the former deals with extent (which might be inaccurate in either direction). Nonetheless, we now have some evidence: a non-insignificant minority of young people in general and perhaps one-third of some demographics (older boys and young adult men) are buying loot boxes with real-world money.

2.1.2. Psychological and sociological perspectives on loot box use
2.1.2.1. The psychological definition of 'gambling'

The widely accepted psychological 'definition' for gambling set out by Griffiths (1995) has five constituent elements: a (i) it must be voluntary; (ii) it involves the exchange of money or something of value; (iii) it is determined by a future event with unknown results; (iv) those results are based (partially) on random chance, wherein (v) the winner gains at the sole expense of the loser (pp. 1–2). Drummond and Sauer (2018) applied this definition to various video game loot boxes in popular video games and, after finding examples that satisfied all five criteria (as reformulated by them), argued that loot boxes are gambling-like.

Drummond and Sauer (2018) notably amended the fifth element of the Griffiths definition because they viewed the loot box-purchasing player and other players of the game as the two relevant parties to the gamble that could potentially either win or lose from the transaction. In what they admitted to be a 'relatively conservative approach', Drummond and Sauer (2018) classified only loot boxes that offered purchasing players a 'competitive advantage' over other players as satisfying the fifth element and constituting 'gambling' (p. 531).

I have argued elsewhere that a more sensible approach would be to instead view the gamble as occurring between the loot box-purchasing player and the video game company selling the loot box (Xiao, 2021a): specifically, the player wins by obtaining

a rare item quickly (*i.e.*, needing to purchase and open very few loot boxes) and thus spends less money in the long run, whereas the company wins when the rare item is obtained after many loot box purchases and openings, thus requiring the player to have spent more money in total (p. 2356). Drummond and Sauer (2018) concluded that 10 of the 22 games (45.5%) they examined had loot boxes that constituted 'gambling' (p. 532). But when we revert this unjustified replacement of Griffith's fifth element with 'competitive advantage' by Drummond and Sauer (2018), we find that the loot boxes from 17 of 22 games (77.3%) would have satisfied the 'gambling' definition.

Later research, including additional work by Drummond and Sauer, all applied a definition for loot boxes that did not require providing players with a competitive advantage as an essential criterion when measuring product prevalence (*e.g.*, Xiao, Henderson, et al., 2024; Zendle, Meyer, et al., 2020) and asking players about their loot box spending (*e.g.*, Drummond, Sauer, Ferguson, et al., 2020; Etchells et al., 2022; Zendle & Cairns, 2018). It would no longer be in dispute that paid loot boxes offering cosmetic rewards are psychologically akin to gambling.

Indeed, applying the Griffiths criteria to the loot box definition set out in Section 2.1.1, one can see that they are effectively equivalent. The voluntary nature, *i.e.*, element (i) is assumed in all cases: purchasing loot boxes is an optional activity that players may or may not choose to participate in. Requiring the involvement of real-world money (specifically, the player paying the game company) satisfies elements (ii) and (v), and requiring randomisation (which always occurs following payment) satisfies elements (iii) and (iv). The two-element approach presented herein is a simpler way of putting the same concepts. The 'free', non-paid loot boxes discussed in Section 2.1.1.1 do not satisfy elements (ii) and (v), and non-randomised in-game purchases discussed under Section 2.1.1.2 do not satisfy elements (iii) and (iv). Accordingly, neither is fully psychologically akin to gambling the way that paid loot boxes are. Both are therefore justifiably disregarded for the present purposes in order to limit the ambition of this thesis.

2.1.2.2. Qualitative studies on loot box experiences

The subsections under Section 2.1.2 generally deal with quantitative studies. However, it is important to also acknowledge the importance of qualitative and

other studies on loot boxes as many of these are informative about, for example, why people purchase loot boxes (*i.e.*, motivations), and they can better our understanding of player experiences – in addition to those of other stakeholders, such as parents of child players who purchase loot boxes. This is especially true in relation to individuals experiencing harm.

In terms of motivations for purchasing loot boxes, a great variety of factors were identified by Nicklin et al. (2021). This included, first, that the loot box opening experience is exciting. Second, the contents of loot boxes are valuable: rare loot box rewards may have financial value, and it is possible to gain financially from loot boxes. Certain loot box rewards are aesthetically pleasing, desirable, and therefore subjectively valued highly by some players. Furthermore, certain loot box rewards are functionally useful and can benefit one's competitiveness in gameplay; they are thus valued by some players. Third, engaging with loot boxes helps with gameplay beyond providing competitive advantages. Players can pay money to skip having to wait or grind, as discussed in Section 2.1.1.1 (the need to balance spending either time or money to gain more loot boxes was echoed; see Woods, 2022). Some players also stated that they wanted to financially support game developers and invest in the game. If done to a reasonable extent, this is a socially positive behaviour and certainly not a cause for concern. Other social factors were also mentioned, such as being influenced by the prestige that rare loot box items bring in player communities and being influenced by friends, other players, streamers, and professional gamers to buy loot boxes. Players also expressed how loot box openings could be a social experience for which a group would gather to share in each other's company.

Emotionally, players reported feeling impulsive towards (and losing control over) loot box purchases and using this activity as a form of escapism (Nicklin et al., 2021). The so-called 'fear of missing out' or FOMO was frequently cited as a driver for loot box engagement (Hodkinson, 2019). Players did not want to feel left out of social events either online or in-person, and companies design their commercial products to create potential FOMO. Specifically, certain loot box rewards might be available for only a limited amount of time or at a discount for a brief period. Players are tempted by these offers, and that temptation is often triggered by seeing online advertisements for either the game or loot boxes. Companies also make loot box purchases very easy by allowing players to store their card payment details and buy

with 'one-click', thus reducing the friction and time spent on making purchasing decisions. This deprives players of a delay during which they might reconsider their arguably 'impulsive' decisions (Newall et al., 2022). Children can also more easily make purchases that are not authorised by their parents using previously saved payment details.

The participants of the study by Hodge et al. (2022) recounted many of the same aforementioned feelings towards loot boxes. In addition, players were asked to reflect on their perception of loot boxes as a type of gambling. Many found multiple parallels between the two activities, including that both could be financially damaging. They reported that 'the house always wins' (suggesting that players and gamblers will always lose financially, and game companies and gambling providers will always benefit financially). Indeed, that the house always wins is even truer for video game companies than gambling provider. This is because traditional gambling is a zero-sum game, as reflected in one specific aspect of element (v) of the Griffiths definition ('the winner gains at the *sole* expense of the loser'; emphasis added). For either party to win at gambling, the other must lose. Something of value (*e.g.*, money) must change hands. However, the loot box transaction is not a zero-sum game (Xiao & Newall, 2022): the video game company generates revenue and thereby 'wins' irrespective of what the player obtains as long as they purchase loot boxes because, although the player may or may not gain something of value, the company technically never loses something of value through this transaction because they can reproduce the in-game item of value infinitely at little to no cost. It has been argued above that the game company might 'lose' when they earn less money. However, even earning less money is earning money and may represent a 'win'. Hodge et al. (2022) found that both activities caused participants to feel the same excitement, and both generally felt similar if not identical.

As regards the impact of loot boxes on family life, Mills et al. (2023) reported that children were able to express both what they liked and disliked about loot boxes. For example, they enjoyed feeling excited about opening loot boxes, but they also sometimes experienced 'anger, disappointment, regret, and shame' from their purchases. The latter is concerning from a child protection perspective. Interestingly, but unsurprisingly, some children had a better understanding of video game and loot boxes than their parents and even the researchers, and were entrepreneurially

intending to profit from selling loot boxes they possessed. Other children did not understand complex loot box systems and failed to keep track of their spending.

The parental perspective is also insightful, expressing, *inter alia*, that older generations valued physical objects and other 'traditional' material wants (Mills et al., 2023). However, at least some in the younger generation valued video game 'skins' (or virtual costumes for in-game characters) more. Many parents did not agree with the high value that children attached to digital items, but expressed understanding of shifting generational trends. In short, this new phenomenon gives rise to some concerns and is having an impact on the experiences of children and parents. This is not dissimilar to other novel developments in years past that gave rise to so-called 'moral panics' (*e.g.*, the radio and the television; see Orben, 2020).

In another study by Mills et al. (2024) that discussed parental practices in more detail, parents reported being worried about the normalisation of gambling through loot boxes and having discussions between each other about the potential harms of video games. For example, seasonal and limited-time offers not only affect child players but also place pressure on parents who are ultimately asked to foot the bill for the purchase. Parents and researchers would all benefit from listening more to children, trying to understand better, and taking their perspectives into account.

Many other perspectives have also been shared, including how the use of football cultural history to sell loot boxes in the *FIFA* series, particularly to children, is morally problematic (Heffernan, 2024). User comments discussing loot boxes have also been used to generate insights by Macey and Bujić (2022). These included not just how some players found loot boxes to be problematic, but also how others found them to have been entirely optional and not disagreeable. This extended to how players perceive potential regulation, with some viewing strict regulation (*e.g.*, a ban) as an infringement of their freedom because they would be 'penalised' for what they described as 'a tiny minority' that 'lacks […] self-control' (Macey & Bujić, 2022, p. 212). Others commented on how some politicians lack knowledge of video games but would seek to propose regulations because expressing concern about the loot box issue is 'fashionable' and may be politically beneficial – but without actually helping to resolve the problem for players. Players also expressed concerns as to what worse forms of monetisation might follow as replacements if loot boxes were

forcibly removed through regulation. Finally and interestingly, players drew attention to how physical card packs offering random rewards have been permitted for many decades while loot boxes are disproportionately subject to scrutiny (Mattinen et al., 2023). This could be justified in that card packs are less strongly correlated with problem gambling than loot boxes (Xiao, Zendle, et al., 2024; Zendle et al., 2021), as discussed immediately below. It is recognised that the usage of 'problem' or 'disordered' gambling may be stigmatising (see Biggar & Wardle, 2024; Horch & Hodgins, 2008). The present use merely seeks to reflect the previous literature's established usage for the sake of continuity.

2.1.2.3. The link between loot box spending and problem gambling

The first study to examine the player experience of loot boxes from a psychological perspective was Zendle and Cairns (2018). Through a cross-sectional survey, the researchers found a positive correlation between spending on loot boxes and problem gambling. People whose gambling problems were more severe spent more money on loot boxes on average, with so-called 'problem gamblers' (or people who experienced the most severe gambling problems) spending the most on loot boxes.

This relationship can be interpreted in multiple ways, including that (i) purchasing loot boxes is causing people to develop gambling problems, and (ii) people with pre-existing gambling problems developed elsewhere are spending more money than others on loot boxes. Owing to the cross-sectional nature of the survey, the results cannot prove causality in either direction. Indeed, causation in both directions could also be occurring simultaneously as they are not contradictory. Regardless, a potentially vulnerable group of consumers (people experiencing gambling problems) are spending more money on loot boxes. This is cause for concern as regards whether the profitmaking is ethical, given that loot box sales are generally not regulated in law as gambling and thus do not require providers to take certain measures to monitor and protect their customers. In contrast, traditional gambling providers are required to actively prevent vulnerable people, including children and people 'self-excluded' from future gambling participation, from gambling (*e.g.*, UK Gambling Commission, 2024).

Many further studies consistently and reliably replicated the results of Zendle and Cairns (2018). The same correlation was found when participants did not know that

the study was about loot boxes and gambling (Zendle & Cairns, 2019), and it was repeatedly successfully replicated both generally (Etchells et al., 2022; Li et al., 2019; Macey & Hamari, 2019) and more specifically among adolescents (Kristiansen & Severin, 2019; Wardle & Zendle, 2021; Zendle, Meyer, et al., 2019), during the COVID-19 pandemic (L. C. Hall et al., 2021), and in distinct national samples, *e.g.*, Denmark (Kristiansen & Severin, 2019), Germany (von Meduna et al., 2020), Spain (González-Cabrera et al., 2022), the United Kingdom (Close et al., 2023; Zendle, 2020), Canada (Brooks & Clark, 2019), the United States (Drummond, Sauer, Ferguson, et al., 2020), Australia (Drummond, Sauer, Ferguson, et al., 2020; Hing et al., 2022), Aotearoa New Zealand (Drummond, Sauer, Ferguson, et al., 2020), and Mainland China (Xiao, Fraser, et al., 2024). There were a few failed replications, probably as a result of the study having been underpowered (*e.g.*, Gentles et al., 2022; Xiao, Fraser, et al., 2023). The correlation has also since been confirmed in a secondary analysis (Close et al., 2021) and two meta-analyses (Garea et al., 2021; Spicer, Nicklin, et al., 2022). Its strength is estimated to be $r = 0.26$ or $r = 0.27$, which is decently stronger than $r = 0.1$ and even $r = 0.2$ and means that its effect size is generally recognised as strong enough to be practically relevant in the media effect context (Ferguson, 2009, p. 533, 2023, p. 3).

Other noteworthy studies also examined, *inter alia*, whether different variations in loot box implementation, *e.g.*, some of the differences identified in Ballou et al. (2022) as described above in Section 2.1.1.4, were more strongly correlated with problem gambling (*e.g.*, loot boxes whose rewards can be converted into real-world money or 'cashed out'; loot boxes that are indirectly purchased with an in-game currency that is in turn purchased with real-world money compared with those bought directly with cash; and loot boxes offering players competitive advantages rather than purely cosmetic rewards). They found that the presence of those individual features did not significantly strengthen the relationship between loot box spending and problem gambling, although some practically irrelevant weak strengthening was observed in certain cases (Zendle, Cairns, et al., 2019). Another study used the removal of loot boxes from *Heroes of the Storm* (Blizzard Entertainment, 2014) to examine whether players spent less money after the event. It found that only problem gamblers spent less money following the removal, thus suggesting that these players did not excessively spend on non-randomised in-game purchases in general and did so only on loot boxes specifically (Zendle, 2019).

This provides more support for the specific regulation of loot boxes compared with that of non-randomised, in-game purchases in general. In contrast, Etchells et al. (2022) found the usual practically significant correlation between loot box spending and problem gambling (Kendall's $\tau = 0.2$), but the researchers also found very weak (and arguably negligible, *i.e.*, below $\tau = 0.1$) correlations between non-randomised video game spending and problem gambling (Kendall's $\tau = 0.07$) as well as between non-randomised non-video game digital spending and problem gambling (Kendall's $\tau = 0.07$) (p. 8). Etchells et al. (2022) interpreted the findings as suggesting that problem gamblers may be experiencing general impulse-control issues in relation to all types of spending regardless of the randomised nature of any purchase, thus bringing into question whether loot boxes actually carry unique risks (pp. 10–11). However, given the very small effect sizes of these final two correlations (*i.e.*, below $\tau = 0.1$), it is debatable whether that interpretation could have been confidently made. Loot box spending is more strongly correlated with problem gambling than either of the other two non-randomised types of spending is correlated with problem gambling, and only the correlation involving loot box spending is arguably strong enough to be practically meaningful,

2.1.2.3.1. Comments on the quality of psychology loot box research

Previous research on video games, and specifically video game addiction, has reportedly engaged in certain questionable research practices, such as the modification of existing scales without a sufficiently prominent disclosure and the misrepresentation of the amended construct (Flake & Fried, 2020, pp. 462–463); using different cut-off scores for the same construct (D. L. King et al., 2013, p. 339); and not robustly removing nuisance or mischievous responses (Przybylski, 2016).

For an example of good practice, there are at least two methods for categorising or applying cut-off scores for the Problem Gambling Severity Index (PGSI). The index itself is a series of questions (*e.g.,* 'when you gambled, did you go back another day to try to win back the money you lost?') that many loot box studies have used to measure problem gambling (Ferris & Wynne, 2001). The newer, revised categorisation of the summative PGSI score has demonstrably improved upon the original (Currie et al., 2013), and many studies duly disclosed and made clear that they used the revised cut-offs (*e.g.,* Brooks & Clark, 2019, p. 29; Drummond, Sauer,

Ferguson, et al., 2020, p. 8; Zendle & Cairns, 2019, p. 4). At least one other study detailed using the original cut-offs instead (cf. Etchells et al., 2022, p. 5). Clear disclosure is appreciated.

For an example of debatable practice, the original Zendle and Cairns study (2018) included multiple participants who put down a transphobic reference as their gender, which Zendle and Cairns merely 'cleaned' during data processing to become 'Other'; the researchers did not reflect further as to whether the exclusion of those participants may have been appropriate or would have changed the results (p. 4).

For an example of poor practice, a study on loot box use in Hong Kong by Tang et al. (2022) significantly modified the problem gambling measurement scale (p. 4). The use of the Chinese language instead of English is not at issue, because the PGSI has been translated into and validated in Chinese (Loo et al., 2011). It was also used with success in other loot box studies in China (Xiao, Fraser, et al., 2023, 2024). Instead, the problem was that Tang et al. (2022) modified the wording of the PGSI: references to 'gambling' were converted to 'spending money on gacha mechanics', as the authors revealed in a personal response to my query. This modification was admittedly disclosed, albeit very vaguely and not sufficiently prominently (see 'the authors had modified a few words' in Tang et al. 2022, p. 4). This is not necessarily problematic in and of itself. But continuing to represent the modified scale as if it measured 'problem gambling' was misleading because following the modification, the scale instead measured 'problematic participation in gacha mechanics' – a completely different construct. The modification effectively created a new, unvalidated problematic gacha engagement scale more comparable to the Risky Loot Box Index (RLI) discussed in Section 2.1.2.7 (Brooks & Clark, 2019; Forsström et al., 2022). This means Tang et al. (2022) misrepresented their construct as a measure of 'problem gambling' throughout the paper, from title to abstract through the results and into the conclusion. That has misled readers and is unacceptable.

In general, owing to the wealth of replication and the overall acceptable quality of the literature (*e.g.*, an ample amount of preregistration, provision of open access data, and two representative samples; see von Meduna et al., 2020; Zendle, 2020), we can be assured that the evidence for this effect is robust (Spicer, Nicklin, et al., 2022, p. 10). But as in any other field of research, certain studies such as that of Tang et al.

(2022) must be treated with due caution and possibly considered for exclusion from any meta-analyses.

2.1.2.3.2. Self-reported loot box spending data: The industry failure to share data

A separate issue that should be acknowledged is that all relevant studies rely on self-reported data. For example, participants were asked to try to remember how much they spent on loot boxes in the past month or year. This approach is obviously prone to unintentional misremembering and misreporting (Althubaiti, 2016) and even intentionally mischievous responses (Przybylski, 2016). As noted in Section 2.1.1.8, it is fair to say that the loot box spending variable in all studies was at least partially inaccurate owing to how difficult it is for players to actually know how much they may have been spending. Design 'features' of video games can obfuscate the real-world monetary prices of in-game purchases (*e.g.*, the use of multiple intermediate virtual currencies at varying exchange rates), possibly contrary to obligations imposed by consumer protection law, as opined by the Dutch regulator, the Autoriteit Consument & Markt [Authority for Consumers & Markets] (ACM) (2020, p. 31, 2023, pp. 52–53).

A related issue is how different players might interpret survey questions differently. For example, a large proportion of players view purchasing loot boxes as a form of gambling. When they are asked to answer the PGSI, which enquires about the harms of their 'gambling', they may have reported loot box-related harms (Sidloski et al., 2022). That would be contrary to the researchers' intentions as they would have wanted to measure only traditional gambling harms and correlate those harms with loot box spending. The adulteration of traditional gambling harm with loot box harm creates a different construct. Subsequently finding a correlation between that mixed construct and loot box spending would be less informative and concerning.

Fortunately, a study by my team addressed this issue directly through an experiment finding that the effect was observable even when participants were explicitly instructed to exclude loot box-related harms while responding to PGSI questions (Xiao, Newall, et al., 2024). Nonetheless, more attention should be paid to survey phrasing going forward, particularly in terms providing a precise and sufficiently inclusive definition of 'loot boxes'. Some concerns were also raised around whether the relationship is present in non-Western samples (Gentles et al.,

2022; Xiao, Fraser, et al., 2023). Later research by my team addressed this issue and confirmed that, at least for Mainland China, the effect is present despite major cultural differences (Xiao, Fraser, et al., 2024). Further research elsewhere is ongoing.

It is a credit to researchers in the loot box field that we self-critique and self-correct promptly and openly. Owing to the vast volume of successful replications in various contexts and the relatively consistent effect size that has been detected, I am not concerned that the relationship would not be found if non-self-reported data were used. Moreover, some important context must be acknowledged. Despite many calls for the industry to share actual spending data on loot boxes in the past seven years (*e.g.,* Etchells et al., 2022, p. 12), all video game companies have refused to do so (with one very recent Japanese exception noted in Section 5.7 that does not change this overall context). The industry has intentionally deprived the public of the best available data to produce the best available evidence, so it is estopped from claiming that the research is substandard and must not be relied on by policymakers. The issue of data sharing and industry–academia collaboration has wider implications and is discussed further in Section 5.7.

2.1.2.4. The link between loot box spending and problem video gaming
Besides problem gambling, which is associated with randomised in-game purchases such as loot boxes, concerns have also been raised about (and indeed were first raised regarding) the relationship between spending on 'predatory' monetisation in video games, including but not limited to loot boxes, and problem video gaming or (internet) gaming disorder and addiction (D. L. King & Delfabbro, 2018), as defined by the WHO (2018, section 6C51). Put differently, regardless of the randomisation and gambling aspects, excessive spending on video games and loot boxes could represent a symptom of problems with time management with respect to video games and be potentially harmful. This construct is sometimes described as 'excessive' or 'heavy' gaming, instead of 'problem' or 'disordered' video gaming, given the debate as to whether and when gaming becomes problematic (Colder Carras et al., 2017) and whether this could be assessed through a self-completed questionnaire. The wording's potential stigma and placement of associated responsibility entirely onto the harmed individual should also be acknowledged as inappropriate (Casale et al., 2023). (The same applies to usage of 'problem' or 'disordered' gambling; see Biggar & Wardle, 2024; Horch & Hodgins, 2008.)

There is also a relatively consistent positive correlation between loot box spending and problem video gaming (Brooks & Clark, 2019; Drummond, Sauer, Ferguson, et al., 2020; Li et al., 2019; Zendle, 2020), including among adults in Mainland China (Xiao, Fraser, et al., 2024) and the United Kingdom (Close et al. 2023) as well as among adolescents in both Japan (Ide et al. 2021) and Spain (González-Cabrera et al., 2022). Earlier meta-analyses put the strength of this relationship rather inconsistently at either $r = 0.25$ (Garea et al., 2021) or $r = 0.40$ (Spicer, Nicklin, et al., 2022), owing to having been conducted when there were fewer published studies addressing this specific issue. Given the substantial literature that has been published since, another meta-analysis and secondary analysis would be welcomed.

It is entirely unsurprising that increased spending on video games and loot boxes is associated with excessive or heavy video game use. The reason why players spend money is so that they can play for longer in a more enjoyable manner (notwithstanding the frustration they experience from failing to obtain desired items from loot boxes, for example). In my view, this relationship is not as uniquely concerning as the one between loot box spending and problem gambling; it merely reflects another aspect of potential video game addiction that we should pay attention to (*e.g.*, a symptom).

2.1.2.5. Links between loot box spending and other potential risk factors

Research has also sought to uncover whether other traits associated with problem gambling might be associated with loot box spending and therefore represent potential risk factors. For example, it is not surprising that participation in gambling over the past year is positively associated with loot box spending, given the obvious link between gambling participation and gambling harm (Xiao, Fraser, et al., 2023, 2024). Similarly, gambling-related cognitive distortions are positively associated with loot box engagement (Brooks & Clark, 2019; Close et al., 2023). In terms of demographics, younger people, males, the absence of university-level educational attainment, and unemployment are all associated with more intense loot box engagement; moreover, people with lower incomes spend a higher proportion of their earnings on loot boxes. These demographic traits are also positively associated with 'other addictive and problematic behaviours, including disordered gambling,

drug and alcohol misuse' (Close et al., 2022). The fact that identical associations are found in relation to loot boxes gives rise to some concern.

The most established psychological trait that could be a risk factor is likely to be impulsivity (Garrett et al., 2023): it is well established that gambling behaviour is associated with impulsivity (MacKillop et al., 2014). But in terms of loot box studies, the results have been mixed. The association has been generally very weak and negligible or even negative (Close et al., 2023; Spicer, Fulwood, et al., 2022; Wardle & Zendle, 2021; Xiao, Fraser, et al., 2023, 2024; Zendle, Meyer, et al., 2019). Unlike traditional gambling, it is likely that only some aspects of impulsivity (a complex and multidimensional construct) are associated with loot box spending while others are not (Garrett et al., 2023). Sensation seeking, which may be taken as its own construct or viewed as a part of impulsivity more broadly, has been found to correlate positively with loot box spending (Garrett et al., 2023; Xiao, Fraser, et al., 2024).

Studies have also found positive relationships between loot box spending and obsessive-compulsive symptoms, hoarding, and post-purchase consumer regret (Garea et al., 2023). A positive association was found between autistic characteristics and both problem video gaming and problem gambling; however, a negligible negative association was found between loot box spending and autistic characteristics, which suggests that not all potential risk factors are relevant to loot boxes (Charnock, et al., 2024). There is also a positive association between the experience of a game-related 'flow' state (see Chen, 2007; Csikszentmihalyi, 1990) and loot box engagement (Close et al., 2023).

But although these results inform us as to specific relationships (or lack thereof) between loot box engagement and various constructs and may be useful for highly targeted purposes (*e.g.*, deciding whether or not to provide additional support around loot boxes for people with autistic characteristics), the practical implications of these findings are arguably less obvious than the overall headline relationships between loot box spending and problem gambling and, to an extent, problem video gaming.

2.1.2.6. The link between loot box spending and mental health

A important indicator of the association between potential harms and loot boxes is whether loot box engagement is associated with poorer mental health outcomes. As with problem gambling, causality is difficult to establish. However, the earliest batch of loot box studies did not even consider potential cross-sectional associations between loot box spending and mental health (Etchells et al., 2022, pp. 2–3). Since then, studies have produced mixed results as to whether and how loot box engagement may be associated with mental health. Drummond et al. (2020) found a weak positive correlation between loot box spending and experiencing more severe psychological distress. Another study by this team found that people who purchase loot boxes were at higher risk of experiencing severe psychological distress, even regardless of problem gambling symptoms (Drummond, Hall, & Sauer, 2022). In contrast, Etchells et al. (2022) found no evidence of a correlation in either direction between loot box spending and positive mental health (experiencing better mental wellbeing) or negative mental health (experiencing more severe psychological distress). Similarly, Close et al. (2023) found no association between loot box spending and either mental wellbeing or psychological distress. A survey of Mainland Chinese players conducted by my own team found that loot box spending is associated with *positive* mental wellbeing, and psychological distress *negatively* predicted loot box spending (Xiao, Fraser, et al., 2024).

Further elucidation of what gave rise to such mixed results is needed, particularly given the positive correlation between loot box spending and problem gambling within all these studies. Logically, there should be a negative association between experiencing harm from gambling and better mental wellbeing, as well as a positive association with more severe psychological distress. It could be that, at least for some (if not many) players, loot box (or perhaps, more accurately, broader video game) engagement represents a manner of escapism that does benefit their mental health. This would accord with the wider literature on how video game engagement in general is positively associated with mental wellbeing for most people (Johannes et al., 2021). Video game monetisation aspects that could be viewed as unethical and problematic may not necessarily be harmful, at least not to every single player (Petrovskaya & Zendle, 2023). Yet, regardless of the overall effects of video games or loot boxes on the whole population (see Vuorre et al., 2022), specific individuals may be experiencing harm. Their voices would be drowned out in large-scale survey studies that explore potential associations within a wider population.

2.1.2.7. Dedicated loot box 'harm' measures, *e.g.*, the Risky Loot Box Index (RLI)

A number of constructs intended to assess the potentially problematic use of loot boxes have been created. The Risky Loot Box Index (RLI) was the first to seek to assess problematic aspects of loot box use (Brooks & Clark, 2019). Unsurprisingly, this construct has consistently correlated with loot box spending (*e.g.*, Xiao, Fraser, et al., 2024). But interestingly, it correlates even more strongly with potential risk factors than loot box spending does, meaning that it is probably a better measure for detecting harm than loot box expenditure (*e.g.*, Close et al., 2023; Coelho et al., 2023).

This is probably, at least partially, because, besides monetary spending, the RLI also accounts for the time spent 'earning' loot boxes for free, which is another aspect of potential harm as detailed above in section 2.1.1.1. The RLI has since been translated into Swedish (Forsström et al., 2022) and Simplified Mandarin Chinese (Xiao, Fraser, et al., 2024), showing the potential for cross-cultural use despite some suggestions for improvement and translation. To improve the RLI itself, Forsström et al. (2022) suggested adopting a seven-item scale with two factors respectively focusing on the overconsumption of time and money, rather than a single-factor solution. As for translation, my team drew attention to the potential difficulty of translating 'loot boxes' into another language in a sufficiently inclusive and consistent manner as a perfectly equivalent or corresponding term might not exist (Xiao, Fraser, et al., 2024, p. 8).

Other scales have also been developed, including the 23-item 'Reasons And Facilitators For Loot box Engagement' or RAFFLE scale (Lloyd et al., 2021) and the 18-item 'Problematic Use of Loot Boxes (PU-LB)' questionnaire (González-Cabrera et al., 2022). These two scales account for more aspects of potentially problematic loot box use, but are likely to be too lengthy and disproportionate (too many items demand too much time for each participant to complete). Accordingly, their potential use in broader screening studies, such as annual national youth health surveys (*e.g.*, Y. Kim et al., 2016), cannot be justified. The field in general would benefit from uniform measures rather than allowing for the proliferation of dozens of different measures for the same supposed construct as has occurred with problem video gaming (D. L. King et al., 2020).

2.1.2.8. Studies considering migration and causality, longitudinally or otherwise

A legitimate criticism of the loot box literature has been the absence of longitudinal studies for the four years between 2018 and 2022: all previous studies were cross-sectional and assessed the participants at only one point in time. They did not track participants multiple times over an extended period so as to know how their behaviour developed, *e.g.*, whether people started purchasing loot boxes and then moved on to participating in traditional gambling, or *vice versa*.

To understand potential 'migration' from one behaviour to the other, Spicer, Fulwood, et al. (2022) employed a rather ingenious strategy of simply asking participants to reflect on this issue based on their personal recollection. If a participant reported purchasing loot boxes before participating in traditional gambling, they were asked whether, in their opinion, the loot box purchases contributed to their later decision to participate in gambling and *vice versa*. Around 20% of the participants who engaged in one of these activities reported that their participation in the first activity contributed to their decision to later participate in the second or experienced the so-called 'gateway effect' in either direction; participants who experienced either gateway effect were more at risk, according to a variety of loot box, video gaming, and gambling harm measures (Spicer, Fulwood, et al., 2022, p. 3). This study presented evidence of potential migration in both directions but remained a cross-sectional study in which participants merely retrospectively self-reported personal opinions.

The first longitudinal study was published at the end of 2022 (Brooks & Clark, 2022). This was quickly followed by another such study one month later (González-Cabrera et al., 2023). The two studies were similar in that they each surveyed a group of participants twice, six months apart. Researchers therefore learned about the participants' experience with loot boxes and gambling at two different points in time and could see whether one developed into the other. In summary, people who had spent more on loot boxes six months prior were more likely to start participating in traditional gambling and to spend more on gambling six months later (Brooks & Clark, 2022, p. 7). Owing to the relatively brief window of six months between the two surveys, it was not possible to establish whether loot box use led to gambling *harm*, despite evidence of increased participation in gambling, as mere participation does not necessarily equate to significant harm (Brooks & Clark, 2022, p. 7).

González-Cabrera et al. (2023) presented similar results: those who bought loot boxes six months prior were more likely to participate in online gambling six months later as well as to experience greater harm from online gambling.

2.1.2.9. Support for stricter loot box regulation from psychology and sociology

These longitudinal studies further support the need to regulate loot boxes among young people in particular. In any case, the same group who is attracted to participating in traditional gambling is also attracted to purchasing loot boxes and could represent a type of potentially vulnerable consumer in need of additional protections. In relation to traditional gambling, existing regulations require that a certain degree of protection must be provided (*e.g.*, those under the age of 18 years are generally barred from any participation for their own protection). However, video game companies have been permitted to implement, or at least not prevented from implementing, certain highly questionable design features that are literally banned in relation to traditional gambling. One example is the so-called 'near-miss' effect that shows the player nearly winning before disappointing them with a loss (*e.g.*, slot machines showing the player as having matched two symbols and nearly matching the third symbol, which would have caused them to win, before that third symbol is then turned into a losing symbol at the last moment; see Zendle, Cairns, et al., 2019). This effect has been shown to increase gambling participation because people treat the near-miss as a positively reinforcing win (Clark et al., 2009). It is thus banned as a 'game design' 'feature' in the UK for, *inter alia*, online slot machines (UK Gambling Commission, 2021, section 7C), for example. However, loot boxes showing near-misses are implemented in video games such as *Islands of Nyne: Battle Royale* (Define Human Studios, 2018). With that, we turn inevitably to examine options for regulating loot boxes.

2.1.3. Prior legal literature: A focus on reviews and proposals

2.1.3.1. Gambling law perspectives: Do loot boxes legally constitute 'gambling'?

As soon as the issue of loot boxes emerged in public debates in 2017 in Western countries, legal research began discussing the problem (Abarbanel, 2018). Comprehensive reviews were conducted examining when loot boxes would fall afoul of the gambling laws of different countries (the answer: it depends) (*e.g.*, Castillo, 2019; Schwiddessen & Karius, 2018; Xiao, 2021d) and summarising relevant legal developments in various countries (*e.g.*, Derrington et al., 2021; Liu, 2019;

Moshirnia, 2018). Whether a certain loot box infringes gambling law in a certain jurisdiction depends on the characteristics of that loot box and which jurisdiction is being discussed, as detailed in Paper 1 (Xiao, Henderson, Nielsen, et al., 2022). The early policy proposals focused on requesting (i) disclosure of the probability of obtaining specific items, (ii) separate labels indicating the presence of loot boxes and various related aspects (*e.g.*, Derrington et al., 2021, pp. 316–323), and (iii) consideration of loot boxes when making age-rating decisions for games (*e.g.*, restricting games with loot boxes to adults only) (*e.g.*, Moshirnia, 2018, pp. 107–109).

To enforce any age limit on loot box access, effective age verification is required (Evans, 2022, pp. 433–435). Evidence from other domains, such as online pornography (Thurman & Obster, 2021), suggests that sufficiently robust age verification regimes that are difficult to circumvent are not yet available; realistically, they are unlikely to materialise in the foreseeable future. Even in Mainland China, where very strict restrictions have been imposed on the video game playtime of young people under the age of 18 years (Xiao, 2021c), the age verification systems based on the national identification system (which other countries do not have and therefore would not even be able to implement) intended to enforce those restrictions are easily circumvented (Xiao, 2024e) and are indeed known to have been circumvented (Zhou et al., 2024).

Probability and presence disclosure requirements have been increasingly adopted across the world, *e.g.*, under EU consumer law, as described in Paper 2 (Xiao, 2024c). Even consideration of the presence of loot boxes when making age-rating decisions has been adopted as policy in certain jurisdictions (*i.e.*, Australia and Germany), as discussed in Sections 2.2.3 and 2.2.4, and may receive broader acceptance in the future. Yet more radical proposals have generally not been adopted, such as setting a maximum spending limit on loot boxes (Drummond et al., 2019; Evans, 2022, pp. 435–437); implementing other 'ethical' game monetisation design features (D. L. King & Delfabbro, 2019b, 2019a; Xiao & Henderson, 2021), such as limiting the complexity of loot box design, *e.g.*, the maximum number of rewards within (Xiao & Newall, 2022); and using tax policies to incentivise ethical game design or disincentive loot box implementation.

In the beginning, there was certainly a preoccupation with the legal question of whether different loot box implementations would fall under the gambling laws of different countries (*e.g.*, Xiao, 2022c). This was relevant because gambling law already existed and was already applied, so the implementation of products that would fall afoul of existing law would have been automatically illegal. But most loot boxes would not be illegal under the gambling laws of most countries, as detailed in Paper 1 (Xiao, Henderson, Nielsen, et al., 2022). This means that most concerns associated with loot boxes could not be addressed by pre-existing gambling law. Some countries, *e.g.*, Finland (Tynkkynen, 2022) and the UK (Department for Digital, Culture, Media & Sport (DCMS), 2022), considered but, in the end, did not amend and expand gambling law to regulate all loot boxes. Discussion of dedicated loot box measures, *e.g.*, the Mainland Chinese rule that companies must disclose the probabilities of getting specific items from loot boxes (Xiao, Henderson, et al., 2024), was also popular, given that these were obviously directly relevant. However, such rules addressed only very limited aspects of loot box implementation and applied to only a few countries.

2.1.3.2. Consumer and contract law perspectives: EU law leads the way

Only more recently have consumer and contract law perspectives been taken into account. Unsurprisingly, both established areas of law would apply to the commercial or consumer transaction between the video game player and the company, despite the novelty of loot boxes. It is obvious that certain egregious practices would be prohibited, such as lying about the probability of obtaining various items (the South Korean regulator has enforced the law on that basis; see McEvoy, 2024a) and falsely advertising offers as available for a limited time only to offer them again after that specified time period (Xiao, 2022a, pp. 348–349).

Baeck and Claeys (2021) considered whether, from French, Belgian, Dutch, and English contract law perspectives, restitution is possible for loot box purchases: minors who purchase loot boxes without capacity should, in theory, be able to receive a refund as that contract would be voidable. But owing to the terms and conditions of the game as well as the practical realities of how game companies are paid by the minors' parents, nearly all loot box purchasing contracts are not concluded between the child and the company. Instead, they exist between the

parent or other responsible adult and the company – meaning that the adult does indeed have capacity and cannot seek restitution on that basis.

Another potential ground upon which players may obtain restitution is to claim that the loot box purchasing contract was illegal and contrary to public policy. But most loot boxes are not illegal *per se* in most countries, meaning that it would be difficult, if not impossible, to claim that the contract was illegal because it offended the public conscience (Baeck & Claeys, 2021, pp. 11–13). Only specific types of loot boxes that are implemented in a small minority of games are clearly prohibited under national gambling laws, and only contracts involving those would constitute illegal contracts. Such claims based on the illegality of the underlying contract have been successful in Austria, albeit inconsistently, in relation to a specific category of loot boxes whose rewards were transferable between players and therefore possessed real-world monetary value, *i.e.*, embedded–embedded loot boxes (Xiao, 2024c).

The EU Unfair Commercial Practices Directive [2005] OJ L149/22 (UCPD), which has been implemented into the national laws of all EU member states, has been identified as a particularly relevant piece of regulation that could address concerns associated with loot boxes (Leahy, 2022). For context, the United Kingdom also incorporated EU consumer law into its national law prior to its eventual withdrawal from the European Union on 31 January 2020 (*i.e.*, 'Brexit'). Cartwright and Hyde (2022) argued that the sale of loot boxes in general, especially to vulnerable consumers (such as young players and those experiencing gaming or gambling disorder), may constitute an unfair and aggressive commercial practice prohibited under consumer law – specifically, the national implementation of the UCPD in the United Kingdom (*i.e.*, the Consumer Protection from Unfair Trading Regulations 2008, SI 2008/1277 (CPUTR), which are to be revoked and replaced by the Digital Markets, Competition and Consumers Act 2024 (DMCCA) with no relevant substantive changes). More specifically, the European Commission (2021) has expressed that, by virtue of the UCPD, loot box probability disclosures and presence disclosures are both legally required (p. 105).

The European Commission (2022) has also written to the European trade body representing the video game industry to inform them of their obligations. The Italian consumer protection regulator is known to have enforced this position (Autorità

Garante della Concorrenza e del Mercato (AGCM) [Italian Competition Authority], 2020a, 2020b), while the UK advertising regulator has enforced the presence disclosure requirement (*e.g.*, Advertising Standards Authority (ASA), 2024d; Committee of Advertising Practice & Broadcast Committee of Advertising Practice, 2021).

My review of compliance with Dutch consumer law by video games revealed very poor compliance (Xiao, 2024a), despite the Dutch regulator having published guidance for video game companies as to how to comply with consumer law (ACM, 2023). The law is in place, but we need better enforcement to ensure consumer protection. EU countries and the UK are leading the charge at least in terms of pronouncing how consumer law should apply to loot boxes, but enforcement of those rules remains lacking in nearly all of those countries. Equivalent regulations elsewhere may also be applicable (*e.g.*, Section 5 of the Federal Trade Commission Act in the US that prohibits 'unfair or deceptive acts or practices in or affecting commerce'.).

2.1.3.3. The absence of empirical assessments of policy implementation

What has been missing from the legal literature are empirical assessments of the effectiveness of the various loot box rules that have been adopted. In part, this is because the academic study of the law traditionally did not involve empirical studies. The only study conducted prior to this thesis was my team's previous work assessing whether and how companies complied with the Mainland Chinese requirement of loot box probability disclosures (Xiao, Henderson, et al., 2024). Most companies were found to have complied poorly by making disclosures that were difficult to access. Recommendations were made regarding improvements to both compliance and the drafting language of the rule (Xiao, 2022a). These can be relevant to potential law reform in China and also to policymaking in other countries (*e.g.*, DCMS, 2022, paras 203, 217). Many other rules elsewhere remained unassessed and, inspired by that Mainland Chinese study, this thesis seeks to provide evidence of policy implementation (or lack thereof), make recommendations, enhance compliance and consumer protection, and contribute to evidence-based policymaking around the world.

2.2. Updates on international regulatory positions

Given the concerns enumerated above, many different countries around the world have taken policy action to address the loot box issue. A comprehensive overview of the regulatory positions around the world is provided in Paper 2, which was last updated in December 2023 and is recommended to be read for historical background before this section. Nearly a year has passed since then, and there has been many new developments: in 2024, *inter alia*, new rules have come into force in South Korea and Australia; a new draft law was published in Spain; and the German video game age-rating organisation, the USK (Unterhaltungssoftware Selbstkontrolle), has implemented certain rules on the Google Play Store. In addition, certain matters were omitted from Paper 2 due to my lacking the relevant knowledge due to, *e.g.*, language barriers. Inevitably, given the large number of countries and vast amount of information involved, a few minor developments would be missed. This section of the thesis seeks to address these issues by providing a 2024 update on loot box regulation. If a certain region is not mentioned, then one can assume that I do not have any relevant updates to provide.

2.2.1. Mainland China

2.2.1.1. Mainland China: An abandoned draft law for regulating online games

At the end of 2023, Mainland China published a draft law intending to regulate online video games (国家新闻出版署 [National Press and Publication Administration], 2023a). What dominated the headlines was that Clause 18 of that draft law intended to ban various engagement mechanics in video games, such as daily login rewards, that incentivise players to engage with the game more frequently or intensively (Long, 2024). Those might affect loot box implementations because loot boxes are sometimes given out for free as daily login rewards, for example, but are not otherwise particularly relevant to present purposes.

Other draft rules were more dedicated to addressing monetisation. Clause 18 also intended for companies to set a maximum limit on how much money could be spent inside the game (and to disclose this in the game's terms and conditions). Spending limits have already been imposed on under-18s in Mainland China since 2019 (国家新闻出版署 [National Press and Publication Administration], 2019): specifically, companies are required to not allow children under eight to spend any money at all and to limit spending by 8–15-year-olds to CN¥200 and by 16–17-year-olds to

CN¥400 per month (Xiao, 2020). Clause 18 intended to also impose such a limit on adults but did not specify the amount. Given that the rules in relation to under-18s have been implemented, it is certainly technically possible to impose such limits against individual adult user accounts as well. Further, Clause 18 would have required companies to use a pop-up window to warn players when 'irrational spending behaviours' are detected.

Clause 27 specifically dealt with loot boxes (or rather so-called 'randomised pull/draw mechanics', which was a term that was not defined) and was intended to require companies to design the number of pulls required and the probabilities 'sensibly' so that online users are not 'enticed into excessive spending'. It was further intended that companies must make available alternative options for players to obtain functionally equivalent items without engaging with loot boxes, such as through direct purchase.

Finally, Clause 39 intended to ban offering loot boxes to under-18s. The phrasing of Subclause 39(5) was very broad and could be interpreted as also prohibiting non-paid, free loot boxes from being offered to children. It is unclear whether that was intended and, if so, how the distinctions between loot boxes and other almost certainly harmless randomised mechanics in video games (such as defeating enemies to obtain random loot) would be drawn.

A notable omission from the draft law is the requirement that companies must disclose loot box probabilities (*i.e.*, informing players of their likelihood of obtaining different potential rewards), which admittedly already applies as part of consumer protection law as explained below and does not necessarily need to be restated. However, the draft law does restate such obvious rules as online games must not divulge national secrets or harm national security (Clause 16(3)). Accordingly, the omission of the probability disclosure requirement was likely unintended.

The draft law was merely published for consultation, and so it does not yet apply in practice. Further, it is unlikely that it will be implemented in the near future. This is because the draft law needs revision, and its publication immediately significantly negatively impacted the stock prices of Chinese video game companies. The video game regulator published a press release one day after the consultation started

suggesting that the draft law will be revised after taking into account the consultation feedback seemingly in an attempt to appease the market (国家新闻出版署 [National Press and Publication Administration], 2023b). The draft law has also been removed from the regulator's official website after the consultation period ended (which was abnormal), and a relevant official has been removed from his position (Ye, 2024). It is therefore presumed that the draft law will not be applied in its previously published form in the foreseeable future.

2.2.1.2. Mainland China: A CN¥10,000 fine for not disclosing loot box probabilities
Loot box probability disclosures have been required in Mainland China since 2017 (Xiao, Henderson, et al., 2024): this was imposed by a notice published by the Ministry of Culture (文化部, 2016). That has generally been cited as the regulatory basis for the requirement. However, that notice was actually repealed in 2019 (文化和旅游部 [Ministry of Culture and Tourism], 2019), meaning that there was no longer any (and presently remains no) explicit requirement that video game companies make loot box probability disclosures. However, in January 2023, a company was fined CN¥10,000 for failing to disclose loot box probabilities by a regulator in Shanghai responsible for monitoring the market on the basis that omitting this information breached general consumer protection law (佛陀 [Fotuo], 2023; 诸 [Zhu], 2023). This case reaffirms that irrespective of the repealing of the Ministry of Culture's notice, loot box probability disclosures are required to be provided under Mainland Chinese law.

2.2.2. South Korea: The probability disclosure law comes into effect
The South Korean law requiring loot box probabilities to be disclosed was passed in 2023, but it only took effect on 22 March 2024. The relevant Ministry of Culture, Sports and Tourism helpfully published a guidance document explaining how companies should comply with various requirements set out in the amended Article 33 of the Games Industry Promotion Act (문화체육관광부 [Ministry of Culture, Sports and Tourism], 2024a) and also provided an official English translation thereof to assist non-Korean companies to comply (문화체육관광부 [Ministry of Culture, Sports and Tourism], 2024b). Notable requirements include that the probabilities should be displayed on or be accessible from the loot box purchase page and that the

probabilities for getting each individual potential reward must be disclosed (instead of just a few probabilities for getting different rarity categories of rewards, for example). Any advertising for games with loot boxes must also disclose the presence of loot boxes in those games with the text: '확률형 아이템 포함 [includes random items]'. The Game Rating and Administration Committee (GRAC), which is the national video game age-rating organisation, has been actively monitoring compliance and taking enforcement actions against non-compliant games along with the relevant Ministry (김 [Kim], 2024). This is encouraging to see as many other countries' regulators have not performed their duty by enforcing the law proactively and thus left consumers exposed to potential harms and to fend for themselves, *e.g.*, in Belgium as discussed in Paper 3 (Xiao, 2023b) and in Northern European countries as discussed in Paper 4 (Xiao & Henderson, 2024).

One cause for concern is that a guidance document provided by the GRAC containing questions and answers about the application of the law excludes certain loot box mechanics from being regulated. Specifically, it was asked whether a probability disclosure is required for loot boxes obtained from completing a dungeon (*i.e.*, only after performing certain, possibly skill-based actions), which requires the purchase of an entry ticket with real-world money to attempt. The GRAC answered that a disclosure would be required *only* if the dungeon ticket is only available for purchase with real-world money. On the other hand, if the player is able to both attempt the dungeon for free a limited number of times but can also choose to spend real-world money to buy entry tickets for more attempts, then no disclosure is required (게임물관리위원회 [Game Rating and Administration Committee] (GRAC), 2024, pp. 5–6). This is a quite concerning exclusion. There is arguably no basis in the original text of the law permitting the GRAC to make this decision. Further, in practice, companies can easily change their loot box implementation to meet this definition and thus escape from the legal responsibility of making probability disclosures. In fact, loot boxes satisfying this exact definition have previously been implemented, *e.g.*, the Elder Rifts and Crests mechanic in *Diablo Immortal* (Blizzard Entertainment & NetEase, 2022) (see Byrd, 2022). The implementing companies considered the relevant mechanic to be 'loot boxes' that would contravene the laws of some other countries (*i.e.*, Belgium and the Netherlands) and decided not to release in those countries to comply (Partis, 2022). Stakeholders generally agree that such an implementation is a 'loot box' and

potentially harmful as players can spend large sums of money trying to obtain random rewards, but unsatisfactorily, these mechanics would not be subject to regulation in South Korea, at least according to the GRAC. This appears to either have been an incorrect interpretation of the law or an unintended loophole created through poor drafting of the law. Regardless, this specific issue should be further considered by the South Korean authorities to ensure that consumers are duly protected.

Further details about the South Korean law can be found in an empirical assessment of the policy's implementation my colleague and I conducted (Xiao & Park, 2024).

2.2.3. Australia: Minimum age ratings for loot boxes and simulated gambling

The loot box-related law in Australia was adopted in 2023 and took effect one year later from 22 September 2024 onwards. As set out in the Guidelines for the Classification of Computer Games 2023 (Cth), Video games with loot boxes are required to be rated 'Mature (M)' or not recommended for under-15s at a minimum (*i.e.*, their ratings could be higher than M but must not be lower), while games with simulated gambling are required to be rated 'Restricted (R 18+)' or legally restricted to adults only (Australian Classification Board, 2024a). The relevant government Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDCA) and the Australian Classification Board, which is the national video game age-rating organisation, published two documents providing guidance on how the law might affect video game companies (DITRDCA & Australian Classification Board, 2024a, 2024b).

2.2.3.1. Australia: Defining a 'loot box'

A 'paid loot box' was defined in Australian law under the Guidelines for the Classification of Computer Games 2023 as:

> A virtual container, however described:
>
> a) that can be purchased or unlocked using realworld currency or using in-game virtual currency, items or credits that can be purchased using realworld currency; and

b) that rewards players with an in-game digital item or items where the exact reward the player is to receive is not disclosed to the player prior to purchase.

An explanatory note, which does not affect the above definition, then stated:

Paid Loot Boxes may be known by other names in the computer game industry including but not limited to prize crates and card packs.

'Paid loot boxes', however, is not actually the only problematic element that is subject to regulation. Instead, there is a broader term of 'In-game purchases linked to elements of chance' that the regulation applies to. That term encompasses 'paid loot boxes' and is defined in Australian law under the same Guidelines as:

Digital goods or services determined by chance, including Paid Loot Boxes, that can be acquired within a game:

a) using real world currency; or

b) using in-game virtual currency, items or credits that can be purchased using real-world currency.

This is a very broad definition that includes any mechanic involving both randomisation and real-world money (directly or indirectly), including not just loot boxes that are bought and instantly opened but also random rewards that might be obtained with some considerable delay after initially spending money, *e.g.*, through a so-called 'battle pass' or 'season pass' (Joseph, 2021; Petrovskaya & Zendle, 2020), which require players to both spend money to unlock the possibility of obtaining certain rewards and often spend time playing the game to complete specific tasks to eventually obtain those rewards (DITRDCA & Australian Classification Board, 2024b, p. 2). The category of loot boxes that have been excluded from regulation in South Korea mentioned above (random rewards that are obtained through defeating enemies, which could be defeated more frequently through paying real-world money) would certainly fall within the Australian definition and be regulatable, thus further demonstrating that South Korea has taken an idiosyncratic and unsatisfactory position.

2.2.3.2. Australia: Defining 'simulated gambling'

Two other aspects of the Australian law are interesting: firstly, what mechanics are covered by the 'simulated gambling' definition, and secondly, whether and when the new rules would apply to a game that was released prior to the law coming into force on 22 September 2024.

'Simulated gambling' was defined in the 2023 Guidelines as:

> Interactive activity within a game that:
>
> a) resembles or functions like a real world age restricted betting or gambling service; and
>
> b) does not provide rewards that can be redeemed for real world currency or traded to other players in-game for realworld currency.

A further note was provided stating:

> For example, interactive activity within games that resembles or function like real world commercial casinos, slot machines, lotteries, sports betting services or other betting services will be simulated gambling.

This aspect of the new law was intended primarily to regulate so-called simulated gambling or social casino games that allow players to spend real-world money to buy virtual in-game currency to participate in traditional gambling activities, such as playing on slot machines and blackjack, but do not allow players to convert any in-game currency back into real-world money even if the player wins (Derevensky & Gainsbury, 2016; Gainsbury et al., 2014). Australian players of social casino games have reportedly experienced problem gambling and committed crimes (*e.g.*, stole AU$940,000 (≈DKK 4.3 million) from her employer) in order to fund their addiction to such games (Butler, 2022; Lohberger, 2021; MacDonald, 2021). These games are not regulated as traditional gambling because the player cannot win money as the game is not being 'played for money or anything else of value' within the meaning of Section 4 of the Interactive Gambling Act 2001 (Cth). Accordingly, previously,

people under 18, including children, could have had access to social casino games. The new classification rules mean that they are now legally restricted to only being available to adults in Australia.

However, the simulated gambling definition goes further and regulates other video game mechanics (and by extension video games) beyond social casino mechanics. Specifically, although interactivity is a crucial criterion (meaning that non-interactable traditional gambling imagery alone, such as merely depicting a slot machine in the background to create ambience, would not satisfy the definition (DITRDCA & Australian Classification Board, 2024b, p. 1)), the possibility of investing real-world money into the mechanic is *not* required. This means that simulated gambling mechanics that only involve virtual currency that can only be obtained through gameplay would also fall afoul of the rule, even if the player has no chance of ever spending or losing real-world money, such as the slot machines in *Dragon Quest XI: Echoes of an Elusive Age* (Square Enix, 2017) if they were included in a game released after the Guidelines take effect (DITRDCA & Australian Classification Board, 2024b, pp. 1–2). The relative prominence of the relevant mechanic is also irrelevant: mere presence satisfies the definition (DITRDCA & Australian Classification Board, 2024b, p. 1).

These are so-called isolated–isolated random reward mechanisms that use traditional gambling motifs (*e.g.*, casino imagery) but do not involve real-world money in any way (Nielsen & Grabarczyk, 2019; Xiao, 2022c). There is little, if any, evidence to suggest that this specific type of mechanics is harmful. Their potential harms are certainly no way on par with the known and demonstrated harms of social casino games. These mechanics also appear less harmful than loot boxes as players have no chance of directly experiencing financial harm through them, yet they are now regulated more strictly than loot boxes without traditional gambling motifs that could directly cause financial harm in Australia.

This is a rather extreme regulatory position to take and arguably not evidence based. To be clear, regulating social casino games is justified; however, the regulation of simulated gambling mechanics that do not involve real-world money at all is not. The simulated gambling definition was arguably overly broad. Notwithstanding, this approach is not without precedent, in 2020, the age rating organisation that is

generally relied upon in Europe (except in Germany, where the USK system is used), PEGI (Pan-European Game Information), adopted a similar policy of always rating games containing interactable simulated gambling mechanics (regardless of whether they involve real-world money) 'PEGI 18' (Robertson, 2021), which means suitable for adults only (PEGI, 2024). That PEGI rule only applied to new game rating decisions for physical games and did not apply retroactively, although it is understood that some social casino games on the Google Play Store released prior to 2020 have had their rating changed to PEGI 18 because this was much easier to achieve in practice in relation to digitally distributed games than recalling physical products (Culture, Media and Sport Committee (UK), 2024, p. 9, para 34; Games Rating Authority (UK), 2024).

2.2.3.3. Australia: Retroactive application and software updates that unclassify

The other issue is whether the new rules apply to games that were initially released prior to 22 September 2024. On one hand, it does not seem proportional to change the old age classifications of games that were released two decades ago, *e.g.*, *Pokémon Fire Red & Leaf Green Version* (Nintendo, 2004), and are not being actively monetised (Xiao, 2023a, pp. 22–23). On the other hand, many popular games that continue to receive updates and are generating a lot of revenue even today were first published many years ago, *e.g.*, *Genshin Impact*, and should be regulated with current and updated rules given their continued operation (Xiao, 2023a, pp. 20–22). Indeed, not applying video game-related rules to older products that companies are still operating for profit is a failure to recognise the business reality that many video games, particularly on mobile platforms, now adopt the game-as-a-service business model (Xiao, 2023a, p. 18).

A fair balance to strike would therefore be to require that the age ratings are considered for an amendment (applying the newer rules) if and when the game software is updated on or after 22 September 2024, which is when the new regulations take effect. Fortunately, that is actually the position of Australian law as explained below. However, confusingly and indeed incorrectly, the relevant minister previously publicly said in 2023 that the measures 'will apply to games that are released from September next year and will not apply retroactively' (Rowland, 2023c) and thus implying that all games released prior to 22 September 2024, irrespective of whether they have since been updated after that date, are immune

from the new regulations. That statement was legally wrong and not only misled the public as to what protections will be provided for consumers but also misinformed members of the video game industry as to their future compliance obligations, thus causing delays in compliance and consumer harm as a natural consequence.

It is true that age-rating decisions based on the older rules made before 22 September 2024 remain valid and binding after that date: a game with loot boxes might be rated 'General (G)' for suitable for everyone or 'Parental Guidance (PG)' for not recommended for under-15s without parental guidance, both of which are ratings lower than M and can no longer be given to games with loot boxes (Australian Classification Board, 2024a) after 22 September 2024. That G or PG rating will stay with that game. However, by operation of Section 21(1) of the Classification (Publications, Films and Computer Games) Act 1995 (Cth), games with an existing classification that are subsequently modified or updated would become unclassified (*i.e.*, illegal to be offered for sale or download to the public) instantly and automatically and are required to be reclassified thereafter (under the prevailing classification rules, *i.e.*, potentially the new ones) unless they meet an exception. Those exceptions are set out under Sections 21(2) and 21(3) of the same Act. The Section 21(2) exceptions are irrelevant for present purposes, while the Section 21(3) exceptions are relevant but are actually set out in Section 6 of the Classification (Publications, Films and Computer Games) (Modifications of Computer Games) Instrument 2015 (Cth).

A modification to a video game needs to satisfy all four criteria below to be excepted under Section 21(3) and therefore not require a reclassification. Games that do not satisfy all four must be reclassified. These four criteria are:

> '(a) is a minor and/or technical modification; and

> (b) does not have a material effect on the gameplay of the original game; and

> (c) does not change the title of the original game; and

> **(d) is not likely to cause the game, as modified, to be given a different classification to the original game**' (emphasis added).

The first three criteria are not of particular concern for present purposes, while the fourth is where a loot box and/or simulated gambling modification would fail to meet the exception because that modification is not just 'likely to cause' but *will* cause the game (if it was previously rated G, PG, M, or 'Mature Accompanied (MA 15+)' meaning legally restricted to those aged 15 and over (Australian Classification Board, 2024a)) to be given a different (higher) classification (either M or R 18+ depending on the mechanic concerned). Criterion (d) cannot be satisfied by the modification in question, and so the modification cannot be excepted under Section 21(3). Accordingly, Section 21(1) applies: a modification to the video game that adds loot boxes (and/or simulated gambling mechanics) or changes the pre-existing loot boxes (and/or simulated gambling mechanics) on or after 22 September 2024 will cause the game to automatically be unclassified and thus require a reclassification under the new rules if it is to be legally offered for sale or download to the Australian public.

Accordingly, the new rules will apply to games released and classified before 22 September 2024 in the relevant circumstances described above, contrary to the Minister's statement, and will apply 'retroactively' for all practical purposes. Importantly, these circumstances do not represent an extreme corner case that a legal scholar has unveiled but will not actually be practically relevant; instead, these circumstances are highly pertinent and will apply widely to 80% of the highest-grossing mobile games that are regularly updated with new loot boxes to generate revenue, for example. It is technically true that the rules would not apply retroactively in the sense that older games that will not be updated will not be affected. However, the 'retroactivity' that the public and indeed the industry care about is whether games released prior to 22 September 2024 that will be continually maintained and updated with new content after that date will need to comply with the new rules. They do, which is good for consumer and child protection and important for the industry to plan for with ample time.

This position has since been confirmed by the relevant government department and the Australian Classification Board in their published guidance: games classified prior to 22 September 2024 adding loot boxes and/or simulated gambling mechanics on or after 22 September 2024, irrespective of whether they previously contained

these mechanics, will require a reclassification if the previous rating was below the relevant minimum age rating required under the new rules (DITRDCA & Australian Classification Board, 2024a, p. 2). Changing the rewards or otherwise amending a pre-existing loot box would also likely cause the game to become unclassified and thus requiring a new classification of at least M (DITRDCA & Australian Classification Board, 2024b, p. 2).

These newer publications are legally correct and contradict the statement made by the relevant minister in 2023 (Rowland, 2023c), which has been proven to have been legally wrong. It is unfortunate that the misstatement was made because the legal position has not changed, and the relevant legal analysis was not particularly difficult, especially for the government department in charge of drafting those very laws. The DITRDCA (2024) and I discussed these legal interpretations and agreed to the above conclusion on 24 April 2024. However, the DITRDCA continued to insist that, despite the legal analysis, the rule does not apply retroactively and refused to publicly disown the Minister's previous statement, despite my request, for many more months to come.

The aforementioned official guidance was published not by either the DITRDCA or the Australian Classification Board but instead by the IGEA (Interactive Games & Entertainment Association), which is the Australian and New Zealand video game trade body. The date of publication was 17 September 2024, which was less than a week before the law took effect. (The same materials were then published by the Australian Classification Board (2024b) itself one day later on 18 September 2024) That was the first public statement to correct the error made by the Minster back in 2023 (Rowland, 2023c). Video game companies were therefore given only six days (which included two days of weekend) to prepare to comply with the new rules. This was exacerbated by the rules seemingly 'changing' because they were previously erroneously described by the Minster. Some companies that offered games with loot boxes that had an under-15 audience might have thought they did not need to worry because the new rules would not affect their games as the Minster had incorrectly advised thusly.

It would have been to the benefit of all stakeholders for these companies to have been given ample time to prepare, rather than being told last minute that the rules

have basically 'changed'. It would have been a legitimate commercial decision (although perhaps not a socially responsible one) to not update a game with loot boxes anymore on or after 22 September 2024 to ensure that its original G or PG rating is preserved. Because of the way the guidance was published last minute, some companies may not have seen it and were therefore deprived of the opportunity to consider whether to update their game or not. Such a company may have already updated their game on or after the 22nd, which automatically unclassified their game, without the relevant knowledge to make an informed commercial decision. In a similar vein, because of how late companies were made aware of the exact application of the rules, it is likely many were not prepared to comply after their first update by seeking a reclassification after the 22nd. The consumer may therefore have been illegally offered automatically unclassified games displaying only their old, defunct age rating, while the companies may have unintentionally but technically committed multiple criminal offences.

This has already occurred in relation to *Zenless Zone Zero* (miHoYo, 2024), which was rated PG prior to 22 September 2024 but since modified and updated with new loot boxes on 25 September 2024 (Orr, 2024). As detailed above, the game was therefore automatically unclassified on 25 September 2024. However, as of 2 October 2024, it remains listed on the Google Play Store with a PG classification that it no longer legally possesses. As it stands, that product listing is illegal, and the company is committing an offence under Section 8AA(1) of the Classification (Publications, Films and Computer Games) Act 1995 (Cth) which forbids the use of the age-rating markings to promote games that do not have that age rating. The game is currently unclassified but is being advertised with the marking for the PG classification. Beyond federal crimes, state and territory crimes are also being committed through this act. Unclassified games are not allowed to be offered for download and play on the Google Play Store (*e.g.*, Section 9(1) of the Classification of Computer Games and Images Act 1995 (Qld) and Section 27(b) of the Classification (Publications, Films and Computer Games) Enforcement Act 1995 (NSW)). It is unlikely the video game company in question intended to break Australian law. The Google Play Store likely never provided an opportunity for these companies, many of which are based outside of Australia, to update their automatically generated IARC (International Age Rating Coalition) age rating (see Section 4.6) following the update that occurred

on or after 22 September 2024, which unclassified their games by automatic operation of a piece of legislation they might well have not been aware of.

Apple said it implemented an automatic system to give regional age ratings in Australia to comply with the law (Apple, 2024b), although, anecdotally, compliance appears inconsistent: on 30 September 2024 and on the Australian Apple App Store, *Squad Busters* (Supercell, 2024) contains loot boxes and displayed only a 9+ age rating, but *Zenless Zone Zero* displayed both a 12+ and a 15+ age rating simultaneously as shown in Figure 1. The side-by-side provision of two conflicting age ratings (which could potentially range as widely as 4+ and 15+ being given concurrently) to Australian players and parents is also confusing. The law should have been drafted to prevent such conflicting information from being provided.
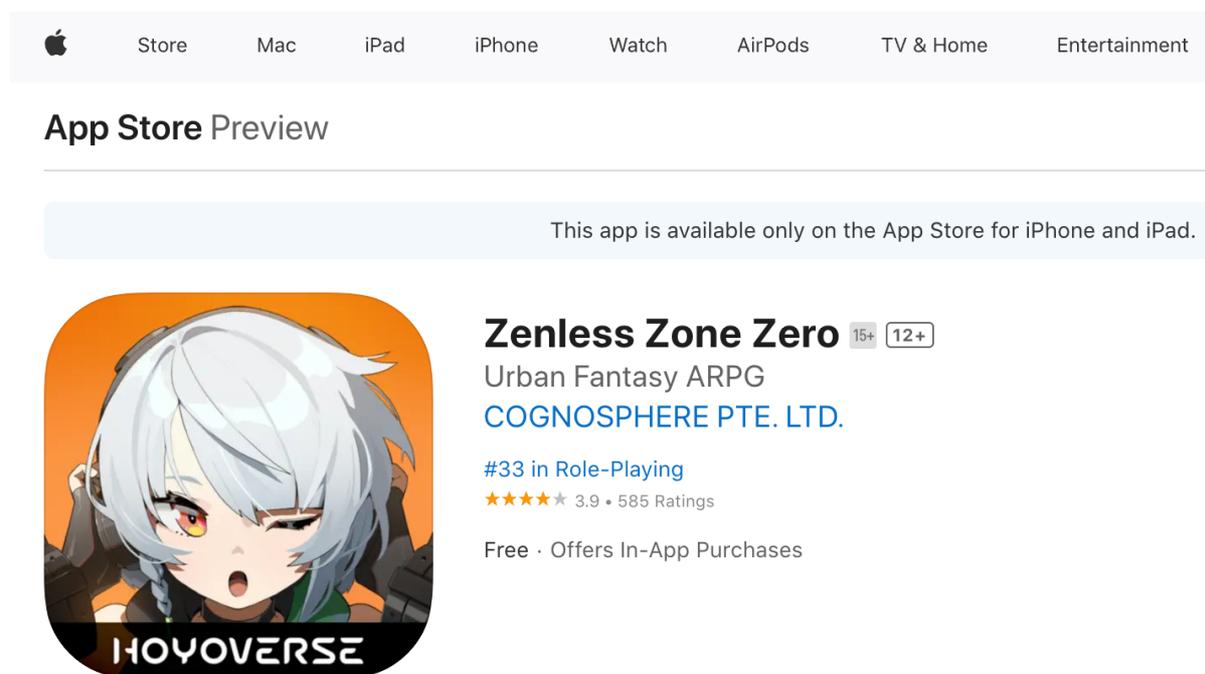
Figure 1. *Zenless Zone Zero* **displayed both a 12+ and a 15+ age rating on the Australian Apple App Store on 30 September 2024. © 2024 COGNOSPHERE, miHoYo, & Apple**

Two insights can be gained from the Australian experience, which other countries should consider. Firstly, needless to say, the law should be communicated accurately and promptly using accessible language. If a misstatement was made, then it must be quickly corrected, rather than ignored to cause even more confusion. Companies (both game companies and app store platform providers, like Google and Apple)

should be given ample time to comply with the regulations and prepare for the potential consequences that new regulations might bring, as this also enhances the eventual compliance and benefits consumers. Telling companies last minute about their legal obligations will inevitably result in poor compliance, which benefits no one, as consumers are not in fact provided with the protection the law supposedly promised. The very late communication of the rules in Australia causing poor compliance exemplifies this.

Secondly, rules that will affect many video games should be rightfully recognised as being practically difficult to implement and would require active and continued monitoring, like the GRAC in South Korea has been doing (Xiao & Park, 2024; 김 [Kim], 2024). The implementation process should start as early as possible. Australia initially announced the intended rules more than a year and half ago (in March 2023 (Rowland, 2023a)) and officially confirmed them a year ago, which in theory should have given companies ample time to prepare (Rowland, 2023b, 2023c). The poor and literally incorrect official communication unfortunately caused delays and confusion. In an ideal world, policy implementation should have started in September 2023 (and relevant preparations should have started even earlier in March 2023) to ensure compliance by September 2024, rather than for implementation to start in September 2024, which unsurprisingly means compliance would not be achieved for many more months to come despite the new law having taken effect. A grace period was already provided, and it was the year between September 2023 and September 2024. The industry should not be given another grace period of an unknown length after September 2024, although this might be justified in this particular instance due to miscommunication on the part of the Australian government. The public would be justified in expecting better policy implementation from the government, and the government should also use its best endeavours to enable and rightfully expect better compliance from companies.

2.2.4. Germany: Implementation of new rules and proposals for even more
2.2.4.1. Germany: Automatic application of a minimum age rating for loot boxes

As detailed in Paper 8 and section 4.8, from 1 January 2023 onwards, Germany started requiring the national age-rating organisation, the USK, to account for loot box presence when making classification decisions. This was achieved through a change in the country's child protection law, rather than any changes to gambling

law. Reviewing the rating decisions made since then reveals that the USK has given at least 'USK 12', which means approved for children aged 12 and above (USK (Unterhaltungssoftware Selbstkontrolle), 2024), to games with loot boxes (Xiao, 2024f). In response to my inquiries, the USK said that these decisions have been and will continue be made on a case-by-case basis (von Petersdorff, 2024). Notwithstanding, given the established practice, companies should expect to receive at least USK 12 for games with loot boxes that are manually rated by the USK for physical release.

The USK also said that that German version of the IARC system, which is used to automatically generate age ratings for digitally released video games after the company fills in a questionnaire, will automatically give all games with loot boxes USK 12 at a minimum (von Petersdorff, 2024). This automatic rule and (over)generalisation are intended to save costs when dealing with the large volume of content that must be rated on digital stores. From my observation, I understand this has already started being technically implemented on the Google Play Store. *Match Masters* (Candivore, 2017) and *Merge Dragons!* (Zynga, 2017) were both rated USK 0 back in January 2024 but were instead rated with the much higher USK 12 in October 2024 citing the additional '*Erhöhte Kaufanreize* [Increased Incentives to Buy]' element. However, the application of the rule appears inconsistent: *F1 Clash* (Hutch, 2019) and *Golf Clash* (Playdemic, 2017) were both still rated USK 0 in October 2024 and not marked with '*Erhöhte Kaufanreize*', despite the presence of loot boxes. Further research is required to explain these irregularities. One would assume that it would not be technically difficult to create a rule that games marked as containing loot boxes (which is already possible and done on the Google Play Store with the label '*In-Game-Käufe (+ zufällige Objekte)* [In-Game Purchases (Includes Random Items)]', which all four aforementioned games had (Xiao, 2023a)) would automatically be granted a certain age rating at a minimum (the same rule could easily apply in Australia as well, changing only what the relevant minimum age rating would be for the presence of loot boxes and simulated gambling).

2.2.4.2. Germany: The State Parliament of Bremen debates loot boxes

On 24 January 2024, the *Bremen Bürgerschaft* [State Parliament of Bremen] debated two competing motions concerning loot boxes (Bremische Bürgerschaft [State Parliament of Bremen], 2024c, pp. 1852–1882). Motion 21/236 was presented by the

coalition government and passed (Bremische Bürgerschaft [State Parliament of Bremen], 2024a), while Motion 21/256 was presented by an opposition party and did not pass (Bremische Bürgerschaft [State Parliament of Bremen], 2024b).

The adopted Motion 21/236 asked for the Bremen State Government to seek the stricter regulation of loot boxes at a federal, national level in Germany. A ban on loot boxes; social casino games (simulated gambling mechanics that *do* require money to engage with); and virtual currencies that cannot be converted back into real-world money was sought. In addition, companies should be required to disclose probabilities for both loot boxes and social casino games, and a ban on the streaming of videos of games that do not comply with the intended rules listed above was also sought. Importantly, this motion, despite passing, represents merely a desire to seek the imposition of the relevant measures in Germany. The measures have not been implemented and are unlikely to be implemented in the foreseeable future.

The competing Motion 21/256 that was rejected would have called on the Bremen State Government to also seek more strict regulation of loot boxes at a federal, national level. The slew of potential measures suggested for consideration included, *inter alia*, identity verification of users before offering them in-game purchases; allowing a monthly spending limit to be set; warning players of potential risks and harms; providing a loot box purchase history; prohibiting children under 10 from engaging with loot boxes, including free, non-paid ones; disabling loot box purchasing by default; requiring probability disclosures; and prohibiting loot box advertising to children. Many of these measures appear to have been inspired by similar harm minimisation measures from traditional gambling, similar to the draft Spanish law on loot boxes published in July 2022 that was not adopted (Ministerio de Consumo [Ministry of Consumer Affairs] (Spain), 2022; Xiao, 2024c).

It is noteworthy that both the Government and the Opposition, across the political spectrum, agreed that loot boxes are potentially harmful and a cause for concern. This reflects a general public desire to see stricter regulation of these mechanics. As mentioned, the passed motion will not materialise into regulation anytime soon. Another issue that should be highlighted is that both the adopted Motion 21/236 and the oral debate contained multiple errors and omissions both in law and in science.

For example, Motion 21/236 and debate contributions by the coalition politicians both referenced how the Netherlands has banned loot boxes, which is a legally incorrect assertation. As detailed elsewhere (Xiao & Declerck, 2023), only a small minority of loot boxes were regulated against by the Dutch gambling regulator, and even that enforcement action was struck down as illegal by the court in March 2022 (Afdeling Bestuursrechtspraak Raad van State [Administrative Jurisdiction Division of the Council of State] (The Netherlands), 2022). Further, the Belgian 'ban' on loot boxes was presented as a good policy to pursue without recognising that it has not been enforced in practice (and that, arguably, it cannot realistically be enforced, as addressed in Paper 3) (Xiao, 2023b). One politician claimed that China banned loot boxes, which is untrue and was possibly a misunderstanding of the draft law discussed in Section 2.2.1.1. The Austrian court was presented as having always ruled that loot boxes are illegal gambling, despite contrary judgments (Xiao, 2024c). Even Germany's own national position was not well understood: recent changes in German law that required the USK to account for loot box presence was presented as not having led to practical benefits, which fails to acknowledge that many games are now rated USK 12 instead of USK 0 and thus potentially benefiting youth protection as detailed above and addressed in Paper 8 (Xiao, 2024f).

Besides legal errors, the coalition politicians also made unsupported and unscientific assertations in their attempt to get their motion passed. This included a claim that engaging with physical card packs with random content caused adults to develop gambling addiction and lose considerable amounts of money in the past. There is no scientific basis to claim that physical card packs *cause* gambling problems: we do not have sufficient evidence on that point (Xiao, Zendle, et al., 2024; Zendle et al., 2021). Even more worryingly, one politician even claimed that video games make children more aggressive, which is contrary to the current scientific understanding (*e.g.*, Przybylski & Weinstein, 2019).

Politicians would be wise to consult both legal and scientific experts prior to making both policy and public statements. When so many obvious flaws are present, it is difficult for the public to place their trust in policymaking. One wonders whether the same politicians would still support these policies if and when they are fully informed. A parent might be misled into thinking that the harms of video games

outweigh their benefits and prohibit their child from playing, thus negatively impacting them (Johannes et al., 2021). The video game industry can also easily point out the errors made during policymaking, thus making it much easier for them to lobby against stronger regulation that might benefit consumers. Public resources that seek to inform people of the regulations in different countries and the scientific evidence base would be useful.

2.2.5. Spain: A draft law prohibiting loot box access by under-18s

In July 2022, a draft law intending to regulate loot boxes was published that sought to require a variety of player protection features including, *inter alia*, restricting access to loot boxes to adults only; publishing probability disclosures; providing price information in euros; limit-setting on spending; and self-exclusion from future participation (Ministerio de Consumo [Ministry of Consumer Affairs] (Spain), 2022; Xiao, 2024c). That bill is discussed in more detail in Paper 2, but it was not adopted before a new Spanish government was elected. However, a new draft law intending to protect minors in the digital environment more broadly contained a specific loot box provision and was announced in June 2024 by the new government (Ministerio de Derechos Sociales, Consumo y Agenda 2030 [Ministry of Social Rights, Consumer Affairs and 2030 Agenda] (Spain), 2024).

Draft Article 5 of the new draft law simply prohibits loot box purchase by under-18s. All other provisions of the previous draft law (*i.e.*, various harm minimisation measures) were dropped. Importantly, the law only regulates so-called embedded–embedded loot boxes that require purchase using real-world money and provides rewards that can be transferred between players and converted into real-world money. This is the same ambit as the 2022 draft law. Therefore, the vast majority of loot boxes implemented in video games cannot be regulated under this new draft law (if it is adopted) as their rewards are not transferable to other players. This means that the law arguably does not go far enough to protect children and address potential concerns around loot boxes because whether or not the loot boxes' prizes are transferable or convertible into legal tender does not appear to make them obviously more harmful than other loot boxes (Zendle, Cairns, et al., 2019, p. 188).

More concerningly, the draft law was legally incorrectly promoted by the Spanish Ministry of Consumer Affairs as if it would regulate all paid loot boxes, irrespective

of whether the rewards are transferable. The relevant press release did not make the important distinction as to what loot boxes will be regulated and what other loot boxes will not be; further, the Ministry cited data produced by the Spanish gambling regulator to state that 'almost 24% of minors between 15 and 17 years of age bought "loot boxes" in the last year' (Ministerio de Derechos Sociales, Consumo y Agenda 2030 [Ministry of Social Rights, Consumer Affairs and 2030 Agenda] (Spain), 2024). That datapoint is correct, but the 'loot boxes' being referred to in the study counted both types of loot boxes (*i.e.*, embedded–embedded and embedded–isolated) (Dirección General de Ordenación del Juego [Directorate General for the Regulation of Gambling] (DGOJ) (Spain), 2023). This means that the engagement rate with embedded–embedded loot boxes whose rewards can be cashed-out *only* is likely lower, and the Ministry either quoted data misleadingly to exaggerate the problem or failed to understand the ambit of the law and thus used the data incorrectly.

Overall, the Ministry gave the public the incorrect impression that all problems associated with loot boxes will be dealt with by the draft law when that is simply untrue. Media reports of the draft law echoed the government press release and also failed to make the distinction, thus giving the incorrect impression that all loot boxes (rather than a small minority) will be regulated (*e.g.*, Seijas, 2024). Like in Australia and in Bremen, Germany, the public was therefore misled with misinformation by the Spanish government. Parents and players might mistakenly think that they will be better protected by the draft law and drop their guard (*e.g.*, stop speaking with their child about the potential harms of loot boxes) when, in fact, they will need to be just as conscious to potential harms because most video games will continue to implement a type of loot boxes that remains legal but is capable of causing financial harm. This false sense of security is discussed further in relation to the unenforced ban on loot boxes in Belgium in Paper 3 (Xiao, 2023b, p. 16). Working together with Spanish researchers and journalists, we were able to take one stab at correcting the public record by publishing a piece that accurately stated the proposed legal position (Domínguez, 2024). However, by then, most readers were already misinformed by other pieces, and the harm caused by misinformation could never be fully undone. Again, governments and politicians must take care to give accurate statements about regulation and science. Otherwise, trust in policymaking is greatly diminished, among other negative consequences, such as giving the public a false sense of security that ends up harming them even more.

2.2.6. UK: Advertising rules enforced, and industry self-regulation takes effect

The industry self-regulation that the then Conservative UK government decided to rely upon to address loot box-related concerns became effective from 18 July 2024. Compliance remains to be assessed, which I am undertaking to do. Some rules contained within the industry self-regulations are in fact pre-existing platform or legal requirements. In particular, UK advertising regulation (which implements UK consumer protection law, which in turn implemented EU consumer protection prior to Brexit) requires that any video game advertising for games containing loot boxes to disclose the presence of loot boxes (Committee of Advertising Practice & Broadcast Committee of Advertising Practice, 2021). This is because this information has been recognised as being material information that a consumer needs to make an informed transactional decision (either purchasing or downloading the game for free).

My research has found that the rate of compliance by social media ads on Meta platforms (Facebook, Instagram, and Messenger) and TikTok is only around 7% (Xiao, 2024b). This has led to the UK advertising regulator publishing rulings upholding four separate complaints on this point. The first three rulings concerned the complete absence of any disclosure of the presence of in-game purchases and of loot boxes specifically (ASA, 2024a, 2024b, 2024c). More interestingly, a fourth ruling concerned whether a disclosure that was technically made but whose visibility was too poor would also breach advertising rules. Unsurprisingly, purporting to 'disclose' material information using very small text in a light coloured font that is set against a rapidly moving background and disappears after a mere two seconds would not be sufficient (ASA, 2024d). Companies need to make reasonably prominent disclosures that could actually be perceived by consumers and thereby taken into account when making transactional decisions; however, it remains unclear exactly how prominent the disclosure ought to be.

Loot boxes were also discussed elsewhere. A UK parliamentary committee report published at the end of 2023 echoed my doubts about the potential effectiveness of non-legally enforceable industry self-regulation (Culture, Media and Sport Committee (UK), 2023, p. 27, para 60). The issue was also mentioned in the House of

Lords on 25 April 2024, where unfortunately, a member, Lord Smith of Hindhead, made the following factually erroneous remark:

> I can recall discussing the subject of loot boxes back in 2016, and I am sure the subject will be mentioned again today. The latest game is "Fortnite", whose loot boxes I say will be the next ones we will be talking about, in a few months or years to come. (Smith, 2024)

Fortnite (Epic Games, 2017) has not offered loot boxes for sale since 2019 (Valentine, 2019), and only an unpopular game mode of *Fortnite* called *Save the World* ever contained loot boxes; the far more popular *Battle Royale* mode of *Fortnite* never sold loot boxes. This means that Lord Smith's knowledge was about five years out of date as he claimed that the game not only contains loot boxes but that apparently it is one of the 'latest' games available when, in fact, it was released seven years ago. Again, this reflects how many politicians are not well informed about video games but are responsible for making policies about them.

One reliable method for addressing that knowledge gap is simply to consult relevant experts and take into account what they have to say. Another report was published by a parliamentary group of the Northern Ireland Assembly (which is the devolved legislature) focused on reducing gambling harms and in part addressed loot boxes (All Party Group (APG) on Reducing Harm Related to Gambling, 2024b, pp. 29–31). Said committee invited experts to share their experience and answer specific questions policymakers had (*e.g.*, NI Assembly All Party Group (APG) on Reducing Harm Related to Gambling, The, 2024a). A draft of the report was also circulated prior to publication so that the experts could comment on any potential errors and unclarity. Corrections and clarifications were then incorporated into the final published version. These are obvious steps that could be taken to ensure that policymakers benefit from relevant expertise.

2.2.7. Ireland: The advertising regulator's limited and unsatisfactory enforcement

In the UK, in 2023, the advertising regulator ruled that app store listings for video games that contain loot boxes must also disclose the presence of in-game purchases and loot boxes specifically (ASA, 2023a, 2023b), and, in 2024, rulings confirmed that social media advertising must also make the same disclosure, as detailed above. I

made complaints on the same points to the Irish advertising regulator, the Advertising Standards Authority for Ireland (ASAI), against companies based in Ireland. No rulings have been published because the matters have, in the eyes of the ASAI at least, been resolved. In short, the ASAI agreed that loot box presence must be disclosed on app store listings; however, after the relevant companies complied after they were told to do so, the ASAI decided there was no further need to pursue the matter (ASAI, 2024a, 2024b). In relation to social media adverts, the ASAI decided that they do not need to disclose loot box presence if the page they link to (*e.g.*, the app store product listing) would do so (ASAI, 2024a), contrary to the UK position where separate disclosures are required at both places.

The Irish experience is unsatisfactory in four regards. Firstly, the relevant companies have been allowed to simply amend their non-compliant and illegal advertising without facing the negative consequences (*e.g.*, reputational) of an upheld complaint for breaking advertising rules. This also means that the advertising rules were not widely promoted through the inevitable media reports of the rule-breaking to allow other companies to learn about this issue and deter them from similarly not complying in the future.

Secondly, to hold that social media advertising does not need to disclose loot box presence on the advert itself and thereby failing to recognise the consumer following the link shown on the social media advert (*e.g.*, to an app store product listing page) as a 'transactional decision' within the meaning of consumer protection law means that the Irish advertising regulator is failing to properly enforce consumer protection law and is allowing arguably illegal adverts to be left unregulated. In light of this, the government consumer protection regulator, the Competition and Consumer Protection Commission, should consider taking action. Social media adverts for games may also not link to a store listing page but instead to an official webpage or to nothing at all: it is not known what the ASAI would decide in such cases as to whether a loot box presence disclosure is required on the ad itself.

Thirdly, using one case as an example, there was a great delay between the initial complaint being made (October 2023) and receiving a response from the ASAI stating that the company has complied (May 2024) (ASAI, 2024a). Consumers were exposed to an illegal advert during the intervening seven months, and the company

faced no consequences because it had later decided to amend its advertising and comply, despite having acted illegally for many years previously.

Fourthly, in one case, the ASAI accepted factual assertions from the relevant video game company that were evidently incorrect and failed to respond at all to contrary evidence (ASAI, 2024b).

Overall, one must question whether the ASAI is biased towards protecting industry interests and not using its best endeavours to reduce the likelihood that consumers are exposed to illegal advertising: it could have taken simple actions to contribute towards that effort of reducing the prevalence of illegal advertising but instead decided not to. Indeed, all that has occurred in Ireland was entirely dependent on the intervention of my complaints; otherwise, nothing would have happened, and Irish consumers would be even less protected. Regardless, the Irish advertising regulatory position in relation to loot boxes is now clearer.

2.2.8. The Netherlands: Enforcement against *Fortnite*'s unfair commercial practices
The Dutch consumer protection regulator enforced against multiple unfair commercial practices that Epic Games was found to have used in *Fortnite* and fined the company €1,125,000 (ACM, 2024). These illegal practices included (i) falsely claiming that certain items were only available for purchase for a limited amount of time; (ii) directly exhorting children to make purchases; and (iii) implementing design features in the in-game shop that confused consumers and contravened the requirements of professional diligence. Notably, Epic Games is appealing this decision. None of issues are directly relevant to loot boxes *per se* as the game stopped implementing them a number of year ago (Valentine, 2019) as mentioned above, and the most popular battle royale mode never offered loot boxes at all. However, this enforcement action should also be recognised for confirming that, as intended, EU consumer protection law applies to video games just like any other commercial product. *Inter alia*, companies are not allowed to directly exhort children to make in-game purchases using terms like 'BUY NOW!' (ACM, 2024, pp. 12–16, paras 45–60). The same naturally applies to loot boxes. In my opinion, some aspects of the decision are more likely to survive the appeal than others. Further commentary must be reserved until after the appeal is decided, which might be many years away.

One notable omission from this enforcement action is the Dutch regulator's long established assertation that all in-game purchases must be priced in euros, in addition to the virtual currency price (*e.g.*, 60 diamonds) (ACM, 2020, p. 31, 2023, pp. 52–53). The *Fortnite* decision contains screenshots showing that in-game purchases were priced in premium virtual currency only and not in euros, but the regulator did not include that as an unfair commercial practice that should be punished. This omission is telling: is the regulator perhaps not prepared to have that assertion challenged in court during the appeal because it is weaker as a legal argument than other complaints?

I conducted a study examining compliance with various aspects of Dutch consumer law and found, for example, that 90% of the highest-grossing iPhone games directly exhorted children to make purchases (Xiao, 2024a). This indicates that the *Fortnite* decision, although precedential, merely scratches the surface of all potential breaches of EU consumer protection law by the video game industry. Regulators in other countries should also consider more proactive and strict enforcement of consumer law to video games given the large number of consumers and amount of money involved.

3. Methods: Research Questions, Interdisciplinarity, and Open Science

Recognising the concerns associated with loot boxes and their regulation, this thesis explores and answers the following research questions:

Research question 1: What regulatory approaches can be taken against loot boxes?

Research question 2: In practice, what have different countries supposedly done, or proposed to do, to regulate loot boxes?

Research question 3: In actual practice, have companies effectively complied with the regulations that have been implemented?

Research questions 1 and 2 were answered by traditional doctrinal legal research consisting of (i) identifying relevant legal sources (*e.g.,* legislation, cases, official interpretations published by regulators, bills, etc.) and (ii) interpreting and analysing the text of those materials to synthesise arguments and draw conclusions

(Hutchinson & Duncan, 2012, pp. 110–113). Paper 1 addressed research question 1, while Paper 2 (complemented by Section 2.2 above) answered research question 2.

The remaining papers dealt with research question 3, which is the most practically relevant and informative. Research question 3 was answered through empirical legal research combining both (i) doctrinal legal research (in identifying the regulations whose implementation should be assessed) and (ii) empirical methods. Specifically, I used content analysis of relevant materials to reveal whether the product complied with regulations. In addition, I conducted some basic statistical tests on the findings to enable drawing conclusions that met the standard of 'science', broadly conceived (which requires that the findings to be shown, to a satisfactory degree, to have been so extreme as to not likely have been the result of random chance).

My methods are difficult to characterise as one specific approach. They bear some resemblance to autoethnography (see T. E. Adams et al., 2017) in that I exposed myself to the games and their loot boxes and tried to experience the regulations personally as part of the research process in order to report on and make sense of them. My engagement with the law, as evident in parts of Section 2.2, also goes beyond merely researching it; I actively interacted with lawmakers and enforcers to strengthen my own understanding as well as inform them and the public. My efforts have impacted policy implementation, either by clarifying legal positions (*e.g.*, my advertising complaints were upheld in the United Kingdom, as discussed in Section 2.2.6, forcibly establishing precedents) or even directly affecting compliance by causing companies to change their game design and corporate practices after learning of my results, as detailed in Paper 9.

In some respects, my empirical research also has features of 'mystery shopper' exercises that occur more often in the context of market and customer service research or, indeed, law enforcement (Jacob et al., 2018). Notwithstanding, this method has historically been used in the context of compliance research: *e.g.*, to determine whether alcohol is sold illegally to underage customers (Gosselt et al., 2007) or whether restricted medicines are administered in accordance with legal requirements (Norris, 2002). I adopted different personas. I sometimes pretended to be a new player experiencing a video game with loot boxes for the first time (Papers 3 and 5). Other times, I pretended to be a parent or player searching for age rating

information (Papers 6 and 7). For Paper 3 in particular, I pretended to be a Belgian player (and even went as far as to physically reside in the country for the duration of the fieldwork) and, for some purposes, a Belgian player who actively wanted to circumvent the rules.

Crucially, the principle of 'open science' was held in the highest regard and followed by this project. Empirical legal research falls behind many other fields of study (*e.g.*, psychology, which leads the charge; see Open Science Collaboration, 2015) in terms of the adoption of open science practices (Chin et al., 2021). Research in the behavioural addiction and gambling fields, within which the subject matter of this thesis (engagement with loot boxes) falls, also broadly suffers from similar shortcomings (Eben et al., 2023; Louderback et al., 2023). I sought to demonstrate that empirical legal research relevant to the behavioural addiction domain can and should do better to improve the credibility of the findings and assist future research (*e.g.*, by preregistering hypotheses prior to data collection and analysis and publicly providing all relevant research materials without restrictions).

In terms of access, all papers are available in full to the public for free. In terms of transparency and reproducibility, all data and analysis scripts and outputs have been publicly shared. Importantly, Papers 3 ('Breaking Ban', Xiao, 2023b) and 6 ('Beneath the Label', Xiao, 2023a) were conducted in the current gold standard open-science format of 'registered reports'. The research motivations and methods were peer reviewed prior to data collection to allow for more effective and efficient use of expert feedback as part of the research process (Chambers & Tzavella, 2022). Indeed, the entire editorial and peer review history is public and can be further scrutinised. These two papers were probably the first registered reports in the field of legal studies.

The engagement with open science was intended to ensure that readers can more confidently trust the findings on the controversial topic of loot boxes. The present research criticises not just commercial companies but also supposedly 'independent' regulators who receive industry funding and even multiple governments. By making the evidence publicly available and verifiable, I provide transparency and allow vested industry interests and indeed all other stakeholders to scrutinise all aspects of the research.

4. Results: Summary of the Appended Research Papers

This thesis includes a total of nine papers published after peer review in either journals or at a conference. These represent the multiple original contributions to knowledge synthesised here. Each paper includes a review (of varying lengths) of the academic literature and regulatory landscape at the time of publication. This is omitted from the summaries below (Section 2 provides a far more comprehensive and updated rendition), which synopsise the novel research questions, methods, and eventual findings and conclusions of each paper.

4.1. Paper 1: Using the Nuffield public health intervention ladder to identify different methods of loot box regulation (Xiao, Henderson, Nielsen, et al., 2022)

> **Title:** Regulating gambling-like video game loot boxes: a public health framework comparing industry self-regulation, existing national legal approaches, and other potential approaches
>
> **Published:** *Current Addiction Reports*, 9(3), 163–178.
>
> **Link:** https://doi.org/10.1007/s40429-022-00424-9.

As detailed in the literature review (Section 2.1) above, concerns about loot boxes have been raised by players, parents, academics, and other stakeholders. While regulations have been implemented in a few countries, the breadth of the range of options available to policymakers remained unclear. The evidence base for regulation at the time (*i.e.*, early 2022 or the start of my PhD) from psychology studies was still relatively nascent but growing stronger. For context, all studies published at the time were cross-sectional in nature (*e.g.*, Close et al., 2021; Drummond, Sauer, Ferguson, et al., 2020; Kristiansen & Severin, 2019; Li et al., 2019; Zendle & Cairns, 2018, 2019). The two longitudinal studies were not published until late 2022 and early 2023, respectively (Brooks & Clark, 2022; González-Cabrera et al., 2023). The conflicting studies about whether loot box engagement is associated with worse mental health outcomes were also not yet published (Drummond, Hall, & Sauer, 2022; cf. Etchells et al., 2022; Xiao, Fraser, et al., 2024).

At the time, there was therefore only a relatively weak argument in favour of *strict* regulation of loot boxes. Despite this, some academics (Close & Lloyd, 2021, p. 40), advocacy groups (Mason, 2021), and policymakers (Select Committee on the Social and Economic Impact of the Gambling Industry of the House of Lords (UK), 2020, p. 115, para. 446) argued for banning or otherwise heavily regulating loot boxes (*e.g.*, regulate loot boxes as gambling, which limits access to adults only even in 'liberal' countries where gambling has been legalised). Immediate resort to the most restrictive regulatory approach for a commercial product whose potential harms are not yet clear seems unwise. Yet this was evidently favoured as a default by some stakeholders, probably owing to the ease with which such an approach could be identified and recommended – even though practical implementation is probably not remotely as easy (Moshirnia, 2018, pp. 111–112). In contrast, some researchers have recommended less restrictive approaches but not in a systematic manner (see Drummond et al., 2019; D. L. King & Delfabbro, 2019a, 2019b; Xiao & Henderson, 2021).)

At the beginning of 2022, there was also little evidence of the implementation or effectiveness of loot box regulations (*e.g.*, in terms of company compliance, which represents the main, novel contribution of this thesis). The only published work was by my colleagues and me examining implementation of and compliance with the mandatory disclosure of loot box probability in Mainland China (Xiao, Henderson, et al., 2024). The only country to have adopted a so-called 'ban' on loot boxes was Belgium, and it was not known whether that policy was effective in reducing the availability of that product in the country. Indeed, page 172 of Paper 1 highlights this lack of policy evidence and alludes to the subsequent Paper 3, which is an empirical work addressing that unknown by assessing implementation of and compliance with the Belgian ban on loot boxes.

Paper 1 sought to address the short-sightedness, evidenced in both academic literature and policymaking, of suggestions for outright bans on loot boxes despite weak scientific evidence and no direct evidence of relevant policy implementation for such a ban. We identified that, on the contrary, policymakers have a wide range of regulatory options involving varying degrees of restriction at their disposal to address concerns about loot boxes. Specifically, we applied the Nuffield Council on

Bioethics' (2007, p. 41) public health intervention ladder, which is reproduced below from the most to the least restrictive potential measure:

> ***Eliminate choice.*** *Regulate in such a way as to entirely eliminate choice, for example through compulsory isolation of patients with infectious diseases.*

> ***Restrict choice.*** *Regulate in such a way as to restrict the options available to people with the aim of protecting them, for example removing unhealthy ingredients from foods, or unhealthy foods from shops or restaurants.*

> ***Guide choice through disincentives.*** *Fiscal and other disincentives can be put in place to influence people not to pursue certain activities, for example through taxes on cigarettes, or by discouraging the use of cars in inner cities through charging schemes or limitations of parking spaces.*

> ***Guide choices through incentives.*** *Regulations can be offered that guide choices by fiscal and other incentives, for example offering tax-breaks for the purchase of bicycles that are used as a means of travelling to work.*

> ***Guide choices through changing the default policy.*** *For example, in a restaurant, instead of providing chips as a standard side dish (with healthier options available), menus could be changed to provide a more healthy option as standard (with chips as an option available).*

> ***Enable choice.*** *Enable individuals to change their behaviours, for example by offering participation in an NHS 'stop smoking' programme, building cycle lanes, or providing free fruit in schools.*

> ***Provide information.*** *Inform and educate the public, for example as part of campaigns to encourage people to walk more or eat five portions of fruit and vegetables per day.*

> ***Do nothing or simply monitor the current situation.***

Our application of this framework revealed that a policy of either banning loot boxes or regulating them as gambling so as to render them inaccessible to young people under the age of 18 years (two 'solutions' that dominated the public debate at that time) would be one of the most extreme options available and perhaps inappropriate in context. We suggested considering the pros and cons of other regulatory approaches. In light of relatively weak evidence for such an extreme policy approach, a less restrictive alternative approach to regulation could be more justifiable. Given the dearth of relevant work and evidence of policy implementation at the time, we also called for an empirical assessment of the 'effectiveness' of any adopted regulations (which the bulk of the subsequent papers and this thesis focus on). Paper 1 should therefore be viewed as a justification for the later research (*i.e.*, Paper 3 onwards).

4.2. Paper 2: Loot box regulation around the world in a comparative perspective (Xiao, 2024c)

Title: LOOT BOX STATE OF PLAY 2023: LAW, REGULATION, POLICY, AND ENFORCEMENT AROUND THE WORLD

Published: *Gaming Law Review*, _(_), _–_.

Link: https://doi.org/10.1089/glr2.2024.0006.

Researchers in legal disciplines, including myself (Xiao, 2021d), have examined how different countries have regulated, or were planning on regulating, loot boxes (see Abarbanel, 2018; Castillo, 2019; Derrington et al., 2021; Evans, 2022; Harvey, 2021; Honer, 2021; Hong, 2019; Leahy, 2022; Liu, 2019; Moshirnia, 2018; Schwiddessen & Karius, 2018). The most comprehensive prior works are Schwiddessen and Karius (2018) and Derrington et al. (2021). These were presumably last updated in either the year of their publication or the year prior: Derrington et al. (2021) disclosed an article acceptance date of 16 October 2020 (p. 332). Owing to the rapid pace at which loot box regulation has developed in different countries around the world in the ensuing years, those studies were severely outdated by 2023. Owing to the unidirectional flow of time, they were understandably unable to predict and report on future developments.

Paper 2 sought to update the literature by comprehensively reviewing and, where relevant, comparing the regulatory positions adopted, proposed, considered, or dismissed in over 16 jurisdictions across the world (not counting US states as separate jurisdictions). In addition to doctrinal legal research methods, Paper 2 also used the methodology of comparative law. It compared the regulations of various regions (including legal texts, but also practical aspects such as enforcement) to identify both similarities and differences as well as highlight which region's approach is arguably superior in a given respect (Eberle, 2011, p. 52). For example, the UCPD was intended to achieve full or maximum harmonisation of consumer protection law (meaning to be at exactly the same standard; no higher and no lower) across EU member states (Joined Cases C–261/07 and C-299/07 *VTB-VAB NV v Total Belgium NV* [2009] ECR I-2949). However, some countries (*e.g.*, Italy) have evidently taken more proactive and robust enforcement actions against loot boxes than others.

In brief, I observed a general trend of countries moving away from considering whether to regulate loot boxes as 'gambling', which was the focus around 2017–2018 (*e.g.*, Belgische Kansspelcommissie [Belgian Gaming Commission], 2018; Kansspelautoriteit [The Netherlands Gambling Authority], 2018; Spillemyndigheden [Danish Gambling Authority], 2017; UK Gambling Commission, 2017). Three other dominant, less restrictive approaches can be identified: (i) mandatory disclosure of loot box probabilities to better inform players of their odds of winning (Mainland China, South Korea, Taiwan); (ii) mandatory loot box presence warning labels and minimum age ratings to ensure players and parents are duly informed of the risks involved with loot boxes (Australia and Germany); and (iii) the application of pre-existing consumer protection law and advertising regulations to address egregious commercial practices relating to loot boxes but not the mechanic *per se* (the Netherlands, Italy, and the United Kingdom). All three approaches continue to permit the sale of loot boxes and the video games containing them, but require their sale to be more transparent and fairer towards consumers.

Other countries have proposed loot box laws that were not passed (*e.g.*, Finland, Spain, the United States, and Brazil). Loot boxes have been the subject of (sometimes class action) litigation between players and game companies, with varying results in Austria, the United States, and Canada. Aside from legal regulation, many regions

have favoured industry self-regulation (*e.g.*, companies adopting protective measures that are not required by law so as to act more fairly towards their consumers). The United Kingdom, in particular, has explicitly relied on self-regulation as a government policy, and many other parts of the world have done so more broadly.

An advancement on traditional legal research achieved in Paper 2 is reaching out to relevant stakeholders for a response to certain propositions, *e.g.*, asking a regulator to provide their perspective on a certain issue. Legal research has historically been limited to passive discussion of the law as revealed through legislation, cases, other academic commentary and such sources. Stakeholders are presumed to continue to hold previously expressed views or to have no opinion at all if that has not previously been discussed in public. Unsurprisingly, this is not always accurate as an identifiable previous position does not necessarily reflect the current position.

In contrast to the traditional method, I undertook to actively engage with relevant stakeholders through my legal research. Unlike with laws passed and cases heard decades ago, issues with loot boxes are very much current. They occurred within several years of the research or even just months prior. By engaging with relevant parties, I was able to access previously unknown legal sources (*e.g.*, unpublished or little-known legal documents) and clarify certain points that otherwise would have necessarily gone unexplained. For example, I discovered that the body representing the video game industry in the United Kingdom (Ukie) reported that the Dutch consumer protection regulator (ACM) supposedly made a statement to Ukie that was contradictory to the regulator's previously published position and effectively disapplied a consumer protection measure. In response, I asked the Dutch regulator to confirm or deny whether this had indeed occurred as it potentially represented a 'change' in the law as reflected in its (non-)enforcement. The Dutch regulator denied it had made the relevant statement, indicating that Ukie had made a misleading statement: the relevant measure continues to apply and remains enforceable. My ability to obtain and publish this insight required active engagement with stakeholders, which is a broader theme that emerges from this thesis.

Paper 2 accurately reflects the law as of December 2023, meaning that it is now also inevitably outdated in some regards as nearly a year has passed since its writing.

Updates to Paper 2 are provided in Section 2.2 of this thesis, which reviews global regulatory positions to ensure presentation of the most current legal positions.

Merely knowing what the regulatory position is, was, will, or might be from a legal or theoretical perspective (*i.e.*, Papers 1 and 2) is insufficient for truly understanding whether the policy can achieve its supposed aims in practice. The majority of this thesis therefore focuses on empirically assessing compliance with regulatory rules, whether legally mandated or voluntarily adopted through industry self-regulation.

4.3. Paper 3: Belgium's so-called 'ban' on loot boxes (Xiao, 2023b)

> **Title:** Breaking Ban: Belgium's Ineffective Gambling Law Regulation of Video Game Loot Boxes
>
> **Published:** *Collabra: Psychology*, *9*(1), Article 57641.
>
> **Link:** https://doi.org/10.1525/collabra.57641.

Paper 3 directly addresses the lacuna in the literature identified in Paper 1: the lack of evidence on whether or not loot box regulation has been implemented effectively. As discussed, it has never before been questioned whether the 'ban' on loot boxes in Belgium in fact led to the intended and desired elimination (or at least substantial reduction) of that product's availability in the country, even though many other countries appeared interested in copying that regulatory position.

Radical policies should not be adopted without evidence that the policy would be beneficial unless there exists a strong justification and accompanying promise to repeal that policy if proven ineffectual. This is particularly true when such evidence is easily within reach because another country has already adopted that policy and that country's implementation can be assessed to inform not only domestic stakeholders, but also the international community.

Leaving aside the self-governing British Crown dependency of the Isle of Man, which has a tiny population and is effectively considered part of the United Kingdom by video game companies for loot box compliance purposes despite legal

differences, Belgium is the only known country in the world to 'ban' loot boxes. Importantly, Belgian policymakers did *not* make an active decision to prohibit loot boxes after learning about the potential problems they may pose. Instead, the country's pre-existing gambling law was drafted so broadly as to *already* incorporate any loot boxes within the legal definition of 'gambling' if (i) the player paid real-world money to engage with a mechanic that (ii) offers random rewards, and (iii) some of those potential rewards are valuable and constitute a 'win', while other rewards are less valuable and constitute a 'loss' (Belgische Kansspelcommissie [Belgian Gaming Commission], 2018). The fact that paid loot boxes are therefore banned is based only on the Belgian gambling regulator's 2018 interpretation of the law, which can be taken as correct as it has not been challenged in court, and the accompanying threat to criminally prosecute companies for non-compliance.

I assessed whether (i) paid loot boxes were indeed eliminated; (ii) their prevalence was at least reduced; and (iii) the ban could be circumvented by players in Belgium. I physically travelled to conduct fieldwork in Belgium, where I examined the 100 highest-grossing iPhone games on the Belgian Apple App Store. Through content analysis (involving downloading and playing the games for a specific, predetermined period of time to review their game and monetisation design), I judged whether they offered any prohibited in-game purchases involving randomisation (*i.e.*, paid loot boxes) that contravened Belgian gambling law.

I found that 82 of the 100 highest-grossing iPhone games in Belgium were still selling loot boxes in mid-2022. It was preregistered that a prevalence rate of up to and including 2% would have been deemed as loot boxes having been effectively eliminated by the ban. However, this 82% prevalence rate was significantly higher than 2%, meaning that the policy had not achieved its aim of eradicating loot boxes. I recognised that partial compliance by some companies leading to an overall reduction (rather than elimination) of product availability can also be viewed as desirable and at least partially achieving the regulatory intent of providing better consumer protection. I estimated, using figures reported by the previous literature (Rockloff et al., 2020; Xiao, Henderson, et al., 2023, 2024; Zendle, Meyer, et al., 2020), that Western countries would have a loot box prevalence rate of 65%. It was preregistered that a reduction of 15 percentage points to below 50% could be deemed as evidence of the policy being effective at reducing loot box availability,

while a reduction to below 25% could be deemed as evidence of the policy being highly effective. Unfortunately, the 82% was in fact significantly higher than the hypothetical 65% rate, meaning the policy had not reduced loot box prevalence at all.

Overall, this was very poor legal compliance by companies. Despite threatening to criminally prosecute companies for selling loot boxes, the regulator has not carried out that threat by enforcing the law. Therefore, the ban was largely ignored by companies. The regulator and Belgian Minister of Justice has since admitted to lacking the resources to properly enforce the law as written (Ramboer, 2022).

As to circumvention, a number of games took technical measures to prevent Belgian players from purchasing loot boxes based, presumably, on their IP address. This was easily circumventable through the use of widely available virtual private networks (VPNs) to obfuscate Belgian IP addresses. Other games offering loot boxes were withdrawn from the Belgian market or not published in the country at all (*e.g.*, not searchable and downloadable from the Belgian Apple App Store). However, players can easily change the country settings of their app store to those of another country in order to gain access to these games and spend money on the loot boxes contained therein.

These findings call into question whether any regulator anywhere in the world, even with sufficient funding, is capable of enforcing a ban or indeed any measure on loot boxes given to the volume of content that must be individually moderated for compliance in major digital ecosystems (*e.g.*, over one million games are available on the Apple App Store alone; the situation for the Google Play Store is similar). I identified a number of disadvantages of this most restrictive regulatory approach, which include negative impacts on a country's esports industry (as some games require players to purchase loot boxes to be competitive, and Belgian players can no longer compete in these games). These disadvantages exacerbate the shortcomings of publicising but not actually enforcing the ban, such as unfairly disadvantaging more socially responsible companies who voluntarily complied with the law despite non-enforcement and whose profits are now being taken by less responsible, non-compliant companies.

4.4. Paper 4: Non-enforcement of UK and Nordic gambling laws against loot boxes (Xiao & Henderson, 2024)

Title: Illegal video game loot boxes with transferable content on Steam: a longitudinal study on their presence and non-compliance with and non-enforcement of gambling law

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Link: https://doi.org/10.1080/14459795.2024.2390827.

In a similar vein to Paper 3, Paper 4 assessed the effectiveness of another aspect of the 'regulating loot boxes as gambling' approach. A specific type of paid loot boxes constitutes illegal gambling not just in Belgium but also in most other countries, as the gambling regulators of many Northern European countries have publicly explained (*e.g.*, Spillemyndigheden [Danish Gambling Authority], 2017; UK Gambling Commission, 2017). Namely, these are loot boxes that (i) cost money to buy, (ii) offer random rewards that (iii) possess real-world economic value or are 'money's worth' (*e.g.*, can be transferred between players in exchange for cash). It is not in dispute that such loot boxes are prohibited, but it is also anecdotally known that some prominent examples continue to be illegally sold without any restrictions (*e.g.*, in the *Counter-Strike* video game series) (Drummond, Sauer, Hall, et al., 2020).

Rather than relying on player reports and personal experience with these mechanics, we wanted to empirically show that these products were available for purchase using an objective and comprehensive method. By doing so, we would provide examples against which regulators could enforce the law using, *inter alia*, our evidence. This was done through content analysis of the Steam video game distribution platform. Specifically, we examined the Steam Community Market where in-game items can be bought and sold between players to compile a list of games that offered transferable in-game items. We then reviewed the product descriptions for those in-game items available for purchase and sale between players; the Steam product page for relevant games; and online resources (*e.g.*, YouTube videos and online forums posts) in order to determine the following:

(i)   whether any of these transferable items were loot boxes that could be used to obtain random rewards and, if so,

(ii)   whether the random rewards obtainable from the loot boxes could be subsequently transferred from player to player.

In total, we found 35 games that offered transferable loot boxes with random rewards that could then be transferred between players. This is prohibited by gambling law as interpreted by the UK and Nordic gambling regulators and thus illegal. The Dutch gambling regulator is the only one to have enforced the law (as it was then interpreted by the regulator) against Steam, which led to the operating company (Valve Corporation) disabling the ability of Dutch players to open prohibited *Counter-Strike* loot boxes (Lanier, 2018). However, that interpretation has since been struck down by the court (Xiao & Declerck, 2023).

Valve is also known to have recognised that its *Counter-Strike* loot boxes might be non-compliant with French gambling law and made certain changes to the French player experience to comply (Xiao, 2024c). Official responses to our research findings on the state of non-compliance and non-enforcement were sought from regulators. Fortunately, most replied. But, unfortunately, the process revealed that the regulators of other countries had either not taken enforcement action (for various reasons or without justification) or, in the case of Finland, been unable to take action after trying to do so owing to a technical, jurisdiction issue. In response to peer review, we introduced a longitudinal perspective to this study during the revision phase. The situation remained unchanged one year after the initial data-collection period and after the list of non-compliant games and supporting evidence had been sent to the relevant regulators, further demonstrating failure to enforce the law.

Paper 4 concludes that many popular games on Steam are offering loot boxes that would probably fall afoul of gambling laws in many countries. Again, relevant regulators failed to actively enforce the law just as Paper 3 showed for Belgium, where stricter rules applied. Indeed, the UK government misled the public by declaring that the UK gambling regulator (the UK Gambling Commission) had taken and would take robust enforcement actions against the specific type of loot boxes that does fall within the existing legal definition of gambling. The regulators have *not* proactively enforced gambling law.

4.5. Paper 5: The UK Apple App Store loot box probability disclosure requirement (Xiao, Henderson, et al., 2023)

> **Title:** What are the odds? Poor compliance with UK loot box probability disclosure industry self-regulation
>
> **Published:** *PLOS ONE*, *18*(9), Article e0286681.
>
> **Link:** https://doi.org/10.1371/journal.pone.0286681.

As Paper 2 identified, there is a global trend of moving away from the 'regulate loot boxes as gambling' approach towards better disclosure of relevant information to consumers prior to purchase. Accordingly, Paper 5 examined so-called probability disclosure requirements while Papers 6 to 8 assessed disclosure of the presence of loot boxes. These papers looked beyond legal regulation to additionally examine the impacts (or lack thereof) of industry self-regulation, which many countries are, at present, solely relying on to tackle the loot box issue.

Probability disclosure means informing players of the likelihood of obtaining different potential rewards from loot boxes. For example, a player may have a 5% chance of obtaining a silver gun and a 1% chance of obtaining a gold gun. There are different degrees of detail that probability disclosures could provide. They could state the precise probability for each individual item (potentially providing an overwhelming amount of information when the loot box contains thousands of different items). Alternatively, they could be more succinct and provide only the probability for certain broader categories of items (which may be easier to understand but mislead through lack of detail, *e.g.,* that different items in the same category do not actually have the same individual probability) (Xiao, 2022a, pp. 368–370). This sort of information would hopefully enable players to make more informed purchasing decisions because they know more about how unlikely it is to obtain a very rare reward. They may also potentially be able to calculate how much money they might need to spend, on average, to obtain a specific item.

At the start of this PhD in 2022, only Mainland China imposed mandatory disclosure of loot box probability by law (Xiao, Henderson, et al., 2024). Since then, Taiwan (since 1 January 2023) and South Korea (since 22 March 2024) have also implemented this legal measure. However, all other countries continue to rely on industry self-regulation to implement this measure. In theory, EU consumer protection law requires the disclosure of probability, as per the European Commission's interpretation (2021, p. 105, 2022). But as there has been no enforcement of that position, companies are presumably complying owing to certainly applicable industry self-regulatory requirements rather than potentially applicable consumer protection law.

Our previous research in Mainland China found that the loot box prevalence rate in Mainland China was 91% (Xiao, Henderson, et al., 2024), which was significantly higher than the 59% and 62% rates previously reported from the United Kingdom (Zendle, Meyer, et al., 2020) and Australia (Rockloff et al., 2020), respectively. Since then, it has been reported that some of the most popular games, *e.g.*, *Rocket League* (Psyonix, 2015), had removed loot boxes owing to associated public controversy (Gach, 2019b; Psyonix Team, 2019; Valentine, 2019), giving the (mis)impression that loot box prevalence may have been reduced across the industry as a result. At the time, it was unknown whether this impression was misleading because a few extreme cases were very well-reported and thus biased public perception, or whether this was a broader industry trend that could be observed in practice. Paper 5 set out to examine this issue, among others.

Additionally, in Mainland China, although 95.6% of the highest-grossing iPhone games with loot boxes at the time disclosed probabilities in some form, most disclosures were difficult to access and not visually prominent. One game required the player to ask the customer support bot, accessed through the settings menu, about probabilities in an entirely different language in order to access the information. The information was then presented in an incredibly difficult to read format (Xiao, Henderson, et al., 2024, p. 598, fig. 2). This meant that players may not have been able to access the relevant information in practice despite its technical 'provision'. At the time, it was unknown whether (i) probability disclosures in Western games were available at all and, if so, (ii) whether they were also sub-

optimally implemented, as in Chinese games. Paper 5 also addressed these two research questions.

Indeed, prior works in other domains, such as alcohol (Noel & Babor, 2017), tobacco (Chapman, 1980), unhealthy foods (Sharma et al., 2010), and chemical companies (A. A. King & Lenox, 2000), have challenged the effectiveness of industry self-regulation owing to conflict-of-interest issues. Stronger regulation often undoubtedly means less profit, disincentivising companies and the industries they represent in general from effective self-regulation. Reasonable doubt can therefore be cast on whether video game companies would adequately comply with industry self-regulation relating to loot boxes.

Considering the above, we accordingly predicted that (i) loot boxes would be less prevalent in the United Kingdom in 2021 than they were in 2019 when the data for Zendle, Meyer, et al. (2020) were collected and (ii) fewer games would make probability disclosures in the United Kingdom compared with Mainland China.

Adopting methodologies similar to Paper 3, Paper 5 examined the then-100 highest-grossing iPhone games in the United Kingdom through content analysis of their game and monetisation design to determine whether these games contained loot boxes and, if so, whether the accompanying probability disclosures had been made and, again if so, how they were made.

Our results indicated that 77% of the 100 highest-grossing UK iPhone games contained loot boxes, which was statistically significantly higher than the 59% rate previously reported by Zendle, Meyer, et al. (2020). Contrary to expectations, loot box prevalence did not decrease but rather increased. The few well-reported examples were just that: a few very well and arguably overly publicised and dramatised examples. As detailed below, there are three reasons for the increased prevalence rate (Xiao, Henderson, & Newall, 2022).

First, the methodology used by Zendle, Meyer, et al. (2020) was inferior: in that previous study, the presence/absence of loot boxes was determined mostly through a review of online resources. Only when that proved unhelpful did the researchers then examine the relevant game directly through gameplay (whose length was

neither predetermined nor reported) (Zendle, Meyer, et al., 2020, p. 1769). It is unwise to conclude that a game element was *absent* purely from a review of online resources (a conclusion of *presence*, on the other hand, would be much more reliable). Indeed, even our Paper 5 could not conclusively state that a game did not contain loot boxes; it could only be said that no loot boxes were found within the predetermined length of gameplay and period of online resource consulting. Accordingly, Zendle, Meyer, et al. (2020) failed to notice that a few games contained loot boxes and therefore undercounted loot box prevalence.

Second, Zendle, Meyer, et al. (2020) applied a more limited definition of loot boxes: specifically, so-called social or simulated casino games that allowed players to spend real-world money to purchase virtual currency to bet on (obviously randomised) gambling activities but did *not* allow players to convert any winnings back into real-world money (Derevensky & Gainsbury, 2016; Gainsbury et al., 2014) were not counted as games containing loot boxes. These social casino mechanics are in-game purchases involving randomisation and should be subject to at least the same, if not even stricter, scrutiny as they arguably pose even more obvious harms (Butler, 2022; cf. Zendle et al., 2022). Indeed, social casino games like *Coin Master* (Moon Active, 2015) can also contain traditional loot boxes.

Finally, one game (examined by both studies) started implementing loot boxes after the data-collection period of Zendle, Meyer, et al. (2020) and therefore was not counted. Overall, it would be fair to conclude that the prevalence of in-game purchases involving randomisation against which (self-)regulation would apply was underreported by Zendle, Meyer, et al. (2020).

Two of those 77 games were *Roblox* (Roblox Corporation, 2006) and *Minecraft* (Mojang Studios, 2011), which contained only third-party implemented (or user-generated) paid loot boxes. These two games were not included in probability disclosure-related assessments because the results would have differed vastly from the loot boxes of one third party to another. The compliance situation in those two games also differs from that of other games. The requirement would no longer apply to mere first-party compliance, but a more complicated situation involving multiple parties (with the first-party platform holder potentially needing to police the actions of third parties). Among the other 75 games, only 48 games disclosed loot box

probabilities (64%). This was statistically significantly lower than the 95.6% disclosure rate found previously in Mainland China. Evidence of this much poorer UK compliance rate calls the effectiveness of industry self-regulation into question.

As to the location(s) of probability disclosure, interestingly, the preferred location for disclosure differed between games in the United Kingdom and those in Mainland China, as shown in Table 3. UK games preferred to make in-game disclosures while Chinese games made website disclosures more often. In-game disclosures are likely to be more directly accessible by players, but website disclosures are more easily accessible by interested non-players, such as parents (Xiao, 2022a, pp. 364–367). Only a minority of games in both regions disclosed at both locations. This would certainly be better than disclosure at only one of either location, because players are more likely to view disclosures if there are more opportunities for access.

Table 3

Location(s) of loot box probability disclosures in Mainland China and the United Kingdom

Location(s)	Mainland China (2020; $n = 91$) (Xiao, Henderson, et al., 2024, p. 602)	United Kingdom (2021; $n = 75$) (Xiao, Henderson, et al., 2023, p. 8)
In-game only	21 (23.1%)	32 (42.7%)
Website only	35 (38.5%)	0 (0%)
Both locations	31 (34.1%)	16 (21.3%)
Neither	4 (4.4%)	27 (36%)

As regards probability disclosure accessibility and prominence, we identified eight categories for in-game disclosure formats and four categories for website disclosures. In-game disclosure formats ranged from automatically displaying the probabilities without requiring the player to perform any actions on the most prominent end, to requiring the player to interact with a button not on the loot box purchase page and instead hidden at the bottom of the game settings menu on the least visible end. Only 10.4% of in-game disclosures could be called 'reasonably prominent', defined as including (i) automatic display of the probabilities on the loot box purchase page and (ii) merely requiring the player to interact with an element explicitly referencing 'probabilities' (Xiao, Henderson, et al., 2024, p. 606). None of the website disclosures were reasonably prominent or easily accessible from the home page of the game website.

One final interesting comparative aspect is the situation among the so-called overlapping sample of 39 games assessed in both Mainland China and the United Kingdom. The loot box prevalence rate was 89.7% (35 of 39 games), and the probability disclosure rate was 94.3% (33 of 35 games with loot boxes), which was significantly higher than the 64.3% disclosure rate found among the highest-grossing UK games when excluding the games in the overlap sample. This suggests that games intended for release in Mainland China were more likely to disclose probabilities, and that the UK version of the relevant games was generally not amended to remove probability disclosures. A legal requirement implemented in one place might cause products also available elsewhere to meet a higher standard of consumer protection as a result. This is because, to avoid incurring additional costs, companies may decide to not make two separate versions for release in each country.

Overall, Paper 5 demonstrates how, in relation to loot box probability disclosures, companies seemingly complied significantly less often with industry self-regulation than legal regulation in Mainland China. Policymakers should therefore reconsider whether exclusive reliance on unmonitored and unenforced industry self-regulation is wise, despite certain potential advantages of this approach (*e.g.*, the ability to more quickly adapt to new industry developments as compared to a protracted multi-year legislative process).

(It should be noted that data collection for Paper 5 concluded prior to the start of this PhD, but the research paper was revised and eventually published during the PhD.)

4.6. Paper 6: Age-rating organisations' loot box presence disclosure requirement (Xiao, 2023a)

Title: Beneath the label: unsatisfactory compliance with ESRB, PEGI, and IARC industry self-regulation requiring loot box presence warning labels by video game companies

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Link: https://doi.org/10.1098/rsos.230270.

Besides the probability disclosures addressed in Paper 5, another self-regulatory measure adopted by the industry in response to public concerns surrounding loot boxes is to draw the attention of potential players and their parents to their presence. Paper 6 focuses on the measure taken by North American and European age-rating organisations: highlighting the presence of loot boxes alongside the age ratings of video games.

In April 2020, the Entertainment Software Ratings Board (ESRB) of North America (2020) and Pan-European Game Information (PEGI) of Europe (2020) started attaching an additional message stating 'In-Game Purchases (Includes Random Items)' to games with loot boxes. The PEGI version of the label was initially worded differently but was soon harmonised, although the capitalisation still differs slightly between each organisation, as shown in Figures 2 and 3 below.

The label appeared alongside the game's age-rating information, although this did not always happen. For example, a game's physical packaging often features only the age rating on the front, while both the age rating and disclosure of loot box presence appear on the back of the packaging. This measure was intended to help players and parents become more aware of the presence of loot boxes in the video game.

Figure 2. The ESRB 'In-Game Purchases (Includes Random Items)' interactive element used to indicate loot box presence as shown on a mock-up age rating. © 2020 Entertainment Software Rating Board (ESRB)

**Figure 3. The current PEGI 'In-game Purchases (Includes Random Items)' content descriptor. ©
2020 (Pan-European Game Information (PEGI)**

Regardless of the potential efficacy or lack thereof of the measure at influencing
consumer behaviour (as discussed under Section 5.4), it is important that the
measure is actually implemented against relevant games. Otherwise, even assuming
that the measure is helpful in practice, non-implementation means that no consumer
can benefit from it. I therefore set out to assess whether games with loot boxes were
actually marked with this warning label.

This was done through two separate studies that examined both possible ways for a
video game to obtain an age rating. First, a game intended for physical release (*e.g.*,
as a physical disk or cartridge) must be submitted to the ESRB and PEGI for a
manual age rating. Second, a game intended solely for digital release (*e.g.*, made
available for download on an app store) must go through the IARC system (2022b).
That system asks the developer to complete a questionnaire on game content (*e.g.*,
whether it contains loot boxes) and automatically generates an age rating based on
questionnaire responses. There are some exceptions to these two routes. For
example, games on the Apple app store do not go through the IARC system and
instead are age rated through Apple's own questionnaire (2024a). When Paper 6 was
completed between 2022 and 2023, the Apple system did not ask about or account
for loot box presence. From mid-2024, Apple's own age rating system began to
include loot box presence in response to legal changes in Australia (see Apple
2024b).

In Study 1 on games intended for physical release that were manually rated by the
ESRB and PEGI, I compared the age-rating decisions of one against the other for the

same games to check for any inconsistencies. This was done by scraping the publicly available age-rating records of both systems. After processing hundreds of age-rating entries for each system, I found that 66 games rated by both the ESRB and PEGI were marked with a loot box presence warning label by at least one of the organisations. There were 40 inconsistencies (60.6%) and 26 consistencies (39.4%), which fell below the preregistered 95% consistency rate and therefore was deemed unsatisfactory.

A closer inspection of the data and correspondence with the ESRB and PEGI revealed that PEGI applied the measure retroactively even to games that had been originally rated prior to adoption of the measure in April 2020, while the ESRB did not. The ESRB is not obliged to apply the measure retroactively, even though retroactively providing consumers with the most accurate information would obviously have been better. To account for this difference in retroactive application, 30 games with inconsistent rating information that were originally rated prior to the measure coming into force were removed from the analysis. Four of the remaining 10 games did not actually contain loot boxes, which meant the other age-rating organisation made a false positive-type mistake. One game took a technical measure, the efficacy of which remained in question, to supposedly ensure that the version available in Europe was different and did not contain loot boxes. This left five games that certainly contained loot boxes in both regions. The ESRB culpably failed to highlight loot box presence for four of those games, whilst PEGI failed to highlight their presence in one game. The ESRB admitted to failure in one out of four of those cases (an unacceptable excuse was provided for the other three instances), while PEGI admitted to failure in the single case where it did not attach the label. This meant that Study 1 identified genuine and since admitted mistakes made by both age-rating organisations.

In Study 2 on games intended for digital release on the app store through the IARC system, I focused only on the IARC implementation of loot box warning labels on the Google Play Store for Android (mobile) devices owing to resource constraints. This choice was because I wanted to study mobile games (which constitute most of the games rated by the IARC), and the Apple App Store did not implement the loot box presence measure.

I produced a random list of 100 popular mobile games known to contain loot boxes by collating data from previous studies, including Papers 3 and 5 (Xiao, 2023b; Xiao, Henderson, et al., 2023, 2024; Zendle, Meyer, et al., 2020). Only 29 of those 100 games (29%) displayed the loot box presence warning label on their Google Play Store product listing page, while 71 games (71%) did not. Those 71 games were re-assessed through actual gameplay (with the same method used in Paper 3) to check whether they continued to contain loot boxes: at the time, all (100%) did. This meant that Study 2 could conclude with certainty that 71 popular games with loot boxes (71%) failed to disclose their presence on the Google Play Store while only 29 games did so (29%).

This fell far below the expectation that at least 95% of games would comply with the measure. The IARC provided an unconvincing justification for this widespread non-disclosure: that games rated prior to February 2022 need not comply. Games that continue to be updated and generate revenue should be held to the current standard of consumer protection, not some other outdated and inadequate standard.

Implementation of the loot box warning label of 'In-Game Purchases (Includes Random Items)' was unsatisfactory among games manually rated by the ESRB and PEGI, as shown through Study 1, as well as games automatically rated under the IARC system, as shown through Study 2. Whether parents or players, consumers were not being presented with accurate and up-to-date information about loot boxes on physical PC and console game products or Google Play Store for Android games. Regulators and policymakers were urged to treat this industry self-regulatory measure with a reasonable degree of caution: it cannot be relied on to inform consumers about the presence of loot boxes let alone 'solve' the loot box problem. The paper recommended adopting an improved, uniform, more strongly worded, and consistently implemented label.

In response to the results of Paper 6, the ESRB, PEGI, and IARC all took remedial action to improve the consumer experience: *i.e.*, adding labels to games with loot boxes that were previously incorrectly or inaccurately unlabelled. These are detailed in Paper 9 and summarised under the corresponding section for Paper 9 below. The situation thus immediately improved, but only to a certain limited extent (*e.g.*, a

limited number of popular games I complained about were labelled, but countless other games with loot boxes remained unlabelled).

4.7. Paper 7: Take Two: PEGI's loot box presence disclosure requirement on other platforms (Xiao, 2023e)

Title: Shopping around for loot box presence warning labels: Unsatisfactory compliance on Epic, Nintendo, Sony, and Microsoft platforms

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Link: https://doi.org/10.1145/3630631.

Papers 7 and 8 also focus on the implementation of the loot box presence warning label. This was done to demonstrate that continued and expanded monitoring of the implementation of regulatory measures is helpful for policy evaluation: the more platforms and countries that are assessed, the more comprehensive and reliable the evidence base becomes.

The general background to Paper 7 is described under Paper 6, *e.g.,* when and why PEGI decided to require games to disclose that they contain loot boxes with the 'In-Game Purchases (Includes Random Items)' label. Implementation of this rule extended beyond the Google Play Store to encompass, *inter alia*, the Epic Games Store, the Microsoft Store for Windows and Xbox, the Nintendo eShop, and the Sony PlayStation Store through the IARC system (2022a). One reason why compliance was poor on the Google Play Store could have been the vast volume of content available, which makes it difficult to ensure that every relevant game has duly disclosed the presence of loot boxes (although this still would not explain the disclosure failure of top games, which can be easily monitored). These other stores for console and PC have far fewer games to monitor and regulate. These platforms are also operated by major video game companies (*e.g.,* Nintendo) that could scrutinise third-party content more rigorously than Google is able to. Finally, PC and console games are far less likely to contain loot boxes, thus further reducing the number of games that need to be monitored for compliance. Therefore, it was

hypothesised that compliance could be higher on the other named platforms as a result.

A list of games that received the relevant loot box label by the age-rating organisation (and so definitely contained loot boxes) was collated using the results of Paper 6. This process also accounted for subsequent remedial actions taken by the age-rating organisations to correctly label games that were previously incorrectly unlabelled, as identified in Paper 6. These games were searched for on the Epic, Microsoft, Nintendo, and Sony stores. A total of 60 games were available on at least one of those four platforms. In addition, 12 games known to contain loot boxes were added to the sample to increase the total number of games studied on the Epic and Nintendo stores. These 72 games formed the sample.

The results are presented from the most compliant store to the least. On the Microsoft store, 49 of 55 games (89.1%) were labelled. On the Sony store, 26 of 37 games (70.3%) were labelled. On the Nintendo store, 13 of 24 games (54.2%) were labelled. On the Epic store, only one out of 14 games (7.1%) was labelled. None of the platforms met the 95% labelling rate deemed satisfactory, although Microsoft came close. Its relatively high compliance rate demonstrates that such a measure could potentially be effectively implemented on platforms with far fewer games to monitor. But as it stood, consumers also could not rely on the accuracy of loot box presence information provided by the four other stores examined, beyond the Google Play Store.

The unsatisfactory situation in the Nintendo store could be partly explained by the higher prevalence of free-to-play titles rated through the automated IARC system rather than the manual PEGI system. The IARC system is less reliable because it relies on developers providing accurate responses to the questionnaire and mistakes are fixed only through post hoc corrections, meaning that consumers are exposed to potentially erroneous rating in the meantime. On smaller platforms such as the Nintendo store, where only approximately 100 games needed to go through the IARC system, it would not be unreasonable to add an extra step involving manual confirmation of the automatically generated IARC rating prior to publication.

The Epic store essentially failed to implement the measure in practice, despite publicly promising to participate in the IARC system (thus implying that loot box presence would be denoted if relevant). Until relevant measures have been implemented, the storefront should not be advertised as complying with a higher standard of industry self-regulation as this misleads consumers into believing that they are better protected on said platform when they are not.

Consumers should not be told to rely on the measure as it was then implemented. Again, as with Paper 6, PEGI and the IARC took remedial action in response to the results of Paper 7 by adding loot box warning labels to games that should have it, so the situation has since improved to an extent. Nevertheless, the loot box labelling requirement could be made more robust. Forms of regulation that are more accountable than exclusive industry self-regulation with no public oversight should be considered. One approach might be so-called 'co-regulation', whereby legislators set out regulatory aims and a minimum standard that the industry self-regulator must then at least meet and perhaps strive to exceed. This was precisely what was subsequently adopted in Germany, as Paper 8 explored.

4.8. Paper 8: The USK's loot box presence disclosure requirement (Xiao, 2024f)

> **Title:** Is loot box presence in video games being correctly and consistently labelled? Comparing all age-rating decisions made by the German USK, the American ESRB, and the European PEGI in 2023

> **Published:** In *Proceedings of the 2024 IEEE Gaming, Entertainment, and Media Conference (GEM)*.

> **Link:** https://doi.org/10.1109/GEM61861.2024.10585443.

From 1 January 2023, the USK (Unterhaltungssoftware Selbstkontrolle) started attaching the label '*In-Game-Käufe + zufällige Objekte* [In-game purchases + random items]' to games with loot boxes, as shown in Figure 4. This was done not because the industry self-regulator decided to act on its own volition to improve consumer protection, but because the law that the USK must implement was amended by German legislators to include loot boxes (or '*glücksspielähnliche Mechanismen*'

[gambling-like mechanisms] as German law described them) as an issue that risks impairing the development of children and young people (§ 10b(3) JuSchG (*Jugendschutzgesetz* [Protection of Young Persons Act])).

This constitutes a more accountable form of combined legal regulation and industry self-regulation, or so-called 'co-regulation', in which there is public oversight and control over the activities of the industry self-regulator (which can no longer behave however it pleases). The law required not only highlighting loot box presence but also taking this presence into account when making age-rating decisions (*i.e.*, potentially increasing a game's age rating owing to loot box presence, as loot boxes are deemed unsuitable for younger children). In contrast, the ESRB, PEGI, and IARC label examined in Papers 6 and 7 was purely informational, and loot box presence was not taken into account when making age-rating decisions, meaning that the lowest rated games by the ESRB (2024) and PEGI (2024), *i.e.*, ESRB Everyone ('generally suitable for all ages') and PEGI 3 ('suitable for all age groups'), may, and in fact did, contain loot boxes, *e.g.*, *EA Sports FC 24* (Electronic Arts, 2023).

Figure 4. The USK '*In-Game-Käufe + zufällige Objekte* [In-game purchases + random items]' label used to indicate loot box presence as shown on a mock-up age rating. © 2023 Unterhaltungssoftware Selbstkontrolle (USK)

The results of Papers 6 and 7, which found that other organisations and platforms have not been able to highlight loot box presence accurately and consistently, cast doubt on whether this measure would be well implemented by the USK in practice. To ensure continued monitoring, it was also deemed potentially insightful to check whether the age-rating decisions made in 2023 by the ESRB and PEGI have all been accurate. This would represent an improvement on their previous performance prior to 2023, as assessed in Study 1 of Paper 6. Again, this was done to expand policy

evaluation to other contexts to broaden the evidence base and confirm that previous studies were reliable and reproducible.

In relation to games intended for physical release that were manually rated by each of the three organisations, emulating the methods of Study 1 of Paper 6, all age-rating decisions made by the ESRB, PEGI, and the USK in 2023 (which Paper 6 could not consider as it focused on decisions made prior to 2023) were scraped. This produced three lists of games that were recently attached with the loot box presence label by each of the age-rating organisations: 16 individual titles were identified for the ESRB, 14 for PEGI, and 10 for the USK. When combined, this produced a list of 22 unique games labelled by at least one age-rating organisation. The ratings of different organisations were then compared with each other.

This comparison revealed that two games were not labelled with the loot box presence warning by the USK, even though PEGI and/or the ESRB had noted their presence. These two games were downloadable contents (DLCs) or expansion packs to pre-existing games originally rated before 2023 and prior to the new USK rule coming into force, which could explain the missing label. However, consumers were being provided with inaccurate information: players of the two DLCs would encounter loot boxes but had not been duly informed. In contrast, the ESRB and PEGI correctly labelled all games with loot boxes that they rated manually, which marked an improvement on their previous performance as assessed in Study 1 of Paper 6. More reliance could be placed on the ESRB and PEGI rating information. However, failure to correctly label the DLCs as containing loot boxes is an issue that potentially affects both the USK and ESRB ratings owing to their policies.

Paper 8 also found that all games with loot boxes rated in 2023 had been given an age rating of at least 'USK 12' (*i.e.*, suitable only for children 12 and above) by the USK (2024). These included the popular sports simulation games, such as *EA Sports FC 24* (a rebranded continuation of the controversial *FIFA* series, see Xiao & Declerck, 2023). Previous games in the same series, *e.g.*, *FIFA 2023* (Electronic Arts, 2022), were given only USK 0 because there was no objectionable content. The USK (2023) explained that this change was partially a result of the presence of loot boxes. *EA Sports FC 2024* still received only the lowest 'PEGI 3' and ESRB 'Everyone' from the other two age-rating organisations because they do not take loot box presence

into account when making decisions around the age part of the rating. Although the USK (2023) has stated that games will be assessed on a case-by-case basis, it appeared that the current established practice of the USK is to rate games with loot boxes as 'USK 12' at a minimum. This can be seen through the age-rating decision of *Madden NFL 24* (Electronic Arts, 2023), which received USK 12 solely because of loot box presence (while the age rating for *EA Sports FC 24* also highlighted other potentially problematic aspects besides loot boxes, such as the non-monetary '*Handlungsdruck* [Pressure to act]').

After discovering this presumed policy, through exploratory analysis, I also checked whether 30 games labelled as containing loot boxes on the Google Play Store were receiving 'USK 12' age ratings at a minimum. These games received a variety of different age ratings, including 'USK 0' and 'USK 6', which are below 'USK 12' and should not have occurred if the policy was uniformly implemented. However, a number of newly released games that were rated 'PEGI 3' or 'PEGI 7' did receive 'USK 12' (rather than the lower 'USK 0' or 'USK 6', which would have been more consistent with the PEGI rating). This suggests that the 'USK-12'-at-a-minimum-for-the-presence-of-loot-boxes policy had been applied in some select cases, *e.g.*, in relation to *eFootball 2024* (Konami, 2023) and *EA Sports FC 24 Companion* (Electronic Arts, 2023).

Requiring or imposing (in all previous cases, despite not being required to do) a minimum age-rating requirement is a new approach to loot box regulation that goes beyond merely highlighting the presence of loot boxes. Australia has also since adopted it (see DITRDCA, 2023) by requiring games with loot boxes to be rated 'Mature (M)', or not recommended for those under the age of 15 years, at a minimum. Games with simulated gambling, including social or simulated casino games/mechanics, must be rated the highest 'Restricted (R 18+)', meaning they are legally restricted to adults only (Australian Classification Board, 2024a).

This approach of imposing a higher age rating for video games containing loot boxes is more restrictive and interventionist than merely providing information about the presence of loot boxes. Parents are provided with more information about loot boxes and advised that they may not be suitable for young children (as opposed to merely informed of their presence without any further guidance on whether the mechanic is

suitable for children). All aspects of age-rating decisions are arguably subjective so the fact that some parents might not agree with the opinion that loot boxes are unsuitable for, say, 10-year-olds should not dissuade regulators from providing public health advice if deemed appropriate. The non-restrictive nature of the Australian 'M' rating (compared with the 'MA 15+' rating, which legally restricts access to those aged 15 and above) is more flexible in that it informs without imposing any restrictions, although stakeholders who advocate for stricter regulation of loot boxes may find the measure insufficiently robust. A parent can decide to not follow government advice, override the age-rating decision, and give the game to a child younger than the age of 15 years if desired.

One shortcoming of this regulatory approach is that it arguably encourages companies to produce games only for older children and adults. This might result in decreased access to video game products by younger children. For all intents and purposes, a football simulation game without loot boxes is not controversial and should be available for everyone to play. Forcing an age rating of 12+ or 15+ means that younger children may no longer have access to such games. It would be wise to encourage (or even demand, as a condition for otherwise selling loot boxes) companies to produce a separate version of the game without loot boxes that is suitable for younger children.

(The direct response from the USK was obtained only after the publication of Paper 8 owing to a four-month delay in their response. It thus did not appear in Paper 8 and is summarised instead in the literature review section of this thesis to reflect the current regulatory position around the world; see Section 2.2.4.1.)

4.9. Paper 9: Impacts on policymaking and corporate practice (Xiao, 2023d)

> **Title:** Opening the compliance and enforcement loot box: A retrospective on some practice and policy impacts achieved through academic research
>
> **Published:** *Societal Impacts*, *1*(1–2), Article 100018.
>
> **Link:** https://doi.org/10.1016/j.socimp.2023.100018.

Paper 9 sought to document the post-study impacts of Papers 3 and 6 on policymaking (specifically, whether the results were taken into account by government and legislators) and corporate practice (specifically, whether video game companies and industry self-regulators did or stopped doing something).

Paper 3 found that the Belgian ban on loot boxes has not been enforced in practice. The preprint version of the findings published at the end of July 2022 was widely publicised by the media in more than 50 reports in over 16 languages (*e.g.*, 3DJuegos, 2022; Carter, 2022a; Nightingale, 2022; Rousseau, 2022; 爆裂真菌 [Exploding Fungus], 2022). A Belgian journalist, Ramboer (2022), was able to secure direct responses to the results from the Belgian gambling regulator and the Minister of Justice of Belgium, who admitted to the unsatisfactory state of affairs of insufficient resources to enforce the law in practice.

Subsequent to my study, the company behind *Roblox* (Roblox Corporation, 2006), one of the most popular games played by young people today (Lyles, 2020), reportedly led a 'program to comply with laws in [...] Belgium' (Carter, 2022b). This was required because the different gameplay experiences on the Roblox platform are actually operated by many third-party companies, thus Roblox Corporation cannot directly institute any changes to game and monetisation design. One of the most popular experiences or sub-games on *Roblox*, *Adopt Me* (Uplift Games, 2017) withdrew its services from Belgium because it offered illegal purchasable loot boxes.

The game did not comply with the law when the regulator first announced their interpretation back in April 2018 (Belgische Kansspelcommissie [Belgian Gaming Commission], 2018), unlike other companies that immediately complied at the time or reasonably soon thereafter (2K Games, 2018; Nintendo, 2019; Square Enix, 2018). The compliance actions led by Roblox Corporation and taken by at least *Adopt Me* occurred over four years after the original ban was announced. Similarly, another game containing loot boxes, *Empires & Puzzles* (Small Giant Games, 2017), confirmed in August 2022 that the ability to make in-game purchases had been 'indefinitely turned off' for Belgian players in response to their complaints about no longer being able to make purchases (Traggeter & Petri, 2022).

There is little doubt that the July 2022 publication of my preprint of Paper 3 caused this new batch of very overdue compliance actions to occur in August and September 2022. All of these companies should have complied back in 2018. This is perhaps surprising, but companies appear to rely on media reports to learn about the laws of other countries. Beyond academic and policy purposes, academic research on current issues could also be capable of influencing corporate behaviour and thereby improving compliance and consumer protection. The crucial role of the media in popularising the academic research findings must be acknowledged: it is highly unlikely for an academic paper to reach industry practitioners and enable change, but this could be made possible with the help of journalists whose stories the industry does read. Actively engaging with journalists (*e.g.*, sending summaries of research results) and building collaborative working relationships (*e.g.*, being responsive to requests for comments) could prove fruitful for everyone and benefit the public.

Like the aforementioned companies, policymakers evidently also took Paper 3 into account when making decisions after its preprint was published in July 2022. In October 2022, for example the UK government stated in the House of Lords (the upper house of Parliament) that it was monitoring 'research' in Belgium on policy implementation and would consider 'evidence' of the effectiveness (or lack thereof) of the measure in practice before deciding whether or not to copy the position (Kamall, 2022). This was a direct reference to my research. Paper 3 was published following peer review in the academic journal *Collabra: Psychology* on 17 January 2023, over three months later than the House of Lords debate. This means that the source from which the UK government had obtained the results of Paper 3 was either the preprint or media reporting thereof and could not have been the peer-reviewed version of record.

Rapid sharing of not yet peer-reviewed preprints helps with informing policy more quickly. Although the preprint results can be subject to change, it is often better to provide evidence of a potentially lower standard than to deprive policymakers of any relevant evidence at all, particularly considering that other stakeholders, such as pro-loot box video game industry representatives and anti-loot box lobbying groups (*e.g.*, Royal Society for Public Health, 2019), also present evidence but are highly unlikely to meet the standard of even preprint versions of academic research.

Australian policymakers similarly took empirical evidence on compliance and implementation derived from Paper 3 into account when recommending law reform (House of Representatives Standing Committee on Social Policy and Legal Affairs, 2023, pp. 144–145, paras. 6.76–6.77). Indeed, during consultation, the Australian industry body representing the video game industry relied on the preprint version of Paper 3 to argue against stricter loot box regulation without highlighting the preprint nature of those results (Interactive Games & Entertainment Association (IGEA), 2022, p. 11), confirming that other stakeholders are willing to rely, and have relied on, non-peer-reviewed evidence. Another team of academic researchers also submitted evidence that included the preprint results of Paper 3 but duly noted its then-preprint nature (Drummond, Hall, Lowe-Calverley, et al., 2022, p. 7). To properly inform policymakers, academic researchers need not be overly cautious and should be willing to publish and discuss preprint results – and even submit such valuable evidence to law reform consultations along with the relevant disclaimer that the results are subject to change following peer review.

Paper 6 found through two separate studies that certain games intended for physical release that were manually rated by the ESRB and PEGI and many digitally released games rated through the automated IRAC system were not correctly labelled as containing loot boxes. The results were communicated to journalists whose reporting informed both the industry (Sinclair, 2023a) and players (Ngan, 2023). Both the ESRB (also representing the IARC), and PEGI replied to my correspondence (Bosmans, 2023; Vance, 2023) and took remedial actions by correcting the ratings of many games, adding the missing loot box presence label. Four months after the research was published, PEGI (2023) also reported that it had taken enforcement actions against two companies, whose games intended for physical release were manually rated for failing to disclose loot box presence to PEGI during the rating process, in the form of a fine of €5,000 each. That academic research led regulators to take remedial and enforcement actions against companies shows how academia can have tangible and practical impacts that benefit consumers, *e.g.*, by ensuring (i) the provision of more accurate information and (ii) dissuading companies from failing to comply (in the future).

More importantly, however, one of the companies fined was Activision Blizzard for failing to disclose loot box presence when applying for a rating decision for *Diablo Immortal* (Activision Blizzard, 2022). This game was identified as having failed to disclose loot box presence on the Google Play Store's IARC system only through Study 2. That the game also failed to disclose directly to the ESRB and PEGI when applying for a manual rating decision for the game's physical release was not identified by Study 1 because of a key limitation of that study: games that did not disclose loot box presence to both the ESRB and PEGI could not have been identified through a cross-comparison of their rating results, which included only games that had been labelled by at least one of them, as such games would not have appeared on either list or been considered for comparison. It is encouraging to see PEGI taking enforcement actions beyond what was directly identified through academic research. Academic research can benefit from such external scrutiny and engagement.

5. Discussion
5.1. General state of non-compliance and non-enforcement: What can be done?
5.1.1. Non-compliance by companies: Better information leads to better outcomes
Overall, it is fair to conclude that most loot box regulations adopted in multiple regions across the world have not worked effectively and some continue to remain highly ineffective. For example, companies were selling loot boxes in Belgium despite the general 'ban', as reported in Paper 3 (Xiao, 2023b). Companies were also selling illegal loot boxes that constitute illegal gambling in other countries, as identified through Paper 4 (Xiao & Henderson, 2024). Contrary to platform rules, many companies failed to disclose loot box probabilities prominently or even at all, as shown in Paper 5 (Xiao, Henderson, et al., 2023). Finally, companies failed to disclose the presence of loot boxes, which is mandatory in multiple contexts, as demonstrated in Papers 6 and 7 (Xiao, 2023a, 2023e).

Beyond the present findings, other results from my team not included in this thesis further evidence broad non-compliance: for example, 93% of UK video game adverts on social media did not disclose loot box presence as required (Xiao, 2024b); less than 10% of games complied with Dutch consumer protection law (Xiao, 2024a); and although the compliance situation is slightly better in East Asia owing to the more active enforcement and potential cultural differences, non-compliance was still

widespread (Xiao, 2024e; Xiao & Park, 2024). (No other research team has assessed compliance with loot box regulations, hence the lack of references to others.)

On the one hand, one may conclude that companies simply do not care what the rules are and either intentionally fail to comply (because they know the rules will not be enforced; non-enforcement is discussed immediately below in Section 5.1.2) or recklessly disregarding the rules by failing to conduct the necessary due diligence to learn them and comply. That is probably true in relation to some of the less socially responsible companies, and they probably require the commencement of criminal prosecution or other strong measures before they could be forced to comply.

On the other hand, we have seen some companies take compliance action following the publication of some results presented herein and other research I have undertaken (*e.g.*, Minassian, 2024), as detailed in Paper 9. This means that at least for some companies, their non-compliance was not deliberate. It was a lack of knowledge of the law that prevented them from complying. They do not wish to break the law but simply do not have enough resources to learn about rules in multiple countries (likely to be applicable to smaller companies) or have not allocated sufficient resources to the issue (applicable to larger companies), which is more culpable.

This is a problem that can be addressed. Policymakers and regulators could conduct education campaigns targeting both domestic and foreign companies to encourage better compliance (for discussion of other informal enforcement methods, see Section 5.1.2.). Researchers and journalists could also certainly play a part in helping to improve the situation. Efforts on my part are as follows:

(i)   complaints to relevant regulators asking for better enforcement of rules (*e.g.*, in relation to UK advertising regulations, as discussed in Section 2.2.6; see ASA, 2024d);

(ii)   active engagement with policymakers and regulators, requesting clarification of certain points and also correction of their mistakes (as illustrated by the examples in Section 2.2 and Paper 2);

(iii)   annually summarising relevant regulations in an article for the leading industry publication to inform companies (Xiao, 2022d, 2023f);

(iv)   encouraging the media to publicise rules and related enforcement actions in order to better inform companies and dissuade them from non-compliance (*e.g.*, Sinclair, 2023b, 2024), as discussed in Paper 9; and

(v)   personally writing to game companies and complaining publicly on social media, requesting that specific issues be fixed, *e.g.*, asking Supercell to amend the Dutch version of *Clash Royal* (Supercell, 2016) to disclose the probabilities for loot boxes contained therein (see Ali-Löytty, 2024).

My individual actions have led to positive changes, although I do have qualms about whether continuing these actions is sustainable, as discussed in Section 5.2.1.

5.1.2. Non-enforcement by regulators: Informal enforcement is better than none

The unfortunate situation of non-compliance is not just a failure on the part of the companies, but also a failure on the part of the relevant government regulator, industry self-regulator, and platform owner responsible for enforcing the rules. The Belgian gambling regulator failed to enforce the ban on loot boxes. The gambling regulators of many Northern European countries (including Denmark and the United Kingdom) failed to enforce gambling law. None undertook to criminally prosecute companies, despite publishing threats – later shown to be empty – to do so. In contrast, the Dutch and Finnish authorities at least attempted to enforce the law, even though they ultimately failed (see Xiao, 2024c; Xiao & Declerck, 2023). Apple failed to enforce its own platform rule requiring loot box probability disclosures by delisting and removing non-compliant games. The ESRB, PEGI, the IARC, and relevant storefronts all failed to accurately label games with loot boxes by the dedicated loot box warning label. The issue is therefore not simply one of non-compliance, but also one of non-enforcement.

Active enforcement undoubtedly would have reduced the likelihood of non-compliance. Such enforcement, in the first instance, does not necessarily need to take the form of drastic criminal prosecutions or delistings from app stores. More informal methods of enforcement could lead to tangible results, such as regularly publishing more information about and publicising the rules; translating rules from the local language into English (as was laudably done in South Korea) or other languages used by major video game companies that the rules are targeting (*e.g.*, Chinese, Korean, Japanese, Finnish, Hebrew, and Turkish); and sending

correspondence outlining concerns to major companies that fail to comply by a certain deadline – perhaps threatening more drastic measures. I was able to convince some companies to comply simply by emailing them or complaining on social media as a mere researcher (*e.g.*, Ali-Löytty, 2024). Regulators with official responsibilities can certainly achieve a lot more through similar actions. Regulators have complained about the lack of resources, but these informal actions would not cost much at all compared with actual criminal prosecution through litigation.

We understand that an estimated 85% of all spending was made on the 100 top-grossing mobile games (Joseph et al., 2023, p. 7253). Regularly monitoring and taking informal enforcement actions against the most popular games would be a valid and cost-effective policy that addresses the bulk of potential harms and protects a majority of players. A lack of resources sufficient to address every problem does not mean that regulators should take basically no action at all, as occurred in Belgium and elsewhere. The Italian consumer protection regulator should be recognised for taking enforcement action against two major companies, Activision Blizzard and Electronic Arts, that led those companies to better comply with EU consumer law (AGCM, 2020a, 2020b), as discussed in Paper 2. The Dutch consumer protection regulator also recently did the same against Epic Games (ACM, 2024), as discussed above in Section 2.2.8. Similar actions in other countries against leading companies could have major impacts beyond national and regional borders. Unfortunately, the Italian regulator has not enforced the rules as proactively since 2020, and the Dutch regulator has not enforced all relevant rules against Epic Games, such as the requirement to provide a price in euros for all in-game purchases, despite obvious breaches. A consistent and persistent effort would be ideal.

External pressure could also be placed on regulators to more actively enforce rules. I have done this in relation to loot box presence warning labels as described in Papers 6, 7, and 9. This involved externally and independently scrutinising the regulator's past work or highlighting the absence of which; communicating any failures to them; and asking for remedial action. Companies have been forced to comply and even fined for bad behaviour. These would discourage future non-compliance. Advertising regulations in the United Kingdom is another area against which I have been able to push the regulator to enforce more proactively, as discussed in Section 2.2.6. By gathering evidence and submitting it to the advertising regulator as part of

specific complaints against individual companies, I have secured rulings that restated the rules publicly and received both video game and advertising industry media attention, and that were thereby probably circulated widely among industry practitioners.

On the other hand, this sort of pressure does not always work: Paper 4 was specifically intended to gather evidence for gambling regulators, because they lack funding and other resources to do it themselves, and share that data with multiple relevant regulators to help with potential enforcement. Although many regulators responded and engaged with me, which may not have happened had the study been conducted by less persistent researchers or if I did not have the help of established local researchers when initially making contact, no regulatory enforcement action has been taken in the year since the initial publication of the preprinted results. The evidence still informed regulatory practices, or so regulators have stated, but setting expectations reasonably low with such policy engagement would be wise. Researchers should always attempt to impact policy, but expect nothing.

5.1.3. Towards future solutions: Continued monitoring

A strong theme that emerges from this research programme is that the mere adoption of a regulatory measure does not necessarily (and probably does not) entail satisfactory compliance. The continued monitoring of various measures in practice, post-implementation, can inform both (i) domestic policymaking by identifying non-compliance and the need for better enforcement and (ii) foreign policymaking by advising on how future laws could be drafted and enforced better elsewhere to avoid similar shortfalls. The simple adoption of rules will not solve the problem by itself. It is important to regularly and continuously assess the implementation of those rules. Even if the rule is well-designed and effectively addresses the underlying problem (many of the current rules in the loot box domain likely do not, see, *e.g.*, Denoo et al., 2023; Garrett et al., 2022; and Xiao, Fraser, et al., 2023, as discussed below under Section 5.4), poor compliance means that it will not benefit the wider public. Once non-compliance is detected, efforts to increase compliance are necessary to ensure that regulatory aims are achieved.

When a rule is made, funding should be allocated to monitor compliance and implementation. The only country publicly known to have dedicated a significant

number of resources towards such efforts is South Korea. It did so in relation to its recently adopted probability disclosure law, as briefly discussed in Section 2.2.2. As we reported elsewhere (Xiao & Park, 2024), the relevant regulator regularly monitors the most popular games and those subject to player and media complaints for compliance. Furthermore, the regulator has sent informal requests for compliance in the first instance to many companies and also formal demands for compliance threatening severe negative consequences where required (김 [Kim], 2024). These actions are encouraging to see. They should be emulated by regulators elsewhere and duly funded by policymakers as a necessary cost for ensuring the adopted rules are actually applied in practice.

Unfortunately, besides the South Korean example, compliance and implementation around the world has generally not been assessed by those who should be responsible for doing so, *e.g.*, national gambling regulators, consumer protection regulators, advertising regulators, industry self-regulators, and platform owners. I believe that my team has performed this function through our academic work, including this thesis. We have provided insightful evidence and improved compliance as detailed in Paper 9, for example. But it is not sustainable in the long-term to rely on academic researchers to perform what should be a duly and specifically funded public function.

Stepping back, if my team had not conducted our research – if I had never undertaken to write this thesis – then the research would probably never have been done at all. I do not imagine any other team would have done what we did, given that no other research group has since produced adjacent research to complement our outputs (which would be most welcomed and enhance the reliability of the literature by diversifying research expertise and methods). That means, for example, (i) many companies would still fail to comply with Belgian gambling law and (ii) many popular games with loot boxes would still fail to disclose their presence because the remedial actions described in Paper 9, for example, would not have been taken. Similarly, policymakers in other countries, such as the United Kingdom (Kamall, 2022) and Australia (House of Representatives Standing Committee on Social Policy and Legal Affairs, 2023), would not have benefited from the evidence of poor implementation in Belgium to inform their national policies.

That is a concerning thought. In addition, many more countries are adopting different rules for loot boxes owing to the global fragmentation of regulation discussed below in Section 5.3. All of these new rules need monitoring and all previously adopted but still effective rules also require continued assessment. The amount of effort required has increased drastically. In the past, it was possible to track all relevant regulation because little existed. Now, there is a great deal – perhaps too much to track. This year, in 2024, I benefited from the award of an EliteForsk Travel Grant from the Danish government in the final year of my doctoral research. With this funding, I sought to conduct fieldwork in Mainland China (Xiao, 2024e), South Korea (Xiao & Park, 2024), the Netherlands (Xiao, 2024a), and the United Kingdom to further examine the regulatory compliance of mobile video games. These results have not yet been peer reviewed and published and so are not included as part of this thesis *per se*, but are referred to where appropriate alongside other pieces of grey literature. The scope of some of these studies had to be reduced, while for others, I had to request help from colleagues to complete data collection. This personal experience demonstrated that it is certainly no longer possible for one person to monitor loot box regulation compliance around the world even with the help of a few colleagues.

5.1.4. Opportunities and funding for more video game research

Notwithstanding, I do believe that the line of research presented herein is demonstrably and directly beneficial to public policy. Furthermore, it is scalable and worth pursuing in the long term. In an ideal scenario, governments and platforms making the rules would dedicate more funding to policy implementation, compliance monitoring, and enforcement. But recognising practical realities (*i.e.*, that more funding is unlikely to materialise in the short-term, if at all), more academic efforts in lieu would benefit the public. An academic policy observatory could be established with proper funding for multiple team members, and with the intention of growing even further, to enable both the (i) continuous monitoring of existing policies that have already been adopted and previously assessed (*e.g.*, replications and extensions of Papers 3 to 7, similar to how Paper 8 expanded on Paper 6) and (ii) additional scrutiny of newly adopted policies around the world as they arise, *e.g.*, compliance with South Korea's new probability disclosure law (Xiao & Park, 2024).

To prevent redundant and duplicative work and explore possibilities for potentially powerful collaboration, regulators and academic researchers should have conversations about research agendas. Academic researchers have been astute in identifying specific gaps in evidence that should be filled to inform policymaking. Regulators who work on multiple different areas and are therefore usually more generalists would have additional insights into the research needs of other areas that more specialist academics may not notice.

It is fair to say that video game regulation has not been on most government agendas despite the activity being one of the most popular. The European video game industry trade body reported that, in Europe, 53% of people aged 6 to 64 years, or approximately 126.5 million people, played video games in 2022 (Video Games Europe, 2023, p. 8). The figures elsewhere in many parts of the world would not be too dissimilar. Globally, video game policy – especially as it pertains to stricter regulation and consumer protection – has simply not received a proportional amount of attention. In contrast, tax relief regimes to develop the video game industry for economic and cultural benefits have been popularly adopted in many countries (see Webber, 2020).

It is encouraging to see more recent government policy recognise the importance of video games in our everyday lives. For example, the UK government published the Video Games Research Framework designed to encourage further academic research into the sector that would benefit public knowledge and inform policy (Department for Culture, Media & Sport (DCMS) (UK), 2023b). However, that framework was not accompanied by any earmarked research funding. This means that despite the strong call for action, researchers must still turn to pre-existing funding opportunities. The government therefore failed to truly enable research in an area of obvious interest. Put bluntly, if governments truly care about video game research, then they must put their money where their mouth is and fund it.

5.2. Privatisation of regulation: Unreliable industry self-regulation

The so-called privatisation of regulation is a recognised phenomenon in the wider literature. Rules are becoming privatised: private entities (*e.g.*, industry bodies, non-governmental organisations), digital platforms, and even consulting firms (Fransen & LeBaron, 2019), rather than governments, are designing, interpreting, and

enforcing rules. This has been observed across contexts ranging from anti-corruption (K. Hall, 2013), the environment (Green, 2010), and labour-related issues (Vandenbroucke, 2024) to internet governance (Quintais et al., 2023), *e.g.*, YouTube's copyright strike system purporting to enforce some manner of US intellectual property law on a global scale (see *Moviebox Megastores Intl v Rahi* [2023] EWHC 501 (Ch)).

Privatisation is reflected in the loot box domain by the wide adoption and preference for industry self-regulation. Instead of the government legally compelling companies to disclose loot box probabilities (as in South Korea), private platforms and trade bodies have set similar requirements without legal oversight, such as Apple and Google requiring all games on their app stores to disclose probabilities (Gach, 2019a; Kuchera, 2017). American and UK video game trade bodies have further promised that their members would disclose probabilities (Entertainment Software Association (ESA), 2019; Ukie (UK Interactive Entertainment), 2023).

The suggested advantages of industry self-regulation are that
    (i)   a dedicated, specialist video game regulator would have more relevant expertise than a generalist government regulator (*e.g.*, the consumer protection regulator responsible for scrutinising all commercial industries);
    (ii)   the rules could be more flexible and amended more quickly to address novel developments, compared with protracted legislative processes to change the law that can take years to advance and an additional year to take effect; and
    (iii)   costs are reduced for all parties involved, meaning fewer or even no strains on public finances (Ogus, 1995, pp. 97–98).

Still, there are also disadvantages:
    (i)   the industry self-regulator appears biased and would often indeed be conflicted about acting against the industry's commercial interests (Edwards, 2017), which would mean that
    (ii)   the rules might not be sufficiently strict or proactively enforced;

(iii)   relatively ineffectual industry self-regulation might be used as a strategy to dissuade or forestall effective legal regulation (*e.g.*, Pantani et al., 2012); and

(iv)   some unscrupulous companies may decide to not follow the industry self-regulatory rules and, owing to lack of legal enforcement powers, thereby remain unregulated. This is detrimental to the interests of both consumers and other rule-abiding companies.

An example illustrating this last point is how a Finnish company operating in the United Kingdom (*e.g.*, Supercell) may decide not to follow the industry self-regulatory rules (*e.g.*, disclose the presence of loot box in any advertising for the game) set by the national video game industry trade body, Ukie, which has little to no recourse to stop this rule-breaking behaviour. UK consumers are harmed as they will download the game not knowing it contains loot boxes and the risks involved. Rule-abiding UK companies are disadvantaged as the irresponsible companies' games are probably downloaded more frequently due to a lack of loot box presence disclosure. And Ukie's reputation is also tarnished as it would be perceived as being incapable of enforcing its own rules and ensuring consumer protection.

This thesis assessed the implementation of a mix of both formal legal regulatory measures (*e.g.*, the Belgian ban on loot boxes, which stems from gambling law, in Paper 3) and industry self-regulatory measures (*e.g.*, the ESRB's loot box presence disclosure requirement in Paper 6). Looking beyond the overall result that no measure of either type seemed to have been implemented well and considering wider works in the literature, it can be concluded that, unsurprisingly, comparable legal regulatory measures on loot boxes are better implemented than industry self-regulatory ones and therefore more effective at protecting consumers. Paper 5 presented evidence that compliance with Apple's industry self-regulatory requirement for games to disclose probabilities (64.0%) (which, in the United Kingdom, is also arguably a legal requirement under consumer law but is not necessarily viewed, nor has it been enforced, as such) was worse than compliance with Chinese law (95.6%) (Xiao, Henderson, et al., 2023) and South Korean law (84.4%) (Xiao & Park, 2024).

Previously, South Korea relied on industry self-regulation to require companies to disclose probabilities until March 2024; since then, it was discovered that the previous industry self-regulator had arguably misled the public by suggesting that compliance was high when it almost certainly was not (Xiao & Park, 2024). Cases where no probabilities or even false probabilities had been given during the industry self-regulatory period were uncovered (McEvoy, 2024a; Park et al., 2023). The fact that the GRAC (*i.e.*, the since-appointed legal regulator) took so many enforcement actions regarding loot box probability disclosures since March 2024 (when disclosures should have been well implemented given the prior industry self-regulation) further casts doubt on whether the previous industry self-regulatory rules were indeed supposedly well implemented (김 [Kim], 2024). In any case, in South Korea, a dedicated official regulator now provides better consumer protection than the previous industry self-regulator, even though this process probably costs the public more money.

The benefits of more accountable forms of regulation could also be seen through how the German age-rating organisation, the USK, is recognising and addressing the problem of young children accessing loot boxes more proactively by restricting access to only those aged over 12 years. The USK is technically an industry self-regulator but is required to regulate according to German law under a so-called 'co-regulation' arrangement (Better Regulation Task Force, 2005, p. 26). It is more active than the wholly industry self-regulatory North American ESRB and European PEGI, which have not taken any steps to restrict young children's access to loot boxes. The Irish advertising regulator's unwillingness to act against industry interests even when doing so would have certainly better promoted the public interest (as detailed in Section 2.2.7) also reflects poorly on the efficacy of industry self-regulation.

Given these many instances of past failings, governments should reconsider relying on industry self-regulation to address the loot box issue, as the United Kingdom is doing at present (DCMS, 2022, 2023a). The industry is clearly biased in preferring this approach, but has repeatedly demonstrated around the world that it is unwilling to assume more social responsibility. Even when relevant measures were likely highly ineffective at reducing potential harms (as discussed in Section 5.4) and could have been easily implemented at little to no cost, compliance was still unsatisfactory. Legal regulation may be more costly but could be justified in terms of the additional

consumer protection it provides. The industry could also be required to fund the relevant costs, such as through a higher tax on randomised in-game purchases that may then also discourage their implementation outright.

5.2.1. Privatisation of enforcement, too?

Another aspect of the privatisation of regulation is how, owing to limited government resources, the enforcement of certain rules is not carried out centrally by a regulator but instead through private civil suits or similar processes (Goldring, 1990). Rather than asking a regulator to monitor product safety in general and to criminally prosecute companies that bring unsafe products to market, for example, consumers who are harmed may seek compensation through civil legal proceedings against the company. This reduces the burden on public funding and could be a more efficient way to achieve the ultimate regulatory aim of ensuring product safety. But by placing the responsibility for enforcing the law onto individuals, less-resourced consumers who are unable to assert their private rights as strongly may be unfairly disadvantaged.

The implication of this privatisation of enforcement within the loot box domain is that private parties are expected to take action to seek legal enforcement. Often, no one will seek to privately enforce the law when harms are not obvious because no one has a particular interest in doing so. Therefore, in many cases, this required me, as an interested academic researcher, to personally take action. For example, the UK advertising regulator did not act against the widespread phenomenon of failure to disclose loot box presence in video game advertising. Enforcement actions were taken only at my prompting, as detailed in Section 2.2.6. The problem here is that costs are necessarily incurred by the private party who intends to enforce the law, in terms of time spent and obtaining relevant legal and video game expertise.

This cost for me has been absorbed in part by my PhD research fellowship: the time spent pursuing enforcement of the law was viewed as time spent on research (although I have certainly worked beyond my normal paid hours). As I already possessed the relevant expertise, I did not have to pay for legal advice. This has been justifiable thus far because investigation of legal enforcement in practice is a valid line of research enquiry. But once the first few precedents are set through enforcement (which has already occurred in the United Kingdom), there is little

academic justification for continuing to fund research that seeks further enforcement of the law. However, the problem has not been solved: illegal video game advertising that fails to disclose loot box presence remains widespread today, so consumers remain exposed to harm. Continued monitoring and enforcement in the long-term are required, but who will fund it? Academic funding sources will eventually be exhausted (indeed, one research funder, understandably, refused to monetarily contribute towards costs that exclusively related to policy engagement), and reliance on individual volunteers is not sustainable. It may be hyperbole to say the government is abandoning its people, but the government certainly needs to provide adequate funding to ensure enforcement. This has not been done in the United Kingdom in relation to video game regulation.

Another concerning aspect is that governments seem (entirely) reliant on academic research to inform policymaking. The then Conservative UK government said, in relation to the industry self-regulation on which it has decided to rely to address loot boxes, that it 'welcomes independent academic scrutiny' and, in fact, '[it wants] to see independent research and academic scrutiny of the implementation of these industry-led measures…' (DCMS, 2023a, paras 3, 21). At the risk of sounding overly self-important, those references to 'independent research' and 'academic scrutiny' are to me and me alone. No one else is conducting similar research. I feel pressured to continue working in this area as I fear there is no one to take my place in helping to ensure evidence-based policymaking. Many other examples of the positive benefits that the present research has brought, which otherwise would not have materialised (*e.g.*, policymakers in multiple countries not acquiring the knowledge that a loot box ban does not work in practice), are set out in Section 5.1.3 above.

It is important to be cynical and self-critical. Accordingly, I have qualms about letting governments, regulators, and policymakers become so reliant on academic research for their own work (which should be otherwise funded and conducted). The encouragement of further monitoring of policy implementation through academic research, as argued in Section 5.1.4, contributes even more to this arguably unhealthy and perhaps unsustainable dependency. The diversion of academic research funding towards this (albeit certainly impactful) end and production of useful research could make governments even less likely to properly fund policy research and enforcement because they now expect to obtain these services from

academia for free. In turn, funding is taken away from other research areas. However, I do not see another solution that would benefit consumers as governments are not easily persuaded to provide more funds towards the implementation and enforcement of video game policy.

5.3. Fragmentation in regulation: Negative consequences for compliance

One contributing factor to the lack of knowledge of regulations and struggle to comply among relevant companies is that regulations around loot boxes are piecemeal, complex, and fragmented across the world. This is true even for regions, such as the European Union, where laws are supposed to be more harmonised (possibly identical) and easier for companies to comply with; different countries cannot agree on what the appropriate degree of regulation would be (Cerulli-Harms et al., 2020, pp. 9, 42). It is not surprising that the more rules there are, the harder it is for companies to comply with all of them. Similarly, the more languages those rules are written in, the less likely it is that companies can understand and comply with them all.

Although some rules are now widely adopted and effectively global (*e.g.*, mandatory disclosure of loot box probabilities), specific requirements apply in different countries. For example, South Korea demands a very high degree of detail (Xiao & Park, 2024) while Taiwan requires the display of a specific warning message alongside the probability disclosure (Xiao, 2024c). Other rules apply only to some countries, *e.g.*, only the United Kingdom has formally upheld the mandatory disclosure of loot box presence in video game advertising, even though the rule should apply in the European Union as well as they stemmed from the same source and have not been altered following Brexit (European Commission, 2021, p. 105, 2022). Other countries have decided that the same rule either does not apply at all (*e.g.*, Singapore; see ASA, 2024e) or not to the same degree (*e.g.*, Ireland, as explained under Section 2.2.7; see ASAI, 2024a). This fragmentation makes research difficult too, because many more jurisdictions and rules must be separately and continually assessed.

Video games, and by implication the loot boxes contained therein, are global products that are marketed simultaneously to all countries. Once a game is uploaded to an app store, for instance, it is usually listed on all versions of the store in all

countries (*i.e.*, over 150 different stores). The products are supposed to comply with the laws of every country where they are marketed, but this requires a significant amount of due diligence and compliance work that is not realistic for most video game companies to undertake on their own. Loot box compliance, or perhaps video game monetisation compliance, has arguably developed into its own area of private legal practice. Many law firms prominently advertise their experience in advising on loot boxes to potential clients (*e.g.*, Lewis Silkin, 2024; Taylor Wessing, 2024), thus demonstrating demand from video game companies for this service. However, most companies simply cannot afford to pay for such advice in many dozens of jurisdictions around the world.

5.3.1. Potential negative consequences of regulation

For now, these regulatory requirements have not yet contradicted each other in the sense that something forbidden in one country is not yet been specifically required in another. A company is thus still theoretically able to produce a version of a game that could potentially comply with regulations everywhere. Yet it is foreseeable that rules may clash in the future, requiring that specific amendments be made for different national versions and thus further increasing the costs of game development and compliance. Because loot boxes are not permitted in Belgium at all, for instance, an internationally compliant version of a video game cannot implement loot boxes. This does not yet represent a contradiction because companies can choose to not include loot boxes as their implementation is not specifically required in another country.

However, that Belgian rule has already led to a number of major companies deciding to either not release their games in Belgium (*e.g.*, Partis, 2022) or remove their already released games from Belgium (*e.g.*, Nintendo, 2019). This is because it was deemed not profitable to either design and operate a different national version of the game for Belgium only or to remove loot boxes from all versions of the game in all countries. Belgian players are thus deprived of certain gameplay experiences as a result of regulation. Paper 3 explores this issue of loss of access to some extent. However, the paper overlooked one aspect of the issue as I lacked relevant perspective at the time of its writing. I have since been informed by players with lived experience of harm not from loot boxes but from the *regulation* of loot boxes who contacted me through social media.

This novel aspect is what happens to players who are invested (financially, temporally, socially, emotionally, etc.) in the game at the time when the game is changed or removed, whether owing to the adoption of new relevant regulation or a company deciding to comply with pre-existing regulation that they previously did not comply with, for whatever reason. The South Korean regulator recognised this issue as potentially harmful to consumers: specifically, if access to a game needed to be prohibited for non-compliance with the loot box law, Korean players would be negatively affected (although in all likelihood, given the circumvention-related findings of Paper 3, these players may well be able to find ways to play the game anyway). If Korean players can no longer access their accounts, they lose everything they had invested – including money. Owing to the game's terms and conditions, it would be unclear whether a refund would or must be offered and whether the player could otherwise claim compensation in law.

It should also be acknowledged that players may not necessarily want only their money back. Players would also lose access to an entertainment activity they enjoy and their social network of online friends. In September 2024, it was announced that *Pokémon UNITE* (TiMi Studio Group & The Pokémon Company, 2021) would be withdrawn from the Belgian and Dutch markets (The Pokémon Company, 2024). Players launched a petition requesting that the game be amended to remove loot boxes so that it would comply with Belgian law rather than be removed from the market entirely (Carbillet, 2024). The company is unlikely to accede to this demand given that the potential financial benefits would be outweighed by the amount of work and costs required to amend the game. The game's profitability would also be heavily impacted by the removal of loot box features.

The adoption of new laws affecting some people negatively in some ways for the benefit of others (and perhaps even, on balance, eventually overall benefiting those who were initially affected negatively in some way) and in the public interest is a regular occurrence and not disagreeable in and of itself. But what has been revealed here is that regulators did not adequately plan for the potential fallout of policy implementation. No loot box regulation anywhere in the world stated what should happen in the event a game is removed from the market for non-compliance. It would not be unreasonable to legally require companies such as that behind *Pokémon*

UNITE to at least refund all players affected, especially as the situation arose in the first place owing to the criminal rule-breaking of the company.

A more ideal solution may be to require the company to produce a legally compliant version of the game. Yet that is not commercially realistic unless the company decides to stay in the market despite financial losses (perhaps for brand recognition purposes, among other reasons). The same unfortunate situation has already occurred in Australia, where new loot box regulations were adopted without reference to potential consequences under older laws. This resulted in companies automatically and almost certainly unintentionally committing criminal acts rather than having ample opportunity to comply, as detailed in Section 2.2.3.3.

5.4. Regulatory ineffectiveness, regardless of compliance

This thesis has focused on assessing compliance with regulations. However, there is another side to the coin that is effective policymaking: the underlying measure ought to be effective in the sense of adequately addressing the underlying problem (*e.g.*, reducing potential harm; see Raustiala, 2000). To illustrate, we might agree that the policy of keeping a fire extinguisher at home reduces potential damage. For that policy to be 'effective', there must be broad acceptance in the form of people having many fire extinguishers in all of their homes (*i.e.*, compliance). However, the fire extinguisher itself must also be effective at extinguishing the fire when used (*i.e.*, efficacy). One without the other, in either case, would make the policy ineffective. Even if compliance were 100%, the policy could still be ineffective if it is incapable of changing the underlying behaviour.

Generally speaking, research beyond this thesis strongly suggests that most loot box policies adopted thus far probably have limited efficacy as detailed immediately below. This is unfortunate and should be improved on. However, it does not render compliance studies irrelevant because finding potential ways to improve compliance and setting up the necessary groundwork would mean any future policies with efficacy could, upon adoption, be widely implemented so they very quickly benefit players.

5.4.1. Real player circumvention of the Belgian ban on loot boxes

In Belgium, Paper 3 found that dedicated players could still spend money on loot boxes by circumventing regulations – even for games that had complied with the so-called ban either by taking technical measures to prevent players from making in-game purchases or through removal of the game from the national app store. I proved this point in theory by demonstrating that I myself could circumvent regulations while physically in Belgium. However, my ability to do so was not evidence that real Belgian players had actually done so.

This issue was investigated by Denoo et al. (2023) through a survey of Belgian players between 11 and 18 years old. As part of a wider survey, the researchers analysed 453 responses to an optional question asking participants how they managed to open loot boxes after the ban was implemented (pp. 378:6–378:7). A substantial minority of young players (27.4%) demonstrated they clearly knew at least one way to circumvent the Belgian ban on loot boxes. The researchers identified nine different practices that included relocating the account (*e.g.*, changing the country setting away from Belgium) and using a VPN, which were the two most popular.

I tried and tested both methods, which Paper 3 showed to be capable of circumventing the ban. It is thus excellent to have confirmation that real players engage in these relatively simple transgressive practices to circumvent the national ban. In combination, these two papers show how complementary studies can enhance the other's trustworthiness in a manner similar to how replication can enhance credibility. Empirical legal research is known to struggle with these aspects (Chin et al., 2021), as discussed below in Section 5.8.

5.4.2. Loot box presence warnings: Neither well-understood nor practically useful
The ESRB and PEGI loot box presence warning label that most platforms now use to disclose the presence of loot boxes has been criticised since its inception. On its face, the measure already did not appear to be particularly robust (Xiao, 2021b). One reason is because the label does not refer to 'loot boxes', 'gacha', or similar terms that players actually use to describe these in-game purchases involving randomised elements on online forums or social media when they discuss such mechanics. Instead, the ESRB and PEGI decided to invent a new and inaccessible terminology

unfamiliar to the public; the average parent reading this label is unlikely to understand either what it means or its implications (*e.g.*, potential harms).

Indeed, empirical research has found that, under experimental conditions, most consumers do not fully understand that this label refers to the following two elements: (i) financial expenditures and (ii) randomised outcomes. Although 75% of participants in one study understood that financial expenditures were involved, only 36.3% understood the message as meaning that randomised outcomes were involved (Garrett et al., 2022, p. 6). In contrast, when a warning label used the word 'gambling', over 75% of participants understood that randomised outcomes would be involved (Garrett et al., 2022, p. 6). These findings demonstrate the importance of word choice in any warning label.

Another problem is that the label appears in small text and is therefore far less visually prominent than the graphic depiction of other potentially problematic elements, such as the image of a raised fist denoting violence in Figure 3. This appears to suggest that loot boxes and in-game purchases in general are viewed as less problematic than other elements and thus given far less prominence. Indeed, neither the presence of loot boxes nor the general presence of in-game purchases are considered when the ESRB and PEGI decides which age rating to assign to video games, meaning that games rated 'ESRB E' or 'PEGI 3' (*i.e.*, suitable for everyone) and supposedly appropriate for very young children to play may sell loot boxes. In contrast, Australia and Germany have recognised that these monetary aspects are potentially problematic and not suitable for younger players aged under 15 or 12 years, as discussed in Sections 2.2.3 and 2.2.4.1, respectively.

A further issue is that too many games are now marked as containing loot boxes, which means the presence label is losing its meaning and impact. The measure was intended to inform consumers. But given the high prevalence of loot boxes in games on mobile platforms, especially, a large percentage of games are now labelled (*e.g.*, 80% in Western countries). That severely reduces the potential efficacy of the measure as the information it provides is no longer particularly useful in practice. The label is not helping consumers to choose when most options contain loot boxes, as consumers have little real choice. Players are faced with the practical reality that if they want to play popular video games on mobile platforms (whose popularity

might be a reflection of perceptions of high 'quality' among players) or the game of choice for their social group (which is highly likely to contain loot boxes if it is a mobile game), then they must accept the fact that they will encounter loot boxes and be pressured to spend money on them, *i.e.*, they must accept the relevant risks and expose themselves or their child to potential harms.

Indeed, when all members of a child's friendship group are playing a certain video game containing loot boxes, then neither the child nor their parent arguably has a choice. The provision of more child-friendly versions of a game, wherein loot boxes have been removed or can be turned off, would be ideal. But again, companies are unlikely to provide such an alternative, unprofitable version for commercial reasons.

5.4.3. Can probability disclosures reduce spending?

Probability disclosures were foremost intended merely to provide information and ensure transparency, but it has also been suggested that informing players of their odds of winning could potentially reduce more irrational spending. This is because upon learning how unlikely it would be to obtain rare rewards, some players might make more informed decisions and be less likely to spend money. Still, no empirical research has been published on the efficacy of probability disclosures at reducing irrational spending. It is also questionable whether the results obtained from experimental conditions are informative as to how players would act in real life: it would be difficult, if not impossible, to replicate in a quick experiment how deeply players care about and value potential loot box rewards.

For example, some loot boxes offer players a small chance at unlocking the ability to play as their favourite characters (*e.g.*, in *Genshin Impact*). The parasocial relationship (see Dibble et al., 2016) that a player may have built up with in-game characters occurred naturally over many months and potentially many hundreds of hours of gameplay (Blom, 2022). The emotional value attached to the non-monetary aspects of digital possessions is not easily replicable in artificial conditions. The ideal environment to assess the effectiveness of probability disclosures is thus likely through implementing different variations in a live commercial video game and conducting A/B testing.

Yet some potential experiments may already be impossible to conduct owing to legal requirements and platform rules. There is arguably no circumstance where a loot box without the disclosure of probability is permitted. Therefore, it would no longer be possible to test loot boxes with disclosure against loot boxes without. Still, other research questions remain answerable, such as whether different methods of disclosure have varying impacts on players.

My team has conducted one relevant study on the potential effects of probability disclosures (Xiao, Fraser, et al., 2023, pp. 654–655). Specifically, we surveyed Mainland Chinese players as to whether they saw legally required probability disclosures; where they saw them if they did; and how seeing the disclosures affected their subsequent spending. An important caveat is that our data were self-reported. Nearly all players who purchased loot boxes (84.6%) saw probability disclosures; this rate may be lower in countries with worse probability disclosure rates, *e.g.*, Western countries (Xiao, 2024a; Xiao, Henderson, et al., 2023). More players reported seeing probability disclosures in-game (80.7%), rather than on official websites (44.3%), which suggests that in-game disclosures were more visually prominent and more likely to be accessed. But as argued elsewhere (Xiao, 2022a, p. 365), it is important to also provide non in-game options to enable concerned non-players, such as parents, to easily access probability disclosures (as opposed to forcing them to do so through the game, which takes time).

Regarding the effect of seeing a probability disclosure on spending, 72.4% of players who bought loot boxes reported no change in their spending behaviour; 19.3% reported spending less; and 8.3% reported spending more. This shows that probability disclosures may have limited impact on the spending behaviour of most players. However, if the 19.3% of players whose spending was reduced represented the highest-spending players at most risk of harm, then the measure would have achieved important goals. This aspect was not considered.

In addition, there is a potential backfire effect that should be acknowledged. A small minority of players (8.3%) reported spending *more* money after seeing the probability disclosures. This may initially appear insensible, but could be attributable to how some disclosures actually inform players that they would be guaranteed to receive a rare reward after a certain, predetermined number of

purchases, *i.e.*, so-called 'pity' mechanics (see Xiao, Fraser, et al., 2023, pp. 646–647). Upon learning that, a player close to reaching the target and triggering such a pity mechanic may choose to additionally spend the remaining amount of money required to guarantee obtaining the rare reward.

5.4.4. The dubious efficacy of broader video game policies

Loot boxes do not represent the only area where governments have tried to regulate video games. There have been other attempts and none were very effective. For example, both South Korea and Mainland China have tried to limit the length of time young people can spend playing video games. From 2011, South Korea prohibited those under the age of 16 years from playing online games between midnight and 6 AM with the aim of better ensuring (*i.e.*, increasing) their sleep time. But post-implementation research showed that even though sleep time increased very slightly immediately after the rule became effective, that benefit dissipated as the years passed at least partially because the prohibition could be easily circumvented (Choi et al., 2018; Lee et al., 2017). The South Korean policy was ultimately repealed in 2021 owing to ineffectiveness and the importance of giving parents and children more flexibility rather than imposing paternalistic unilateral measures (Bahk, 2021). This case demonstrates how empirical evaluations of policy implementation can ensure evidence-based policymaking.

Mainland China restricted how long those under the age of 18 years can play video games in 2019 (Xiao, 2020), then made those rules even more strict in 2021 to combat online gaming addiction (Xiao, 2021c). Post-implementation research has similarly shown no evidence of the policy achieving the desired effect of reducing heavy play (Zendle, Flick, Gordon-Petrovskaya, et al., 2023). Zhou et al. (2024) found that even under-18s who reported complying with gameplay time restrictions often spent their time on other activities also deemed 'undesirable', such as playing other games against which the restrictions did not apply (*e.g.*, offline console games) (23%); watching video game streams (20%); watching short videos (*i.e.*, TikTok-equivalent) (59%); watching anime or TV (51%); and reading internet novels (20%). Policy evaluations can therefore identify not just ineffectiveness, but also other negative consequences. Interestingly, although originally unreported, a closer scrutiny of Zhou et al.'s sample (2024) revealed that a significant number of those under the age of 18 years did not comply with the older 2019 rules at all (Xiao, 2024d).

5.5. Misunderstanding of the legal position

One emerging theme is that stakeholders are often not well informed as to what the regulatory position for loot boxes is in either their own country or other countries. This is reflected in two ways: a lack of knowledge or the inaccuracy of existing knowledge. To illustrate, Sections 5.1.1 and 5.3 discussed how some companies fail to comply with the law because they do not know it well. Some companies did not comply with the Belgian ban on loot boxes because they did not know such a ban was in place, and they quickly complied on learning about it from the publication of Paper 3. This is less concerning in that the provision of information could resolve the issue, as suggested in Section 5.1.1. Once people are duly informed, then there is no problem. The possession and spread of inaccurate knowledge is more concerning and can be demonstrated through how many companies chose to comply with a since-overruled and more restrictive regulatory position in the Netherlands (*e.g.*, Carter, 2022b; Partis, 2022; The Pokémon Company, 2024), even though they can now rely on a judicial authority and basically have blanket approval to sell any type of loot boxes (Xiao & Declerck, 2023).

Both players and journalists have often misunderstood legal positions. Leaving aside mistakes in lesser-known publications and player comments on online forums (which are more forgivable), even leading media venues such as the BBC have published incorrect legal statements. These include references to 'some countries, like … the Netherlands, … have banned [loot boxes]' (BBC, 2023) and 'some countries have already banned loot boxes, including … the Netherlands' (BBC Newsround, 2023). Such statements would have been oversimplifications if published before the relevant court decision in March 2022 but were literally incorrect when they were published in 2023, over a year after the relevant judgment (Afdeling Bestuursrechtspraak Raad van State [Administrative Jurisdiction Division of the Council of State] (The Netherlands), 2022). These were not isolated incidents, either: Australian law was misunderstood and miscommunicated by well-respected publications with a wide reach, such as *The Guardian* (May, 2024), 1News (Al Saafin, 2024), and *The New Zealand Herald* (Craig, 2023). Naturally, policymakers and the public then pick up misinformation from these sources and spread it even further, as illustrated by the slew of legal mistakes that were made during the Bremen State Parliament debate on loot boxes discussed in Section 2.2.4.2.

When mistakes are made 'officially' in, *e.g.*, parliamentary debates and government press releases, the problem becomes even more serious. One wonders how much misinformation (mis)guided policy decisions without the public knowing. Policymakers should always be careful not to make mistakes in relation to the laws of other countries, but doing so is more forgivable than if they misunderstood their own country's laws. The Australian and Spanish ministers in charge of loot box regulation literally misrepresented their own policies to the public, as discussed in Sections 2.2.3.3 and 2.2.5, respectively. These mistakes were probably unintentional, but the relevant minister and their team failed in their duty to accurate inform the public. They misled players, parents, and companies to the detriment of all stakeholders.

This general disregard for reporting actual legal positions accurately can be further observed in the academic literature. For example, Zendle, Petrovskaya, and Wardle (2020) claimed that loot box probability disclosures were required in China owing to 'national lottery laws' (p. 2) and 'Chinese lottery legislation' (p. 5), which is broadly true as to what legal requirements exist but the 'lottery law' part is an invented fiction. This is not too worrying because at least the research was not based on an incorrect legal interpretation and can therefore be safely relied upon. More concerningly, Zhou et al. (2024) omitted key legal developments in their background review, failed to account for them in their study design, and presented the results in a misleading manner out of context, as I commented on elsewhere (Xiao, 2024d). The often-misquoted Dutch legal position on loot boxes was also mistakenly described in papers that I have peer reviewed (which meant they were corrected prior to publication) and in Bank (2023), which I did not review. I have tried for over a year since that paper's original September 2023 publication to correct the public record and, despite the Editor-in-Chief promising a corrigendum that the original author acceded to in January 2024, the paper remains uncorrected as of October 2024. Just as with media reports containing incorrect facts, the academic literature is also misleading members of the public who read it.

I have sought to correct the public record when the relevant venue is sufficiently important (the aforementioned examples in the media have all been corrected thanks to responsive journalists, but one case required a complaint to the Australian media

regulator to force the correction and other cases remain uncorrected). But just as with making complaints to regulators and continually monitoring compliance with various rules across multiple jurisdictions, this task cannot be sustainably conducted by one single volunteer. And although *post hoc* corrections may prevent future readers from being misled, all previous readers of the incorrect version of the article have already all been misled. Given the delay in securing a correction, the vast majority of readers likely saw the incorrect version. Accordingly, journalists should seek expert opinions pre-publication rather than address their mistakes after the fact. Researchers should similarly involve local and legal expertise to ensure their research does not misinterpret and misrepresent the law.

Some parallels between the frequent misunderstanding of loot box regulation and so-called 'pseudolaw', or ideas that appear to have a legal origin but are patently false and have no actual grounding in law (Netolitzky, 2018, p. 420), can be observed. This phenomenon has been highlighted here, and future research is needed to understand how these ideas developed and spread (*e.g.*, through a video game news report that first misinterpreted the law or through stakeholder failure to keep up to date with the law as it changed) and what harms they might cause (*e.g.*, making companies less likely to comply, or policymakers incorrectly proceeding on the basis that other countries have done something they did not do). Methods for preventing the spread of misinformation should also be tested and put to use (*e.g.*, J. Kim et al., 2018).

5.6. Difficulties with regulating technology: Theoretical aspects

The regulation of loot boxes and video games more broadly are not issues that somehow exist in a vacuum. They certainly involve specific or unique factors. For instance, it requires significant skill and time investment before certain content can be observed for compliance and they are frequently updated, so minor changes are difficult to detect and record. But many other digital products (*e.g.*, online pornography) similarly require regulation and, in fact, have been subject to regulation for far longer because they have existed for longer.

Generally, it could be said that the regulation of the internet or cyberspace more broadly remains an unsolved problem and challenge. Lessig (2006) used the example of online gambling as something that is less 'regulable' than offline gambling (pp.

15–16). That applies to loot boxes in comparison to, for example, physical card packs, which would be easier to regulate as they are much less changeable and always within jurisdiction. Loot boxes have many features that make them difficult to regulate, including being (i) technically difficult for regulators to understand (the 'knowledge' problem); (ii) offered by many different companies in many different games in many different variations (the 'volume' problem); and (iii) offered by foreign companies that are either not subject to regulation or not realistically within the reach of enforcement (the 'jurisdiction' or 'enforcement' problem).

This thesis has focused on exploring the practical implementation of the law and has not spent time considering more theoretical aspects, which future research should examine. For example, it could be said that the IARC age-rating system asking game companies to complete a questionnaire and then assigning ratings based on the responses represents 'code' that is attempting to regulate video games and enforce the relevant 'law', applying Lessig's 'code is law' idea (2006, p. 5). The problem arises when the 'code' departs from the 'law'. As discussed in Section 2.2.4.1, the USK has implemented, or at least is in the process of implementing, a German national version of the IARC questionnaire that automatically deems games with loot boxes as unsuitable for those under 12 and therefore gives them a 'USK 12' rating at a minimum in all cases (von Petersdorff, 2024). As the USK has said itself, German law merely asks for loot box presence to be taken into account and the rating decision should be made on a case-by-case basis, which does happen for the comparatively small number of games intended for physical release that are manually rated by the USK (von Petersdorff, 2024).

But owing to the vast volume of games available for digital download on app stores, such as the Google Play Store, a shortcut must be taken to ensure cost effectiveness when giving all of those games age ratings. The German national application of the IARC system 'code' applies a mutated form of the original law: hypothetically, under the 'law', there are games with loot boxes that should have nonetheless received an age rating lower than 'USK 12' despite loot box presence; however, this is not possible under the 'code'. The right to due process of game companies is being infringed upon by automation. To resolve this problem, the USK should allow companies to appeal their automatically generated IARC age ratings (perhaps for an additional cost), which would then be subject to manual assessment.

5.7. Access to better research data: Beyond industry data-sharing collaborations

As mentioned in Section 2.1.2.3.2, despite repeated calls from academic researchers, advocacy groups, and policymakers to share data on loot box spending to enable better research, the industry as a collective and companies as individual entities have all refused to do so. This intentional omission has deprived the public of the best available evidence, so the industry is not entitled to rely on that point to argue against stricter regulation.

There has been one very recent exception: the study by Amano and Simonov (2024) that used data associated with a game no longer in operation and provided by a Japanese company. This study therefore could only analyse the spending data without reference to player circumstances. Nonetheless, a number of interesting findings were presented, including the following:

    (i)   95.7% of paid in-game currency was spent on loot boxes (showing how when a game is monetised with them, most players will basically only buy loot boxes);

    (ii)   90% of spending was made by 1.5% of players, who might be described as 'whales' (see Close et al., 2021); and

    (iii)   the highest-spending players bought 50,000 paid in-game currency (priced between US\$0.60 and US\$1.20), meaning they spent at least US\$30,000 over, at most, a four-year period (assuming they played for the entire period the game was in operation).

This study demonstrates that some concerns associated with the highest-spending players are indeed justified, and that industry data can shed light on many questions academic researchers would struggle to answer reliably using self-reported data (*e.g.*, the very small minority of highest-spending players, who are very few in number, might never participate in the study but would, of course, be included with industry data). The study reinforces many points established by other studies in the literature through the use of actual industry (rather than self-reported) data but, importantly, clearly demonstrates that potential for better research using real data. It might indeed be easier to convince companies that no longer sell loot boxes, *e.g.*, Epic Games (Valentine, 2019), to share data as their data have become less commercially sensitive.

There is a wider debate about the use of data shared by the industry for academic research. These data represent so-called 'digital trace data' (Ohme et al., 2023) that would not only be more accurate than self-reported data, but also far more granular. The data would reveal things that players themselves would not have recorded nor even have noticed in some cases (Yin-Poole, 2018). A number of data-sharing agreements were signed between the Oxford Internet Institute of Oxford University and leading video game companies (such as Nintendo and Electronic Arts). These led to a number of important and insightful publications that have informed the public debate with better quality evidence (*e.g.*, Johannes et al., 2021). But although laudable, one major criticism is that these agreements lead to conflicts of interest that potentially compromise research integrity (Xiao, 2023c; Zendle & Wardle, 2022). Companies choose what data are (and are not) shared, so commercial interests dictate what research can (and cannot) be conducted to the highest standard using the best available data – similar to the discretionary funding of only certain research questions (Xiao, 2023c).

Curiously, leading members of the industry have been perfectly willing to enter into data-sharing agreements with academic researchers in relation to other research questions. This includes data concerning whether time spent playing video games negatively impact wellbeing (Johannes et al., 2021, 2022) and whether so-called 'violent' video games make people more aggressive (Johannes et al., 2022). Neither is true. It so happens, then, that the research produced results that supported the industry's commercial interests and narrative. An adverse inference can be made: the data on player spending on loot boxes, which the industry has refused to share, will likely lead to results unfavourable to commercial interests and support the prevailing academic findings based on self-reported data.

Indeed, it would not be outrageous to suggest that some video game companies likely already conducted similar studies using their own data and, after finding adverse results, decided against sharing the data more widely. This is because if the potential findings could have been beneficial, the industry would have been heavily incentivised to share that data and publicly disprove the very strong and commercially damaging allegations that academics are making against one of the industry's most profitable business models. The industry has effectively forced

academic researchers, policymakers, regulators, and the public to rely on inferior quality data.

In my view, the potential conflicts of interest that data-sharing agreements may lead to should be acknowledged, but such research should still be encouraged as the results do inform the public. One video game company has even implemented a research version of the game that included psychological surveys (Vuorre et al., 2023). There are many opportunities to explore. However, research not involving the industry should be conducted in conjunction using other methods (Ballou, 2023, p. 2:11–2:14). Data donation is an approach that could be done in multiple ways. For example, Petrovskaya and Zendle (2023) asked participants to report the amount of time and money spent on video games based on what was recorded by their hardware devices. This is a more 'objective' source than self-reported data but has less industry involvement in terms of what is shared and what is not.

Similarly, Ballou et al. (2024) ingeniously built a tracking tool and harvested gameplay time data from a specific video game platform, which meant there was no industry input on data collection. The major critique here is that both methods required a significant amount of manpower: Petrovskaya and Zendle (2023) required player-provided screenshots to be manually processed in order to extract relevant data (p. 5), while Ballou et al. (2024) had to laboriously build a dedicated tool for data harvesting that could stop working at any moment if the relevant platform is discontinued or even if its user interface changes (p. 11).

Another potential avenue for obtaining data is to forcibly demand digital trace data from companies by making data access requests under data protection law (*e.g.*, under Article 15 of the EU General Data Protection Regulation (GDPR) [2016] OJ L119/1) (Ballou, 2023, p. 2:12–2:13). In theory, companies are required to provide all data held in relation to the user and thus can no longer choose to share only some data and not others. But again, the data collection procedure is strenuous. Even though filing a request might not be too difficult, legal knowledge is required to check the data provided and, importantly, pursue companies for probable omissions. Then, a large amount of data (most of which are likely irrelevant) must be processed. The data from different game companies are probably also difficult to combine together. Importantly, for the dataset to be valuable, a large number of

players must be organised together to make a batch of requests, possibly alongside answering survey questions. In addition to these difficulties, the participants who self-select into participating might not represent the population.

In short, researchers are starting to explore many other methods of collecting data on video games beyond self-reporting from online convenience samples. Industry data-sharing collaborations have arguably been the most explored and fruitful, but are at risk of raising potential conflicts of interest. Less prestigious institutions and researchers, too, may not have equivalent access to potential opportunities (Ballou, 2023, p. 2:12). Other methods that have been attempted or suggested are laborious, but researchers should persevere through those difficulties to provide better evidence to the public. Incentive frameworks, *e.g.*, academic publishing and promotions, should be revised to account for the quality of the research rather than the quantity (Feist, 1997). Doing so would encourage researchers to explore more robustly but less productively (merely in the sense of producing publications) rather than to continue to rely on convenience samples and self-reports.

5.8. Open science for (empirical) legal research

The adoption of open science practices differs across disciplines. Empirical legal research has fallen behind others in terms of preregistration and data and code sharing (Chin et al., 2021). The present thesis sought to demonstrate that legal studies can be preregistered, share data and materials, and even be conducted as registered reports (whose research motivations and methods are peer reviewed prior to data collection), which are the current gold standard for open science (Chambers & Tzavella, 2022). Even for traditional legal research that does not involve empirical data, legal sources could be collated in a repository to assist others in finding them, as I have done with Paper 2 (Xiao, 2024c). This helps to reduce the burden on others trying to find the same materials in the future, particularly considering 'link rot' or how hyperlinks for accessing online resources become defunct and unusable even when they have been duly provided in the paper (Markwell & Brooks, 2003).

It is also important to reflect on how I did not preregister Paper 4 (although I did share the data). As the work was exploratory, I was in a process of figuring out whether the research methods would work while collecting data. Confirming that the method worked required observing a significant portion of the data, because

they were few datapoints (as disclosed in Paper 4). It is quite justifiable to not preregister in such an instance, given that the work is exploratory and not confirmatory (Kimmelman et al., 2014) so the method is more open to potential change, etc. However, an effort should still be made (Dirnagl, 2020).

In my later research that similarly required testing a method as part of the research process, I preregistered after confirming the method worked by viewing a small portion of data (Xiao, 2024b). An exploratory study is expected to deviate from a preregistration, and those changes to the methods and their justifications are also interesting aspects of exploratory research that should be duly recorded. Writing down what did not work helps future researchers avoid making the same mistakes again.

Others have recommended what publishers (such as journals and conferences) can do to encourage open science practices. I would point to removing word count restrictions on method sections (if not from other sections, too) because the details provided there are not gratuitous. In practice, they are highly relevant for reviewing the work (*e.g.*, assessing potential departures from the preregistration) and planning replications (Heirene et al., 2024, p. 28). Anonymisation policies for review processes should also be reconsidered: reviewers benefit from having access to the preregistration and the data. Overly strict anonymisation policies place heavy and extra burdens on authors to carefully anonymise every aspect of their preregistration and data. It becomes easier and safer to simply not provide the registration or data in fear of accidentally breaching anonymisation rules. Open science practices should be encouraged through incentives rather than punished with disincentives.

5.8.1. Smallest effect size of interest for empirical legal research

One final aspect that deserves discussion is the smallest effect size of interest (SESOI), which is relevant to research planning, preregistration, and the interpretation of results (Lakens et al., 2018). Even if an effect was found in the sense that it was a statistically significant result, for example, was it large enough to be practically meaningful? Some convention and guidance for interpreting effect sizes for media research have been proposed (Ferguson, 2009, 2023), and previous research has indeed relied upon them (*e.g.*, Drummond, Sauer, Ferguson, et al., 2020, p. 11; Zendle et al., 2021, p. 12). The question of whether such heuristics are justified

and actually valid in a certain context, rather than a mindless and misleading 'rule of thumb', has been raised (Lakens, 2022, pp. 8–9).

For compliance research, we do not know what the small effect size of interest is. My research (Papers 6, 7, and 8) has generally proceeded on the following basis: a compliance rate > 95% is deemed as worthy of commendation; a rate < 95% but > 80% is viewed as effective but requiring improvements; while rates < 80% are viewed as unsatisfactory (Xiao, 2023a, pp. 9–10). Those cut-offs were based on my intuition as to what policymakers would agree with at that time.

However, those cut-offs should certainly change with different contexts. For example, a product capable of significant physical harm should require a compliance rate far above 95%. There is also a temporal element: expectations should become higher as time passes. What was a satisfactory rate of compliance may no longer be so once rules have been in effect for many years as companies are expected to be more familiar with them and comply better. Future research should consider speaking with stakeholders such as policymakers and parents to better empirically understand what they view as satisfactory compliance and how much impact they expect regulation to have on various products.

6. Conclusions

Loot boxes are purchases players can make inside video games using real-world money in exchange for random rewards. These mechanics are gambling-like, both structurally and psychologically. Players are potentially at risk of spending significant sums of money on these mechanics, which may be detrimental to other aspects of their lives. But unlike traditional gambling, which is heavily regulated if not entirely prohibited around the world, loot boxes are widely available in video games – including those deemed by age-rating organisations as suitable for very young children, who do not have legal access to traditional gambling. The potential harms of loot boxes have been identified by many previous studies in psychology and sociology. Many stakeholders, including players, parents, and policymakers, are concerned. Various regulatory approaches to addressing this problem are available. Regulations have already been imposed, or at least declared as having been imposed, in a number of countries.

Through a comprehensive evaluation of various loot box regulatory policies around the world, this thesis reveals that rules are poorly followed by companies and poorly enforced by regulators (if at all). Even in countries where the potential harms of loot boxes have been recognised and addressed to some extent through regulation, consumers are nonetheless left exposed to harm. Many other countries have not yet adopted any regulation to combat the problem, despite public concern. More effective forms of loot box regulation that seek to reduce problematic engagement should be invented, tested, and implemented. Regardless of what measures are adopted, all countries should fund continued and regular evaluations of policy implementation to ensure that whatever benefits policies were meant to provide are actually realised in practice. Ineffective policies should be repealed and replaced (if the regulatory aim remains of interest), while poorly implemented policies should be better enforced with more funding.

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8. Ludography (Selected)

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Paper 1: Using the Nuffield public health intervention ladder to identify different methods of loot box regulation

No new empirical data were produced for this paper.

Regulating Gambling-Like Video Game Loot Boxes: a Public Health Framework Comparing Industry Self-Regulation, Existing National Legal Approaches, and Other Potential Approaches

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Abstract

Purpose of Review Loot boxes are gambling-like monetisation mechanics in video games that are purchased for opportunities to obtain randomised in-game rewards. Gambling regulation is increasingly being informed by insights from public health. Despite conceptual similarities between loot boxes and gambling, there is much less international consensus on loot box regulation. Various approaches to regulating loot boxes are reviewed via a public health framework that highlights various trade-offs between individual liberties and harm prevention.

Recent Findings Many countries have considered regulation, but as yet only a few countries have taken tangible actions. Existing regulatory approaches vary greatly. More restrictively, Belgium has effectively 'banned' paid loot boxes and prohibits their sale to both children and adults. In contrast, more liberally, China only requires disclosure of the probabilities of obtaining potential rewards to provide transparency and perhaps help players to make more informed purchasing decisions. Most other countries (e.g., the UK) have adopted a 'wait-and-watch' approach by neither regulating loot box sales nor providing any dedicated consumer protection response. Industry self-regulation has also been adopted, although this appears to elicit lower rates of compliance than comparable national legal regulation.

Summary Many potential public health approaches to loot box regulation, such as expenditure limits or harm-reducing modifications to loot box design (e.g., fairer reward structures), deserve further attention. The compliance and clinical benefits of existing interventions (including varying degrees of regulation, as adopted by different countries, and industry self-regulation) should be further assessed. The current international variation in loot box regulation presents opportunities to compare the merits of different approaches over time.

Keywords Loot boxes · Video gaming regulation · Online gambling · Consumer protection · Interactive entertainment law · Video games · Public health

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Introduction

'Loot boxes' are gambling-like monetisation mechanics in video games that players can engage with to obtain randomised rewards, which can provide cosmetic changes or gameplay advantages [1••, 2•]. All loot boxes involve 'randomisation' when deciding which rewards to provide to players. However, depending on (i) whether or not the player pays real-world money to become eligible to engage with the loot boxes and (ii) whether or not the rewards that the players receive can be transferred to other players in exchange for real-world money [3] (the latter being a particularly important distinction for regulatory purposes at present), loot boxes have been divided into four categories by Nielsen and Grabarczyk [4••], as summarised in

Table 1. The existing academic literature and regulatory scrutiny have focused on so-called paid loot boxes (i.e., the shaded third and fourth categories described in Table 1) that the player spends fiat currency to purchase because these might lead to the player overspending real-world money and thereby suffering potential financial harms [5•]. The first and second categories of loot boxes that do not require purchase appear less obviously harmful, although they might in contrast lead to the player overspending *time* (in order to 'grind' or repeatedly complete largely identical in-game tasks to achieve or receive something with only a small chance of happening [6, 7]), rather than overspending *money*, and

Table 1 Nielsen and Grabarczyk [4••]'s loot box categorization framework [4••] (adapted from Xiao [5•] and Xiao et al. [11])

Perceived level of potential harm in the authors' view (ascending, with 1 being lowest risk)	Costs real-world money to engage?	Provides rewards possessing real-world monetary value?	Example implementations in video games	Regulatory position in selected jurisdictions
1	No	No	Loot drop system in *Path of Exile* (Grinding Gear Games, 2013) [as intended by the developer]; Gachapon machines dispensing costumes for the player avatar in *Yoshi's Crafted World* (Good-Feel, 2019)	Unregulated in most countries
2	No	Yes	Loot drop system in *Path of Exile* (Grinding Gear Games, 2013) [in practice contrary to the developer's intentions]	Unregulated in most countries
3	Yes	No	Booster packs in *Magic: The Gathering Arena* (Wizards of the Coast, 2019); FIFA Ultimate Team packs in *FIFA 2019* (Electronic Arts, 2018) [as intended by the developer]; Card packs in *Hearthstone* (Blizzard Entertainment, 2014)	Deemed as gambling in Belgium [13] Unregulated in most other countries
4	Yes	Yes	Booster packs in *Magic: The Gathering Online* (Wizards of the Coast, 2002); FIFA Ultimate Team packs in *FIFA 2019* (Electronic Arts, 2018) [in practice contrary to the developer's intentions]	Deemed as gambling in Belgium [13], Denmark [14], the UK [15] and many other countries Previously *incorrectly* deemed as gambling in the Netherlands [16-18]; presentl confirmed *not* to constitute gambling generally under Dutch law as of 9 March 2022 [19, 20] Only the Netherlands is known to have enforced the law (albeit erroneously [19, 20] [17, 18, 21] cf. the UK which has not actively enforced the law [22]

potentially lead to or exacerbate the World Health Organization's (WHO's) so-called gaming disorder or problematic engagement with video gaming as a form of behavioural addiction.[1] The degree of the 'problematic-ness' and level of potential harm for each category of loot boxes, as perceived by the authors and generally understood by the literature, are outlined in ascending order in Table 1. Hereinafter, this article discusses paid loot boxes only and refers to them as loot boxes, unless otherwise specified, following colloquial norms and the existing literature [11].

This article introduces loot boxes' current prevalence in video games and discusses why loot box regulation could be, and should be, conceptualised as a public health issue that can be approached in many different ways. Then, existing self-regulatory approaches from the video game industry, and the legal regulatory frameworks for loot boxes in various example jurisdictions, are summarised. Finally, both existing and potential loot box harm minimisation measures are considered in the context of the Nuffield public health intervention ladder [12(pp. 41–42, paras 3.37–3.38)], with respect to how they balance inherent trade-offs between individual liberties and harm prevention.

Prevalence and Deemed Suitability to Children

Loot boxes are presently frequently implemented in video games, particularly on mobile phone platforms: in 2019, amongst the highest-grossing video games, 59% on the Apple iPhone platform contained loot boxes in the UK, as did 36% on the PC Steam platform [23•]. Loot boxes remain an evolving issue as the prevalence rate was found to have increased to 77% for UK iPhone games when it was re-assessed in 2021 using a comparable sample [24]: this appears to be due to multiple reasons including (i) a greater number of popular games starting to implement loot boxes; (ii) difficulties with identifying well-hidden loot box implementations with complex purchasing procedures; and (iii) semantic and definitional ambiguities with what game mechanic exactly constitutes a loot box [25•]. The prevalence rate also differs across countries: 91% of the 100 highest-grossing iPhone games contained loot boxes in China in 2020 [26], suggesting that the loot box situation might be different across countries and cultures and that future research should include the perspectives of non-Western countries and players [see 27].

Although some members of the public, e.g., some parents [see 28], consider loot boxes to be unsuitable for children, game companies and self-regulatory video game age rating systems, which are financially supported by the industry and therefore arguably conflicted from acting against the

industry's commercial interests, generally deem loot boxes to be suitable for implementation in children's games and, by implication, suitable for children to purchase (e.g., the Entertainment Software Rating Board (ESRB) in North America and Pan European Game Information (PEGI) in Europe, neither of which requires a minimum age rating for games containing loot boxes as of May 2022, although imposing this would be within their self-regulatory powers [29]; this should be contrasted with how mere *depiction* of tobacco, alcohol and illegal drug use would generally render the game to be deemed as suitable only for older adolescents, e.g., 'PEGI 16' or suitable for players aged 16 and above [30]). Indeed, 58% of the highest-grossing UK iPhone games deemed suitable for children aged 12 + contained loot boxes in 2019 [23•], meaning that children are regularly exposed to loot boxes and can readily purchase them. The UK Gambling Commission found that 23% of young people aged between 11 and 16 have paid real-world money to purchase loot boxes [31(p. 39)]; in contrast, only 7% have ever participated in traditional online gambling [31(p. 33)].

Conceptual Similarities with Gambling

Purchasing loot boxes is conceptually similar to gambling both structurally and psychologically because the player voluntarily spends real-world money to engage in a randomised process whose results could be desirable or, more often, undesirable, given that most potential loot box rewards are often contextually worthless to the player (either because they already have a duplicate copy or because they are already in possession of some other superior or effectively equivalent in-game item) [2•, 32]. Through purchasing loot boxes, players potentially either 'gain' by obtaining a valuable and wanted item or 'lose' by obtaining a non-valuable and unwanted item [32]. This is even more evident in relation to loot boxes that provide rewards possessing real-world monetary value that the player can subsequently sell on the secondary market, because many non-valuable rewards are worth far less than the cost of purchasing the loot box, compared to the potential large 'jackpot' wins from valuable rewards [3], similar to the incentive structure of lottery tickets [24]. Certain particularly rare and highly sought-after loot box content is worth hundreds, and potentially over one thousand, euros on the secondary market [33]. Indeed, opening 'rare' rewards from loot boxes elicits physiological responses similar to participating in certain traditional gambling activities [34]. One adult player reportedly spent over US$10,000 on loot boxes in one game over a 2-year period [35], and four children spent 'nearly £550 in 3 weeks' of their father's money without permission and still failed to obtain the rare item that they were hoping for [36].

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[1] The debate on that issue is not addressed herein [8, 9] and has been addressed in other articles in *Current Addiction Reports* [e.g., 10].

Differing Interpretations of the Loot Box 'Harm' Evidence Base: Allusions to Longstanding Debates on the Evidence Base of Gambling Harms

Importantly, loot box expenditure has been found to be positively correlated with self-reported problem gambling severity in many cross-sectional studies across various Western countries, including the USA [37], Spain [38], Denmark [39] and Australia [40], amongst both adult and adolescent player samples [41]. Reviews and meta-analyses of these studies have been conducted elsewhere [42••]; [43–45]. However, the causal direction (if any) of this positive correlation is not known [46], and there is debate as to how the current evidence base should be interpreted. McCaffrey has argued that, presently, there is insufficient evidence to demonstrate that loot boxes cause widespread harm and that regulatory intervention is therefore not yet justified [47, 48]. In contrast, Drummond et al. have argued that there is already sufficient evidence demonstrating the potential harms of loot boxes (particularly, similarities with traditional gambling and the involvement of real-world money) and that loot boxes should therefore immediately be regulated more stringently [2•, 3].

These diverging perspectives have similarly been present in the longer-standing debate in gambling. Collins et al. have argued that existing harm reduction methods have been successful (as evidenced by stable or flat prevalence rates of problem gambling), and that further regulation would unnecessarily reduce the (safe) enjoyment of gambling as a leisure activity by many people [49(p. 994)]. The gambling industry also echoes this interpretation [e.g., 50], perhaps unsurprisingly given its commercial interests. In contrast, other researchers have argued that the problem gambling prevalence rate fails to reflect the full extent of the potential harms of gambling and that non- 'problem gamblers' would also potentially suffer harms, which is why a population-based public health harm minimisation approach might be required to reduce the risk of harm amongst all gamblers [51–56].

The conflicting interpretations, in both the loot box and the gambling contexts, arguably arise partially from the methodological weaknesses of a majority of the evidence base, which relied on retrospective self-reported data. Such data, derived either from a representative panel (such as a prevalence survey [57]) or from online convenience samples [58], might lack reliability due to the participants' responses being intentionally dishonest (due to a desire to hide one's participation in gambling due to perceived stigma [59]) or unintentionally inaccurate (due to memory recall issues [60]; inconsistent interpretation of questions [61]; or incorrect estimations and calculations of expenditures [62]). To illustrate, in the UK, gambling prevalence studies have, in the 12 months prior to May 2022, recorded rates of problem gambling as varied as 0.2% (by

the UK Gambling Commission [63]) and 2.8% (by YouGov on behalf of GambleAware) [64(p. 2)]. This suggests that 'harm prevalence' data may be subject to a range of methodological issues affecting their accuracy and validity that researchers are not fully aware of and cannot account for. More recently, Muggleton et al., relying instead on more objective transaction data from a high street bank, suggested that even the higher, previously identified problem gambling prevalence rates (i.e., ~ 3.0%) have underestimated the extent of gambling-related harms and, importantly, failed to reflect the widespread associations between gambling and various harms even amongst less engaged (supposedly, non-problem) gambling participants [65]. For loot boxes, this suggests that the prevalence of loot box 'harms' might have been underestimated by prior studies and that research collaborations with the industry using players' *actual* (and, therefore, more objective) loot box spending data could provide important insights [66]. However, in yet another striking parallel with gambling research, the video game industry has hitherto been unwilling to share their data, similarly to how the gambling industry has been unwilling to share data with independent researchers [67].

Loot Boxes and Gambling Both Show a Trend Toward Pre-emptive Industry 'Self-Regulation'

The video game industry has adopted certain pre-emptive self-regulation purportedly to enhance transparency and reduce harms ahead of potential impending legal regulation. For example, some companies have committed to making probability disclosures detailing the player's likelihood of obtaining different randomised rewards voluntarily *outside* of Mainland China (where, uniquely, disclosures are required by law [26])[68]. Major app stores, such as the Google Play Store and the Apple App Store, also require probability disclosures globally [69, 70]. In addition, the two major self-regulatory age rating systems of North America and Europe, the ESRB and PEGI, have introduced an 'in-game purchases (includes random items)' content descriptor to label and signify the inclusion of loot boxes in a video game [71, 72]. However, this self-regulatory measure has been criticised as being insufficiently detailed to truly inform potential customers about the risks involved with loot boxes [29], and there is no evidence of these labels providing any tangible benefit.

Loot box-related industry self-regulation mirrors many attempts by the traditional gambling industry to self-regulate (seemingly in conflict with its own financial interests) arguably in order to fend off stronger (and likely more effective) interventions from regulators and policymakers [73]. For example, the gambling industry has, for a long time, directed funds towards non-restrictive interventions, such as warning messages or education programmes about the risks of gambling, which do nothing to alter the properties

and availability of potentially harmful products [74]. In the UK, the industry has agreed to partial restrictions around advertising in professional sports (e.g., 'whistle-to-whistle' ban): however, this has not effectively reduced sports watchers' frequent exposure to gambling marketing via logos and website addresses shown on, for example, shirts and pitch-side billboards in soccer [75]. Research has additionally critiqued the inadequacies of the main gambling warning message used by the UK industry from 2014 to 2021 ('When the Fun Stops, Stop') [76, 77], and also its lack of effect on influencing gambling behaviour [78]. Many gambling researchers have therefore advocated for stronger interventions, akin to the graphic health warnings or restrictions on availability adopted in tobacco contexts [79], but uptake of these approaches has been slow.

What Does Taking a Public Health Approach Mean?

Within the discourse surrounding loot box regulation, there is substantial support for banning the mechanic entirely [80]: for example, as advocated for by academics [e.g., 81(p. 40)], gambling-related charities and other NGOs (non-governmental organisations) [e.g., 82], and, indeed, members of the legislature [e.g., 83(p. 115, para. 446)]. However, banning the product is only one potential approach amongst a spectrum of different approaches of varying degrees of restrictiveness. An indiscriminate ban is one of the most extreme approaches and is not strongly supported by the evidence from, and the experience of, other public health domains given significant potential negative consequences thereof. For example, the US ban on alcohol during the Prohibition era (1920–1933) was not successful: consumption and alcohol-related harm was likely reduced, but demand remained and caused the industry to shift towards a higher risk illegal industry supplied by organised crime, thus incurring 'unacceptable social and economic [costs]' that led to support for the eventual repeal of the ban [84].

To ban or heavily regulate loot boxes as gambling is but one potential regulatory approach that has dominated the discourse. Notably, in contrast, most countries have seemingly decided not to regulate collectible card packs and other similarly gambling-like products (e.g., blind boxes) [85], even though these products likely contravene existing gambling laws [86] and would constitute the most seemingly harmful fourth category of loot boxes (per Table 1) had these been virtual, rather than physical, products [87]. Many video game players have identified this uncomfortable incongruence between many countries' strong desire to regulate and ban loot boxes and regulatory *inaction* in relation to other gambling-like products as deserving of some further consideration [88•]. Indeed, a wider range of other

options that interfere less with the players' ability and choice to purchase loot boxes and the companies' commercial interests are available. The Nuffield public health intervention ladder [12(pp. 41–42, paras 3.37–3.38)] is a tool that helps to illustrate the acceptability of various measures on each 'rung' by identifying, comparatively, how intrusive on personal liberty each measure may be; how much justification may be required before they are adopted; and whether they are proportionate responses for achieving regulatory aims (as shown in the first column of Table 2).

The lowest rung of 'do nothing' or simply 'monitor the situation' is technically a public health approach. This has the advantage of not restricting choice and does not remove any of the potential (e.g., economic) benefits of the product. Such an approach is likely appropriate when the potential for harm is deemed to be low or little information is available as to whether the product is, on balance, more harmful or beneficial to society. However, generally, the second lowest rung of 'provide information' is likely a superior approach when compared to 'do nothing', because 'provide information' can guide choice towards better alternatives and provides the same freedom of choice as 'do nothing'. Many intermediary approaches rest between the lower, non-restrictive rungs and the highest, most restrictive rung of 'eliminate choice'. Several different approaches might also be used in relation to one subject matter simultaneously: for example, the UK public health approach to obesity works at multiple levels, e.g., by providing information on nutrition (in supermarkets) and calories (in restaurants), whilst also restricting choice via new policies on the marketing and promotion of unhealthy foods (especially to children). Similarly, many approaches have been implemented in relation to tobacco: in addition to what has already been done in many Western countries (e.g., age limits on purchasing the product ('eliminate choice'); restrictions on advertising ('guide choice'); and warning messages on packaging ('provide information')), many tobacco researchers have been advocating for greater uptake of e-cigarettes and other generally less harmful combustion-less tobacco alternatives [89, 90]. More sustainable improvements to health may arise not from simply banning the existing product (without providing alternatives and ignoring potential negative consequences thereof), but by inventing, promoting and disseminating healthier alternatives to the original product.

These examples from other public health domains have been highlighted because, although loot boxes share strong similarities with gambling (which itself is now seen as a public health issue [51–56]), there are also major differences between loot boxes and gambling. Importantly, there are potential public health interventions for loot boxes that are not possible in traditional gambling contexts. Commercial gambling relies on individuals losing money to be profitable, and since a majority of gamblers spend very little money on

Table 2 Mapping loot box harm minimisation measures (non-exhaustive) onto the Nuffield public health intervention ladder [12(pp. 41–42, paras 3.37–3.38)]

Range of intervention options	Examples of specific measures	As adopted by or as recommended by…
Eliminate choice Regulate in such a way as to entirely eliminate choice, for example, through compulsory isolation of patients with infectious diseases	Prohibit the sale and, by extension, the purchase of loot boxes to all players Or less restrictively, prohibit the sale and, by extension, the purchase of loot boxes to *underage* players	Belgium, which has effectively 'banned' the sale and purchase of both the third and fourth categories of loot boxes through applying existing gambling law [13] Technically, Denmark [14], the UK [15] and many other countries through applying existing gambling law in relation to the fourth category of loot boxes, although this regulatory position has seemingly not been enforced in practice
Restrict choice Regulate in such a way as to restrict the options available to people with the aim of protecting them, for example, removing unhealthy ingredients from foods, or unhealthy foods from shops or restaurants	Maximum spending limits on loot boxes: i.e., that a player is only allowed to spend up to a predetermined sum during a specified period [115, 116•] Less directly, maximum gameplay time limits: i.e., that a player is only allowed to spend up to a predetermined length of time on video games during a specified period, which might dissuade purchase of loot boxes given that less time can be spent on enjoying their content Prohibit the implementation of specific types of loot boxes deemed to be particularly problematic	China, which only permits underage players to spend a certain amount of money in online video games per month [120] China, which also only permits underage players to play online video games on specific days during specific time periods [120, 121] Japan, which prohibits the implementation of *kompu gacha*, which is a type of loot boxes that provide a particularly valuable extra reward only after the player collects all other 'regular' potential rewards from the loot box (i.e., after the player spends a substantial sum of money) [98(pp. 314–315)]
Guide choice through disincentives Fiscal and other disincentives can be put in place to influence people not to pursue certain activities, for example through taxes on cigarettes, or by discouraging the use of cars in inner cities through charging schemes or limitations of parking spaces	Institute an extra tax that is payable by players when purchasing loot boxes, above and beyond usual sales taxes (if any) Require video game companies to obtain and pay for a specific (non-gambling) licence in order to sell loot boxes, which represents a cost that is likely to be shifted onto the player-consumers	None
Guide choices through incentives Regulations can be offered that guide choices by fiscal and other [positive] incentives, for example, offering tax-breaks for the purchase of bicycles that are used as a means of travelling to work	Require video game companies to provide players with the choice to obtain all potential loot box rewards through direct purchase or some other form of non-randomised monetisation method at a price that would, on average, be *lower* than had the player attempted to obtain those rewards through purchasing loot boxes. (That it is generally cheaper to obtain the rewards through direct purchase should also be required to be prominently disclosed because 'incentive' in this context is difficult to control given that the randomisation could mean that some players might still be tempted to purchase loot boxes for a chance at obtaining all potential rewards even more cheaply.) Provide discretionary grants and tax relief to video game companies based on their implementation of more ethical loot boxes or their decision not to implement loot boxes at all. These financial benefits may also be shifted onto the player-consumers and make more ethically designed video games more widely available	None Not yet, but governmental funding is already available for the video game industry in many countries: these could be redirected, withheld and awarded on a basis that focuses on social responsibility in relation to loot boxes, rather than on, e.g., the employment of citizens belonging to certain countries [119]
Guide choices through changing the default policy For example, in a restaurant, instead of providing chips as a standard side dish (with healthier options available), menus could be changed to provide a more healthy option as standard (with chips as an option available)	Require video game companies to offer potential loot box rewards through direct purchase or some other form of non-randomised monetisation method at a reasonable and comparable price *by default*, such that the player must undertake extra effort in order to find the alternative option of attempting to obtain the rewards through purchasing loot boxes	None

Table 2 (continued)

Range of intervention options	Examples of specific measures	As adopted by or as recommended by…
Enable choice Enable individuals to change their behaviours, for example, by offering participation in an NHS 'stop smoking' programme, building cycle lanes, or providing free fruit in schools	Require video game companies to provide players with the choice of either (a) purchasing loot boxes or (b) obtaining all potential loot box rewards through direct purchase or some other form of non-randomised monetisation method at a reasonable and comparable price	Some video games (e.g., *Brawl Stars* (Supercell, 2017)) currently offer the option to purchase *some* potential loot box rewards directly, but this is often confined to opportunities that are time-limited and do not include all possible rewards [22(p. 43)]. This option should be provided for *all* items on demand
	Promote ethical game design measures that are likely to minimise potential loot box harms: (i) encourage video game companies to adopt them and (ii) encourage players to play and only spend money on games adopting them	A variety of measures are available, some of which have been partially implemented by certain video game companies [93••, 118, 119]. Promotion programmes directed at companies and players have not been forthcoming
Provide information Inform and educate the public, for example as part of campaigns to encourage people to walk more or eat five portions of fruit and vegetables per day	Require the expected, average real-world monetary cost of obtaining potential rewards to be calculated and published by companies for the player's benefit	The UK advertising regulator attempted to require this [122], but has since decided *not* to do so following consultation citing difficulties that companies would face in calculating this value given the complexity of in-game economies [123(pp. 9–10)] (which were arguably intentionally designed by companies to be that way and so the companies should be liable for any costs-related consequences thereof)
	Require probability disclosures as to the likelihood of obtaining potential rewards to be published	China by law [26] Nearly all other countries by industry self-regulation [24]
Do nothing or simply monitor the current situation	Continue to allow loot boxes to be sold without intervening	In practice, the current position in Denmark, the UK and many other countries, given that existing gambling laws have not been enforced as interpreted and therefore no actions has been taken against the fourth category of loot boxes

the activity, gambling profits are driven by a small percentage of high-spending gamblers incurring high losses (so-called whales in land-based gambling environments) [91(p. 21)]. The term 'whales' has also been used as a term for high-spending loot box purchasers, and this small minority of players have been identified as effectively financing the video game containing the loot boxes (for the benefits of not only the operating company but also many non-paying players) [92]. However, other loot box business models that rely on more players paying a reasonable amount of money (and no players spending extreme amounts) may also be commercially viable [93••].

Finally, public health has a 'precautionary principle' stating that the lack of scientific certainty cannot justify regulatory inactivity when potential harms are significant. This principle has already been cited by the loot box literature [26] and by policymakers [94(p. 29)] to argue in favour of regulating loot boxes, despite the absence of a strong evidence base. Given that this principle has already been invoked in relation to loot boxes, it is important that stakeholders are aware of the full spectrum of approaches that could be used in a public health approach to regulating loot boxes. In particular, the negative consequences of both an overly lenient and an overly restrictive approach should be recognised. Indeed, a non-restrictive or less restrictive approach might be more appropriate at present when regulation is imposed based on the precautionary principle.

A Public Health Framework Comparing Industry Self-Regulation, Existing National Approaches, and Other Potential Approaches

The perceived urgency of the loot box regulation issue and the divergent interpretations of the emerging evidence base on potential loot box harms have meant that various countries (including those that are otherwise ideologically quite aligned, e.g., Western European countries) have taken very different policy approaches, as previously comprehensively collated by the legal literature [95–98]. Players, including children, in different countries are therefore provided with varying degrees of consumer protection: players in Belgium (where all paid loot boxes have effectively been 'banned' [13]) are provided with the highest degree of protection, whilst players in the UK are provided with no dedicated loot box consumer protection measures (because, although paid loot boxes that contain rewards that can be transferred to other players and therefore possess real-world monetary value technically contravene gambling law according to the national gambling regulator [15], no enforcement actions have been taken against known illegal implementations [5•, 85]). Players from different countries are therefore

not provided with the highest level of consumer protection uniformly, meaning that some players are more frequently exposed to potential harms than others, which does not appear to be ideal [22]. Cerulli-Harms et al.'s report commissioned by the Committee on the Internal Market and Consumer Protection of the European Parliament has argued that divergent regulation would also lead to increased compliance costs for companies (which might more unfairly affect smaller, newer companies, thus making it harder for them to compete with more established companies [48]) and is contrary to the principles of the European Single Market [100].

However, it should also be noted that, conversely, companies' economic interests and players' freedoms are less restricted in the UK than in Belgium. In addition, there are also benefits to this divergent regulatory environment: specifically, data can be collected from multiple countries as to the pros and cons of different public health-based approaches, which can then be compared with each other and with data on industry self-regulation and also with perspectives on other potential regulatory approaches that have been suggested but not as yet trialled. Multiple national policy experiments are effectively being conducted across the world: taking advantage of this opportunity would facilitate the improvement of existing policies and the adoption of better policies in all countries. To assist in visualising and comparing the array of harm minimisation measures that have either been adopted or proposed in relation to loot boxes (either as (i) industry self-regulation or (ii) national legal regulation), these are non-exhaustively mapped onto the Nuffield public health intervention ladder [12(pp. 41–42, paras 3.37–3.38)], as shown in Table 2; some (iii) additional approaches that have not previously been suggested are also summarised therein.

Industry Self-Regulation

As mentioned under "Loot Boxes and Gambling Both Show a Trend Toward Pre-emptive Industry 'Self-Regulation'" section, the video game industry self-regulates loot boxes through mandating probability disclosures. However, importantly, the motivations for the industry to self-regulate should be viewed with an appropriate degree of scepticism because established research from traditional addictive domains, such as gambling, alcohol and tobacco, have all suggested that, when their industries have purported to act in socially responsible ways, those self-regulatory efforts have in fact been self-interested and suboptimal and have therefore failed to maximally advance the public interest [101–103]. Indeed, industry self-regulation might not have been adopted by companies for purely altruistic purposes (e.g., improve public welfare at the cost of its own commercial profits) and may instead have been adopted to placate

public concern, dissuade stricter legal regulation, and maintain control over whether and how much the product is regulated [104].

This cynical view is justified in relation to the self-regulation of loot boxes. The Apple App Store requires loot box probability disclosures for all video games on the platform. However, when the 100 highest-grossing UK iPhone games were examined in 2021, only 64.0% of those games containing loot boxes actually complied with industry self-regulation and disclosed probabilities [24]. Additionally, many UK probability disclosures were found to have been implemented using methods that were difficult for players to access (e.g., requiring multiple buttons to be pressed before the disclosure is shown) [24]. Despite this unsatisfactory level of compliance (which is likely reflected also in other countries adopting industry self-regulation), the industry's adoption of probability disclosure self-regulation has been widely promoted: however, this measure's effectiveness (particularly in relation to children) is not even known, and research from other risk communication domains and self-reported evidence would suggest that it is unlikely to reduce loot box spending on a broad scale [93••, 105]. This perfunctory and unsatisfactory state of affairs is reminiscent of similarly suboptimal information disclosure-based industry self-regulation in gambling [78] and other addictive domains, e.g., tobacco [101].

Existing National Approaches

In contrast to how probability disclosures have been required in other countries through industry self-regulation, China has imposed this measure by law [26]. A direct comparison of the loot box probability disclosure rates amongst the 100 highest-grossing iPhone games in China and in the UK has been conducted: the compliance rate with Chinese law was 95.6% in 2020 [26], which was significantly higher than the compliance rate with UK industry self-regulation at 64.0% in 2021 [24]. This demonstrates that legal regulation appears to have been more effective at ensuring compliance than industry self-regulation (cultural differences between the two countries as to companies' willingness to comply with law and regulation notwithstanding) [24]. However, Chinese law gave discretion to companies as to how they can comply: any disclosure, however difficult for the player to access, is deemed compliant [106]. For this reason, many disclosures in China were also found to have been published by video game companies using methods that were not prominent and difficult for players to access: even though companies could have displayed the probability disclosure on the in-game page where loot boxes could be purchased, so that players can easily view them and perhaps make more informed purchasing decisions, only 5.5% of games containing loot boxes did so [26]. In one extreme example, the player had

to enter the Chinese game's settings menu and chat with the customer support bot in English in order to access the disclosure [26]. Further, the effectiveness of probability disclosures at reducing overspending and harm is unproven and doubtful, even when they are easily accessible and have been seen by the player: only a small minority of Chinese players (16.4%) self-reported spending less money after seeing loot box probability disclosures [93••, 105]. Thus, it is important not to treat the adoption of only one consumer protection measure as a 'solution,' given that the measure might not be complied with fully and that the measure itself might not effectively reduce harm even if it has been effectively adopted [93••].

In other countries, although a consumer protection law approach to loot box regulation (e.g., using the Unfair Commercial Practices Directive 2005 and national implementations thereof in the European Union and the UK [106, 107•, 108, 109]) and other approaches might be tenable, the focus has been to apply gambling law to regulate loot boxes in light of the apparent similarity and relationship between loot boxes and gambling, and the ease and promptness with which existing gambling law could be applied to immediately address the issue [22]. This assessment has already been completed by the national gambling regulators of many countries, *inter alia*, the UK [15], the Netherlands [16] (which has since been found to be incorrect [19, 20]), Belgium [13], France [110], and Denmark [14]. The national gambling regulators would attempt to fit various implementations of loot boxes within the pre-existing national gambling law framework, meaning that the legal definitions of 'gambling' differ from the common sense understanding of gambling. National gambling laws also differ across countries: specifically, the various legal elements that must be satisfied for a product to constitute gambling are not the same [5•, 22]. This means that different national regulators may easily arrive at different conclusions as to whether a specific type of loot box legally constitutes gambling under the national laws of any particular country. This also means that the conclusion reached by any one national regulator (one way or the other) is not necessarily reflective of, or relevant to, the decision that a different country's regulator might arrive at [20]. The decision-making processes are separate and based solely on how that country's gambling law was originally drafted. Finally, national gambling regulators generally cannot change the law (from how it was originally drafted by the legislature) or make new laws: they merely pronounce an interpretation; express a desire to enforce that interpretation; and potentially take enforcement actions against products that are deemed to be contravening the law (with the proviso that the regulators' interpretation of the law might be legally wrong and therefore remains challengeable in court by video game companies, as has been successfully

done by Electronic Arts against the Dutch gambling regulator's previously published interpretation [19, 20]).

Briefly put, Belgium, due to the distinctiveness of its national gambling law, has deemed the third and fourth categories of loot boxes (as described in Table 1; both of which require payment of real-world money to engage in a process that provides randomised rewards) to legally constitute gambling [13] and therefore effectively 'banned' all implementations of the product from the country [22, 100]. In contrast, most other countries (e.g., the UK [15], France [110], and Denmark [14]) concluded that only loot boxes that both require payment of real-world money to purchase and provide players with rewards that can be transferred to other players in exchange for real-world money (i.e., only the fourth category of loot boxes per Table 1) legally constitute gambling. Notably, although the countries adopting this latter position agreed as to which category of loot boxes legally constitute gambling under their laws, the national regulators' enforcement actions have differed in relation to the same games that arguably contravene the gambling laws of multiple countries. Indeed, only the Dutch gambling regulator was known to have enforced the law [16–18], whilst the regulators of many other countries have chosen not to act despite having issued compliance advice suggesting that such loot boxes would be illegal [e.g., 15]. However, a recent Dutch judicial decision overruled the Dutch gambling regulator's interpretation of the law [19] and instead effectively affirmed the legality of the fourth category of loot boxes in the Netherlands [20].

Accordingly, no country, besides Belgium, is actively regulating loot boxes using gambling law at present. Some companies quickly sought to comply with Belgian law by changing the design of the national version of the game, specifically removing the possibility of purchasing loot boxes with real-world money [111, 112]. Doing so allowed these games to continue to be available to Belgian players: importantly, the games were not banned, and only the loot box monetisation method was. These corporate actions also suggest that (i) it is possible to rapidly remove the loot box functionality if required to do so and (ii) these games were still deemed to be commercially sound even without the loot box revenue stream. This might be due to these games being able to generate revenue through the sale of the software or other non-randomised in-game product offerings, or because maintaining strong brand awareness amongst the player base in Belgium was deemed as being worth the loss in revenue and operating costs. However, in contrast, other companies instead removed their games from the Belgian market entirely [113], rather than to only remove the loot box feature, likely because it was no longer commercially viable to operate those games. This shows that some genres of video games (so-called gacha games [114]) whose monetisation models rely heavily on loot boxes were likely more severely affected by the Belgian ban. The effectiveness of Belgium's blanket 'ban' of loot boxes remains to be assessed, although this measure appears to have not perfectly achieved the elimination of paid loot boxes from that market [99].

Other Potential Approaches

Many regulatory measures that may be taken in relation to loot boxes are presented on Table 2. Notably, many are phrased as an intervention that can be imposed on players. This framing seemingly places the burden on individuals to change their loot box purchasing behaviour, which perhaps is inequitable because it is the video game companies that are providing a potentially harmful product, so it is their behaviour that policy should aim to influence. A public health approach to gambling regulation has recognised the importance of moving past the 'blame-the-victim' framing that is inappropriately preoccupied with the gamblers' individual responsibility [54]. Therefore, the loot box regulatory measures could also be rephrased as interventions against video game companies, e.g., prohibiting the 'sale' of loot boxes by companies, instead of prohibiting the 'purchase' of loot boxes by players, or restricting the amount of money that 'companies are allowed to receive' from each player, rather than limiting the amount of money 'players are allowed to spend.' This would more accurately reflect that the policies are aimed at targeting the product availability that companies provide, rather than restricting players' ability to purchase, although practically the two might be identical. The responsibility should rest with the companies to do less harm, rather than for players to protect themselves, and the framing of any regulation should more accurately reflect with whom that onus lies.

In addition, there are other potential ways of minimising loot box harms that emulate examples from public health issues other than gambling. For example, promoting the use of e-cigarettes in smoking is a way of reformulating the delivery of nicotine in a way that is fundamentally less harmful than combustible tobacco [89, 90]. Similarly, less harmful and fairer loot boxes could be implemented by increasing the likelihood of obtaining the rarest rewards; limiting how many different loot boxes may be offered within a single game and how many different potential rewards may be obtainable from a single type of loot box; and not providing players with useless (or significantly devalued) duplicate rewards [93••]. Importantly, such design changes are plausible because of one fundamental difference between loot boxes and traditional gambling: gambling providers profit only when gamblers lose money and so harm to gambling participants is inherent to the profitability of that industry; however, loot box providers profit from each loot box sale regardless of whether the video game player has 'won' a valuable reward or not [93••] and so profitability

is *not* dependent on the player 'losing' money and harm is *not* inherent to the loot box monetisation model. Video game companies' commercial interests might be negatively affected by the adoption of the aforementioned measures, as players would now only need to buy fewer loot boxes before becoming satisfied with their rewards. However, the business model would still in theory be potentially profitable (and previously non-spending players may now be more willing to spend small amounts of money on the game as the chance of obtaining a valuable item would be higher, thereby unlocking a new source of revenue for video game companies). Similar design changes would be impossible for traditional gambling as the industry would be rendered unprofitable (the house edge would be lost) [93••]. Such design-based approaches are, in the authors' opinion, the best regulatory proposal at present because it balances the interests of all stakeholders: the potential harms of loot boxes would be effectively curtailed, but players and companies would still gain from the economic benefits of the loot box monetisation model.

The video game industry and individual companies should be encouraged to self-regulate and adopt so-called ethical game design measures (even potentially through granting tax incentives for making more 'ethical' games or placing tax disincentives on loot box purchases) [119]. However, any one particular measure on its own should not be deemed as sufficient consumer protection. The effectiveness of self-regulation should be continually monitored, and some legal intervention (e.g., banning certain problematic aspects of loot boxes) might be appropriate, if voluntary measures are shown to be merely performative and ineffective. Similarly, any legal regulatory measures that have been adopted (e.g., Belgium's ban on paid loot boxes and China's probability disclosure requirements) should also not be assumed to be an ultimate and effective 'solution' that other jurisdictions should immediately emulate without question: the differing cultural contexts should be considered. Which approach a certain jurisdiction decides to take is a policy decision for the people of that jurisdiction to make (national loot box research would allow for evidence-informed regulation) [80]. Consumer protection regulation can always be improved upon and must continue to adapt, as loot boxes continue to be designed and implemented in newer ways by video game companies.

Conclusions

Conceptual similarities between loot boxes and gambling and the potential harms of loot boxes have been highlighted. A public health approach to gambling regulation can inform a similar approach for loot box regulation. However, attempting to regulate loot boxes as gambling is only one of many different potential approaches. A whole range of harm minimisation measures of varying levels of restrictiveness are available to both policymakers and video game companies. A broader public health perspective allows the loot box issue to be viewed more holistically: specifically, by comparing the pros and cons of different approaches and by balancing the interests of different groups of players (e.g., on one hand, those who benefit from having continued access to cheaper entertainment due to loot boxes and who appreciate this more flexible monetisation model [88•] and, on the other hand, those who may be in need of consumer protection from potential financial harms) and the commercial interests of video game companies. Intrusive measures might be more immediately effective at reducing harm but may lead to negative consequences, whilst less intrusive measure better respect all stakeholders' interests but might not provide sufficient consumer protection to the most vulnerable players. Existing legal and self-regulatory responses to loot boxes (whose effectiveness should be subject to empirical assessment) must be viewed critically and *not* seen as ultimate 'solutions' that have successfully and effectively removed all potential harms from those countries. Consideration should be given as to which measure would be the most appropriate for different types of players (e.g., young children, as compared to adults) in different countries.

Declarations

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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Paper 2: Loot box regulation around the world in a comparative perspective

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LOOT BOX STATE OF PLAY 2023: LAW, REGULATION, POLICY, AND ENFORCEMENT AROUND THE WORLD

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Abstract

Loot boxes can be bought with real-world money inside video games to obtain random items of varying value. Although these mechanics are gambling-like, they are widely available for purchase, including in children's games. Many countries are considering better regulation. The rapid regulatory and policy developments and proposals across the world in recent years are summarized: (i) probability disclosure requirements in Taiwan, South Korea, and China; (ii) enforcement of gambling law in Belgium, Austria, Finland, the Netherlands, France, the UK, and Australia; (iii) enforcement of EU consumer protection law in Italy, the Netherlands, and the UK; (iv) age ratings and warning labels

in Germany, Australia, and the U.S.; (v) expanding the legal definition of "gambling" so as to encompass loot boxes in Finland and Brazil; (vi) the ambitious dedicated regulatory regime in Spain; (vii) class action civil litigation in the U.S. and Canada; (viii) industry self-regulation in the UK; and (ix) attempts to ban online games of chance in India.

1. INTRODUCTION

Loot boxes are virtual items in video games that players open to obtain *random* rewards. The rewards are usually of varying value with the rarer rewards being highly desirable and valuable (both in terms of within the players' own perception and, where it is possible to buy and sell in-game items between players, in terms of their real-world monetary value[1]). The more common rewards are generally undesirable and often nearly useless because they would be a duplicate or even a weaker version of other items the player already possesses. Some loot boxes can be obtained through gameplay (e.g., defeating an enemy) or otherwise opened without paying real-world money. Regulation and this article are, however, focused on loot boxes that are purchased with real-world money. This is because such paid loot boxes are conceptually and psychologically similar to gambling in that the player spent real-world money to participate in a randomized process to obtain rewards of varying value with the possibility of either "losing" (by obtaining a more common reward) or "winning" (by obtaining a rarer reward).[2] Hereinafter, references to "loot boxes" refer to paid loot boxes unless otherwise specified.

Besides referring to a specific visual implementation of monetization mechanics whereby the player spends real-world money to open a virtual box to obtain random content, "loot boxes" is also used as a short-hand term by researchers and player communities to refer to other products and mechanics inside video games that are bought to receive random rewards.[3] These include, for example, character summoning systems where the results are randomized and unknown at the point of purchase, which are often referred to by players as "gacha."[4] Other such mechanics are depicted as "card packs" reminiscent of physical collectible and trading card games[5] or even portrayed using traditional gambling motifs, such as prize wheels and slot machines. The rather unwieldy term of "in-game transactions with randomized elements" is used by the Entertainment Software Rating Board (ESRB), which moderates video game content and provides age ratings in North America, to refer to all such mechanics.[6] This includes so-called social/simulated casino games wherein the player is able to spend real-world money to participate in traditional gambling activities but can never convert any winnings back into cash.[7] Hereinafter, the short-hand usage of "loot boxes" is adopted and takes the same meaning as the ESRB's terminology. Importantly, paid loot boxes can be subdivided into two categories: (a) "Embedded-Embedded" and (b) "Embedded-Isolated" loot boxes.[8] The former refers to loot boxes that (i) cost real-world money to purchase and (ii) whose content is transferable between players and thus have real-world monetary value (i.e., can be "cashed-out"[9]). The latter refers to those that are (i) bought with real-world money but (ii) whose content

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[6] Entertainment Software Rating Board (ESRB), "Introducing a New Interactive Element: In-Game Purchases (Includes Random Items)" (*ESRB Official Website*, 13 April 2020) https://www.esrb.org/blog/in-game-purchases-includes-random-items/, accessed 19 July 2023.

[7] Leon Y Xiao, *Beneath the Label: Unsatisfactory Compliance with ESRB, PEGI, and IARC Industry Self-Regulation Requiring Loot Box Presence Warning Labels by Video Game Companies* (2023) 10 ROYAL SOCIETY OPEN SCIENCE Article 230270, 22.

[8] Rune Kristian Lundedal Nielsen and Paweø Grabarczyk, *Are Loot Boxes Gambling? Random Reward Mechanisms in Video Games* (2019) 4 TRANSACTIONS OF THE DIGITAL GAMES RESEARCH ASSOCIATION 171; Leon Y Xiao, *Which Implementations of Loot Boxes Constitute Gambling? A UK Legal Perspective on the Potential Harms of Random Reward Mechanisms* (2022) 20 INTERNATIONAL JOURNAL OF MENTAL HEALTH AND ADDICTION 437.

[9] David Zendle and others, *Paying for Loot Boxes Is Linked to Problem Gambling, Regardless of Specific Features like Cash-out and Pay-to-Win* (2019) 102 COMPUTERS IN HUMAN BEHAVIOR 181.

cannot be transferred between players and thus do *not* possess real-world value (i.e., cannot be cashed-out).[10] This distinction is highly relevant for regulatory purposes.

Loot boxes are widely available in contemporary video games,[11] particularly on mobile platforms, where approximately 75% of the highest-grossing games would sell them in Western contexts[12] and about 90% would in Far East Asian markets.[13] Games classified as being suitable for young children would also often contain loot boxes,[14] such that 23% of UK 11–16-year-olds reported purchasing them in 2019,[15] as did 24% in 2022.[16] Many countries have considered or are considering regulating loot boxes because of their similarities to gambling and broader consumer protection concerns regardless of gambling connotations (e.g., lack of transparency).[17] Comprehensive reviews of the regulatory positions in various territories have been conducted by Schwiddessen and Karius between 2017–2018,[18]

Moshirnia in 2018,[19] and Derrington *et al.* in 2020,[20] amongst others. However, loot box regulation is a rapidly moving policy area.

South Korea[21] and Taiwan[22] have since adopted new regulations for loot boxes, specifically, requiring probability disclosures. Advertising and consumer protection regulators in the UK[23] and the Netherlands[24] have also published guidelines in relation to loot boxes to assist companies with complying with existing EU regulation (that would likely be applicable to other EU countries as a consequence of harmonization). Two court judgments have respectively determined that loot boxes are legal (or rather not regulable) in the Netherlands[25] but are illegal in Austria[26] under existing gambling law. Similarly, litigation has progressed in several Canadian[27] and U.S.[28] cases.

Prospective regulations have also developed. Draft laws or bills intending to regulate loot boxes have

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[10]Nielsen and Grabarczyk (n. 8); Xiao, *Which Implementations of Loot Boxes Constitute Gambling?* (n. 8).

[11]David Zendle and others, *The Prevalence of Loot Boxes in Mobile and Desktop Games* (2020) 115 ADDICTION 1768.

[12]Leon Y Xiao, Laura L Henderson and Philip WS Newall, *Loot Boxes Are More Prevalent in United Kingdom Video Games than Previously Considered: Updating Zendle et al. (2020)* (2022) 117 ADDICTION 2553.

[13]Leon Y Xiao and others, *Gaming the System: Suboptimal Compliance with Loot Box Probability Disclosure Regulations in China* (2021) ADVANCE ONLINE PUBLICATION BEHAVIOURAL PUBLIC POLICY 1.

[14]Zendle and others, *The Prevalence of Loot Boxes in Mobile and Desktop Games* (n. 11).

[15]UK Gambling Commission, *Young People and Gambling Survey 2019: A Research Study among 11–16 Year Olds in Great Britain* (2019) 39–40 https://web.archive.org/web/20210129123612/https://www.gamblingcommission.gov.uk/PDF/Young-People-Gambling-Report-2019.pdf, accessed 19 July 2023.

[16]UK Gambling Commission, *Young People and Gambling 2022* (2022) https://www.gamblingcommission.gov.uk/report/young-people-and-gambling-2022, accessed 12 July 2023.

[17]D Leahy, *Rocking the Boat: Loot Boxes in Online Digital Games, the Regulatory Challenge, and the EU's Unfair Commercial Practices Directive* (2022) 45 JOURNAL OF CONSUMER POLICY 561.

[18]*See* Sebastian Schwiddessen and Philipp Karius, *Watch Your Loot Boxes! – Recent Developments and Legal Assessment in Selected Key Jurisdictions from a Gambling Law Perspective* (2018) 1 INTERACTIVE ENTERTAINMENT LAW REVIEW 17.

[19]*See* Andrew Moshirnia, *Precious and Worthless: A Comparative Perspective on Loot Boxes and Gambling* (2018) 20 MINNESOTA JOURNAL OF LAW, SCIENCE & TECHNOLOGY 77.

[20]*See* Stephanie Derrington, Shaun Star and Sarah J Kelly, *The Case for Uniform Loot Box Regulation: A New Classification Typology and Reform Agenda* (2021) 46 JOURNAL OF GAMBLING ISSUES 302.

[21]게임산업진흥에 관한 법률 [Game Industry Promotion Act] (as amended by Law No. 19242 of 21 March 2023, effective 22 March 2024) (South Korea), art 33(2).

[22]消費者保護處 [Consumer Protection Office] (Taiwan), '網路連線遊戲服務定型化契約應記載及不得記載事項 [Matters that should be recorded and should not be recorded in the finalized contracts of online game services] (as amended on 10 August 2022, effective 1 January 2023)' (行政院 *[Executive Yuan]*, 29 December 2022) https://www.ey.gov.tw/Page/DFB720D019CCCB0A/964028ea-f1f6-4383-9c78-f7d0606086f3, accessed 6 June 2023.

[23]Committee of Advertising Practice (CAP) and Broadcast Committee of Advertising Practice (BCAP), "Guidance on Advertising In-Game Purchases" (20 September 2021) https://www.asa.org.uk/resource/guidance-on-advertising-in-game-purchases.html, accessed 11 July 2023.

[24]Autoriteit Consument & Markt [Authority for Consumers & Markets] (ACM) (The Netherlands), "Rules Regarding In-Game Purchases, Part of the Guidelines on the Protection of the Online Consumer" (15 March 2023) https://www.acm.nl/en/publications/information-for-companies/acm-guideline/guidelines-protection-online-consumer/rules-regarding-in-game-purchases, accessed 7 June 2023.

[25]Afdeling Bestuursrechtspraak Raad van State [Administrative Jurisdiction Division of the Council of State] (The Netherlands), "Uitspraak [Ruling] 202005769/1/A3, ECLI:NL:RVS:2022:690 (9 March 2022)" (9 March 2022) https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RVS:2022:690, accessed 6 June 2023.

[26]Pascal Wagner, "Erstes österreichisches Urteil definiert Lootboxen als illegales Glücksspiel [First Austrian judgment defines loot boxes as illegal gambling]" (*GamesMarkt*, 6 March 2023) https://www.gamesmarkt.de/business/erstes-oesterreichisches-urteil-definiert-lootboxen-als-illegales-gluecksspiel-094c920859945318e67425473f89d21c, accessed 7 June 2023; Pascal Wagner, "Offiziell: Österreichisches Lootbox-Urteil Gegen Sony Rechtskräftig [Official: Austrian Lootbox Verdict against Sony Legally Binding]" (*GamesMarkt*, 5 April 2023) https://www.gamesmarkt.de/business/offiziell-oesterreichisches-lootbox-urteil-gegen-sony-rechtskraeftig-5a5018ba633418dd45f3f9f442f9e881, accessed 15 May 2023.

[27]*E.g.,* *Sutherland* v. *Electronic Arts*, 2023 BCSC 372; *Johnston* v. *Epic Games et al*, 2020 SCBC VLC-S-S-220088 (Canada); *Bourgeois* v. *Electronic Arts et al*, 2020 QCCS 500-06-001132-212 (Canada).

[28]*E.g.,* *Zanca* v. *Epic Games*, Case No 21-cv-000534 (Wake Co SC NC 2021).

been published in Spain,[29] Finland,[30] Australia,[31] and Brazil (where two conflicting bills, one intending to legalize and the other intending to criminalize loot boxes, are simultaneously under consideration).[32] The UK Government concluded its consultation process on loot boxes[33] and decided upon the approach of relying on industry self-regulation rather than legislating;[34] the relevant self-regulatory guidance has since been published.[35] The Australian Government has also published its regulatory proposal intending to require games containing loot boxes to be rated suitable only for people aged 15 + at a minimum.[36]

Empirical policy research testing compliance with, and the effectiveness of, adopted regulation (e.g., Belgium's ban on loot boxes[37] and industry self-regulatory loot box presence warning labels[38]), which allows for more informed commentary, has also advanced. Lastly, legal developments in Italy (where the consumer protection authority has enforced the EU Unfair Commercial Practices Directive (UCPD)[39] to force companies to disclose loot box presence and make probability disclosures) and Finland (where prosecution of illegal loot boxes was considered but could not proceed due to lacking jurisdiction)[40] and the "compliance" action taken by Valve in France in relation to *Counter-Strike: Global Offensive* (*CSGO*) (Valve Corporation, 2012) of

changing how loot boxes are implemented, although predating the publication of prior works in the legal literature, were not analyzed previously.

This article therefore collates and presents all regulatory and policy developments that are known to me. The relevant documents (with redactions of personal and sensitive information as needed) are archived and made publicly available at the data deposit link found in the first footnote containing the Data Availability Statement. This article aims to be comprehensive but cannot claim to be perfectly so because the developments in some territories might have been missed due to language barriers. A summary of these developments is provided alongside some commentary: I hope that the data deposit link would act as a resource that would encourage further in-depth discussions.

For context, the psychology literature on loot boxes has also advanced in the past five years. Previous empirical research has consistently found a link between loot box spending and problem gambling, which has been relied upon to argue that the product is potentially harmful.[41] There are multiple potential explanations for this relationship: (i) people who developed problem gambling issues through traditional gambling may be disproportionally spending more money on loot boxes; (ii) people might be

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[29]Ministerio de Consumo [Ministry of Consumer Affairs] (Spain), "Anteproyecto de Ley Por El Que Se Regulan Los Mecanismos Aleatorios de Recompensa Asociados a Productos de Software Interactivo de Ocio [Consultation on the Bill of Law That Regulates Random Reward Mechanisms Associated with Interactive Entertainment Software Products]" (1 July 2022) https://www.consumo.gob.es/sites/consumo.gob.es/files/BORRADOR%20APL%20Y%20MAIN%20MECAN ISMOS%20ALEATORIOS%20RECOMPENSA%20010722.pdf, accessed 5 July 2022.

[30]Sebastian Tynkkynen, "Lakialoite LA 42/2022 vp [Legislative Initiative LA 42/2022 Vp]" (*Suomen eduskunta/Finlands riksdag [Parliament of Finland]*, 29 September 2022) https://www.eduskunta.fi/FI/vaski/Lakialoite/Sivut/LA_42 + 2022.aspx, accessed 6 June 2023.

[31]Andrew Wilkie, "Classification (Publications, Films and Computer Games) Amendment (Loot Boxes) Bill 2022 (Australia)" (28 November 2022) https://parlinfo.aph.gov.au/parlInfo/search/display/display.w3p;query=Id%3A%22legisla tion%2Fbillhome%2Fr6949%22, accessed 8 June 2023.

[32]Heitor Freire, "Projeto de Lei N° 4148, de 2019 [Chamber Bill No 4148 of 2019] (Brazil)" (18 July 2019) https://www.camara.leg.br/proposicoesWeb/ficha detramitacao?idProposicao=2212564, accessed 6 June 2023; Alessandro Vieira, "Projeto de Lei N° 2628, de 2022 [Senate Bill No 2628 of 2022] (Brazil)" (18 October 2022) https://www25.senado.leg.br/web/atividade/materias/-/materia/154901, accessed 6 June 2023.

[33]Department for Digital, Culture, Media & Sport (DCMS) (UK), *Loot Boxes in Video Games: Call for Evidence* (September 2020) https://www.gov.uk/government/consultations/loot-boxes-in-video-games-call-for-evidence/loot-boxes-in-video-games-call-for-evidence, accessed 6 June 2023.

[34]DCMS, *Government Response to the Call for Evidence on Loot Boxes in Video Games* (17 July 2022) https://www.gov.uk/government/consultations/loot-boxes-

in-video-games-call-for-evidence/outcome/government-response-to-the-call-for-evidence-on-loot-boxes-in-video-games, accessed 18 July 2023.

[35]Ukie (UK Interactive Entertainment), *New Principles and Guidance on Paid Loot Boxes* (18 July 2023) https://ukie.org.uk/loot-boxes, accessed 18 July 2023.

[36]Michelle Rowland, "Albanese Government Outlines Key Reforms to National Classification Scheme" (*Ministers for the Department of Infrastructure*, 29 March 2023) https://minister.infrastructure.gov.au/rowland/media-release/albanese-gov ernment-outlines-key-reforms-national-classification-scheme, accessed 19 July 2023.

[37]Leon Y Xiao, *Breaking Ban: Belgium's Ineffective Gambling Law Regulation of Video Game Loot Boxes* (2023) 9 COLLABRA: PSYCHOLOGY Article 57641.

[38]Xiao, *Beneath the Label* (n. 7).

[39][2005] OJ L149/22.

[40]Länsi-Suomen Syyttäjänvirasto [Prosecutor's Office of Western Finland], "Esi-tutkintaa Ei Aloiteta Asiassa 5650/S/16956/17 [The Preliminary Investigation Will Not Be Started in Case 5650/S/16956/17] Dnro 041/14/18" (8 April 2019) https://osf.io/bxhms, accessed 19 July 2023.

[41]David Zendle and Paul Cairns, *Video Game Loot Boxes Are Linked to Problem Gambling: Results of a Large-Scale Survey* (2018) 13 PLoS ONE e0206767; Shaun Stephen Garea and others, *Meta-Analysis of the Relationship between Problem Gambling, Excessive Gaming and Loot Box Spending* (2021) 21 INTERNATIONAL GAMBLING STUDIES 460; Stuart Gordon Spicer and others, *Loot Boxes, Problem Gambling and Problem Video Gaming: A Systematic Review and Meta-Synthesis* (2022) 24 NEW MEDIA & SOCIETY 1001.

developing problem gambling issues through engaging with loot boxes; or (iii) some other explanation. The oft-cited weakness of previous studies is that they have all been cross-sectional, meaning that they could not prove directional causation, i.e., that loot boxes are causing harm, such as the development of problem gambling issues amongst video game players through purchasing loot boxes. However, two longitudinal studies examining the relationship between loot boxes and traditional gambling have recently been published. A positive relationship between purchasing loot boxes and participating in traditional gambling six months later has been found amongst Spanish young people.[42] Similarly, this relationship was found amongst U.S., UK, and Canadian young people; in addition, those who purchased loot boxes were also more likely to spend more money on traditional gambling.[43] Longitudinal studies that span longer periods of time remain forthcoming but the evidence base has improved such that there is now stronger and more reliable support for loot box regulation than before.

2. PROBABILITY DISCLOSURE REQUIREMENTS

This article begins with the two regions that have adopted new regulation that is already affecting, or will soon affect, companies. In contrast, most of the developments in other countries dealt with later are prospective and unconfirmed and may not necessarily be relevant for compliance purposes.

2.1. Taiwan: probability disclosures required since 1 January 2023

In July 2022, the Consumer Protection Committee of the Executive Yuan announced[44] the approval of an amendment to the regulatory document concerning online video games.[45] Article 6 thereof now provides that games offering "中獎商品或活動 [lottery-winning products or activities]" (i.e., in-game purchases that involve randomization very broadly defined and specifically including cases where the loot box is "earned" by players for free through gameplay but must be opened using a "key" that must be purchased using real-world money[46]) must disclose the percentage probability of winning each item. This means that a "category-based probability disclosure"[47] that, for example, only reveals the percentage probabilities of obtaining specific rarities of rewards and does not provide for the exact probability of obtaining each reward within that rarity category is arguably non-compliant. The disclosure needs to be made on the homepage of the game's website, the game's log-in page, *or* the "purchase page" and on the physical product packaging.[48] The use of the conjunction "or" means that disclosures do not need to be made at all locations listed, and it is unclear whether "purchase page" refers to where the game can be bought or where the relevant in-game purchase involving randomization can be bought. In addition, games are required to provide a reminder stating, "此為機會中獎商品，消費者購買或參與活動不代表即可獲得特定商品。 [This is a chance-based product; the consumer is not guaranteed to obtain any specific product by virtue of purchasing or participating]" or a similar message to that effect.[49] These rules became effective on 1 January 2023.

2.2. South Korea: probability disclosures required from 22 March 2024

In December 2020, a bill was proposed[50] in South Korea (Hanguk) by members of the National Assembly intending to amend the Games Industry

[42] J González-Cabrera and others, *Loot Box Purchases and Their Relationship with Internet Gaming Disorder and Online Gambling Disorder in Adolescents: A Prospective Study* (2023) 143 Computers in Human Behavior 107685.

[43] Gabriel A Brooks and Luke Clark, *The Gamblers of the Future? Migration from Loot Boxes to Gambling in a Longitudinal Study of Young Adults* (2022) 141 Computers in Human Behavior 107605, 7.

[44] 行政院消費者保護會消費者保護處 [Consumer Protection Office, Consumer Protection Committee, Executive Yuan] (Taiwan), "公布轉蛋中獎機率 保障遊戲玩家權益 [Disclosing Loot Box Odds to Protect Gamers' Interests]" (15 July 2022) https://cpc.ey.gov.tw/Page/6C059838CA9744A8/adc0330c-bd72-416b-9ecf-08e6a9d339ec, accessed 19 July 2023.

[45] 消費者保護處 [Consumer Protection Office] (Taiwan) (n. 22).

[46] 行政院消費者保護會消費者保護處 [Consumer Protection Office, Consumer Protection Committee, Executive Yuan] (Taiwan) (n. 44).

[47] *See* Leon Y Xiao, *Drafting Video Game Loot Box Regulation for Dummies: A Chinese Lesson* (2022) 31 Information & Communications Technology Law 343, 368–370.

[48] 消費者保護處 [Consumer Protection Office] (Taiwan) (n. 22) art 6.

[49] *Ibid.*

[50] 대한민국 국회 [National Assembly of the Republic of Korea], "[2106496] 게임산업진흥에 관한 법률 전부개정법률안(이상헌의원 등 17인) [[2106496] A Bill to Amend the Entirety of the Game Industry Promotion Act (17 Members Including Lee Sang-Heon)]" (15 December 2020) https://likms.assembly.go.kr/bill/billDetail.do?billId=PRC_E2I0I1I2R1N4M1C5J5H2O3E3R4M1O3, accessed 19 July 2023.

Promotion Act, which has regulated the national video games sector since 2006.[51] One of the proposals was to have Clause 59 require probability disclosures for "확률형 아이템 [stochastic or probability/chance-based items],"[52] which was to be broadly defined under Clause 2 as in-game purchases involving randomization.[53] That bill has not progressed, but this particular amendment regarding requiring probability disclosures was adopted in substance through a separate procedure on 21 March 2023. Effective from 22 March 2024, the amended Article 33 requires that the probabilities for obtaining *each* item (i.e., category-based disclosures would again likely be non-compliant) must be published.[54]

The exact requirements as to how the disclosures should be made are to be set out by presidential decree.[55] Article 19 of the corresponding presidential decree dealing with the enforcement of the Game Industry Promotion Act (specifically, the Table 3 attached to that Decree) sets out the technical requirements for displaying other game product information already required by Article 33 prior to the amendment, such as age ratings.[56] However, the presidential decree has not yet been amended to detail how to make probability disclosures for loot boxes as of July 2023. It is as yet unclear exactly how probability disclosures should be made in South Korea. Notably, a national industry self-regulator (the Game Self-Governance Organization of Korea (GSOK) of the Korea Association of Game Industry (K-GAMES)) has been requiring and policing probability disclosures since February 2017:[57] relatively detailed instructions as to what compliant disclosures would look like have been provided (e.g., that it must be made on the "purchase page").[58] Later revisions of the self-regulatory code contained even further detail and example implementations in order "to avoid any

misinterpretation and to provide correct understanding."[59] The future role (if any) of the GSOK is unknown.

As to enforcement, Article 38(9) of the newly amended Game Industry Promotion Act grants the relevant minister the power to order companies to make disclosures if they do not do so or else have provided false information. In addition, the minister may recommend or order the company to follow a corrective plan. Article 45 sets out the penalties for non-compliance, which may be imprisonment of up to two years or a fine of up to ₩20,000,000 (≈ £12,000). Failing to disclose loot box probabilities as required per se would *not* attract this penalty (Article 45(7) omits Article 33(2) and only punishes non-compliance with Articles 33(1) and 33(3)). However, non-compliance with a corrective order issued by the minister to make better disclosure under Article 38(9) is punishable (Article 45(11)). These deterrence powers are encouraging to see as they can better ensure that companies will comply.

2.3. China: dubious compliance and efficacy of probability disclosures

For many years, the mainland of the People's Republic of China (PRC) used to be the only jurisdiction to require loot box probability disclosures by law. Initially published in December 2016 and effective from 1 May 2017, the Chinese regulations have *not* been complied with well by the highest-grossing iPhone games.[60] Although 95.6% of games with loot boxes did make disclosures, most used methods that were visually hidden and difficult for players to access.[61] One criticism of the mainland Chinese regulation has been that it did not set out specific requirements as to how companies must comply (e.g., exactly how the disclosures need to be published and how visually

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[51] 게임산업진흥에 관한 법률 [Games Industry Promotion Act] (as enacted as Law No. 7941 on 28 April 2006, effective 29 October 2006) and as later successively amended.

[52] 대한민국 국회 [National Assembly of the Republic of Korea] (n. 50) 49–50.

[53] *Ibid* 8.

[54] 게임산업진흥에 관한 법률 [Game Industry Promotion Act] (as amended by Law No. 19242 of 21 March 2023, effective 22 March 2024), art 33(2).

[55] *Ibid* art. 33(4).

[56] 게임산업진흥에 관한 법률 시행령 [Enforcement Decree of the Game Industry Promotion Act] (Presidential Decree No. 33434 of 25 April 2023, effective 25 April 2023), art 19 and table 3.

[57] 한국게임산업협회 [Korea Association of Game Industry; K-GAMES], "건강한 게임ㅁ화 조성을 위한 자율규제 강령 [Self-Regulatory Code for Creating a Healthy Game Culture] (Enacted 15 February 2017)" (15 February 2017) art. 5(1)(3), http://www.gsok.or.kr/regulations-on-self-regulation/?pageid=2&mod=document&uid=79, accessed 6 July 2023.

[58] *Ibid* app 1.

[59] 한국게임산업협회 [Korea Association of Game Industry; K-GAMES], "건강한 게임ㅁ화 조성을 위한 자율규제 시행기준 [Criteria on Implementation of Self-Regulation for Healthy Game Culture] (Revised 1 July 2018)" (2018) 19–26, http://www.gsok.or.kr/regulations-on-self-regulation/?uid=89&mod=document&pageid=1, accessed 19 July 2023.

[60] Xiao and others (n. 13).

[61] *Ibid.*

prominent and accessible it must be), which resulted in giving companies discretion to comply sub-optimally and not provide maximal consumer protection.[62] The Taiwanese and South Korean regulations have not addressed this specific shortcoming by, e.g., requiring an industry-wide, uniform manner of prominent probability disclosures (although the South Korean Presidential Decree might still be amended to detail this).

A survey of mainland Chinese players also revealed that although 84.6% of players who purchased loot boxes reported seeing them, 72.4% did not report their spending behaviors changing; 19.3% reported spending less money; and 8.3% reported spending more money.[63] Therefore, even when the disclosures are seen by players, they might not be an effective harm reduction measure because the underlying purchasing behavior is rarely affected in the intended direction. Taiwan and South Korea have started to recognize the potential harms of loot boxes by requiring probability disclosures, but they and other countries may need to consider more interventionist regulations, if they wish to provide better consumer protection by more directly reducing spending.

3. APPLYING EXISTING GAMBLING LAW?

Besides adopting new laws to specifically regulate loot boxes, countries have also attempted to enforce existing laws. Two areas of law are particularly relevant: gambling law and consumer protection law.

Under the gambling laws of most countries, only Embedded-Embedded loot boxes legally constitute gambling, whilst Embedded-Isolated loot boxes do not, because the legal definition of "gambling" requires the prizes obtained from the loot box to pos-sess real-world monetary value, e.g., in the UK by requiring the prizes be "money or money's worth."[64] In contrast, Belgium's gambling law is uniquely broad in that Embedded-Isolated loot boxes would also constitute illegal gambling.[65] This distinction has already been explored in detail elsewhere.[66] Importantly, most countries' gambling regulators have not enforced gambling law against Embedded-Embedded loot boxes despite them being unlicensed and illegal under a plain interpretation of those countries' gambling laws.[67] However, there are three exceptions where gambling law has been applied, successfully or otherwise: Austria, the Netherlands, and Finland. Each country's experience presents a unique perspective. France also provides an interesting angle in that one company has purported to take rather dubious "compliance" action that is unlikely to stand up to scrutiny.

3.1. Belgium: no perceivable enforcement of "ban" on loot boxes

In April 2018, the Belgian gambling regulator published a report applying gambling law to a number of loot box implementations found in contemporaneous video games.[68] The conclusion was that any Embedded-Embedded and Embedded-Isolated loot boxes in video games would constitute illegal gambling in all cases as the regulator is unable to license such products as regulated gambling.[69] This is why it has been popularly said that Belgium has "banned" loot boxes,[70] even though this was done passively through the application of pre-existing law, rather than the adoption of new regulation. Companies have reportedly complied by (i) removing loot boxes from Belgian versions of games;[71] (ii) removing games that rely on loot boxes to monetize from the

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[62]Xiao, *Drafting for Dummies* (n. 47).

[63]Leon Y Xiao, Tullia C Fraser and Philip WS Newall, *Opening Pandora's Loot Box: Weak Links Between Gambling and Loot Box Expenditure in China, and Player Opinions on Probability Disclosures and Pity-Timers* (2023) 39 JOURNAL OF GAMBLING STUDIES 645, 654–655.

[64]Gambling Act 2005 (UK), s. 6(5)(a).

[65]Belgische Kansspelcommissie [Belgian Gaming Commission], "Onderzoeksrapport loot boxen [Research Report on Loot Boxes]" (2018) https://web.archive.org/web/20200414184710/https://www.gamingcommission.be/opencms/export/sites/default/jhksweb_nl/documents/onderzoeksrapport-loot-boxen-final-publica tie.pdf, accessed 9 July 2023; Xiao, *Breaking Ban* (n. 37).

[66]*See* Leon Y Xiao and others, *Regulating Gambling-like Video Game Loot Boxes: A Public Health Framework Comparing Industry Self-Regulation, Existing National Legal Approaches, and Other Potential Approaches* (2022) 9 CURRENT ADDICTION REPORTS 163, 171–172; Xiao, *Which Implementations of Loot Boxes Constitute Gambling?* (n. 8).

[67]Leon Y Xiao, *Sussing out the Cashing out: Illegal Video Game Loot Boxes on Steam* (OSF Preprints, 26 February 2023) https://osf.io/taes2/, accessed 19 July 2023.

[68]Belgische Kansspelcommissie (n. 65).

[69]Xiao, *Breaking Ban* (n. 37) 11.

[70]*E.g.*, BBC, *Gaming Loot Boxes: What Happened When Belgium Banned Them?* BBC NEWS (12 September 2019) https://www.bbc.com/news/newsbeat-49674333, accessed 9 July 2023.

[71]*E.g.*, 2K Games, "Statement Belgium" (*2K Games Official Website*, 2018) https://www.2k.com/myteaminfo/be/, accessed 9 July 2023.

Belgian market;[72] or (iii) not publishing games that generate revenue through loot boxes in Belgium at all.[73]

However, in practice, 82 of the 100 highest-grossing iPhone games on the Belgian Apple App Store continued to sell loot boxes.[74] The law has not been enforced because it is practically difficult to do so due to the vast volume of available content,[75] as separately admitted by the Belgian gambling regulator[76] and the Minister of Justice.[77] Games that were removed or not released in the Belgian market were also easily accessible by, for example, changing the Apple App Store's country setting to not be Belgium.[78] Some companies have since taken compliance action after that study result came out,[79] suggesting that at least some cases of non-compliance were due to the companies not having the requisite knowledge about their legal obligations.

The Belgian failure to impose a ban should be considered by other countries intending to seek a similar result through whatever means. Following the study, in September 2022, the Belgian gambling regulator has suggested that it might be more practicable to permit some loot boxes or to license them, rather than to attempt the difficult (and conceivably impossible) task of enforcing a ban on them.[80] (Notably, the regulator also recognized that physical collectible/trading card game booster packs containing random cards[81] would fall within the same category of illegal gambling as loot boxes and should be banned in Belgium at present,[82] contrary to legally incorrect comments previously made by a representative of the regulator in May 2018.[83]) An education campaign targeting industry members and better informing them of their compliance obligations (potentially conducted through the app stores as part of the game uploading process) and a more realistic regulatory goal (e.g., of ensuring that none of the 500 highest-grossing games contain loot boxes[84]) would be well-advised.

3.2. Austria: civil suit concluding that certain loot boxes are illegal gambling

In February 2023, an Austrian player successfully sued Sony for recovery of the sum of money he has spent on loot boxes in the *FIFA* video game series (Electronic Arts, 1993–2022).[85] The Hermagor District Court ruled in his favor and required Sony to refund the amount spent because the "Ultimate Team Player Packs" in *FIFA* are illegal gambling, as they are Embedded-Embedded loot boxes: specifically, (i) the player paid real-world money to open them; (ii) the content was randomized; and, importantly, (iii) the obtained loot box content constituted a "financial benefit" within the meaning of Austrian gambling law because it can be traded on a secondary market between players.[86] Importantly, even though Sony was allowed the opportunity to appeal that judgment, it has not done so, meaning that the judgment has since became final and binding.[87] One

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[72]*E.g.,* Nintendo, "Belangrijke informatie voor gebruikers in België [Important Information for Users in Belgium]" (*Nintendo Belgium*, 21 May 2019) https://www.nintendo.be/nl/Nieuws/2019/mei/Belangrijke-informatie-voor-gebruikers-in-Belgie-1561911.html, accessed 9 July 2023.

[73]Tom Phillips, *Lootbox Laws Reportedly Block Diablo Immortal Launches* (Eurogamer, 31 May 2022) https://www.eurogamer.net/lootbox-laws-reportedly-block-diablo-immortal-launches, accessed 9 July 2023.

[74]Xiao, *Breaking Ban* (n. 37) 10.

[75]*Ibid* 18.

[76]Belgische Kansspelcommissie [Belgian Gaming Commission], "Preliminair Advies: Spelen Met Beperkte Inzet En Winst [Preliminary Advice: Play with Limited Stakes and Profit]" (2022) 7, https://gamingcommission.paddlecms.net/sites/default/files/2022-09/Preliminair%20advies_Spelen%20met%20beperkte%20inzet%20en%20winst_0.pdf, accessed 19 July 2023.

[77]Timon Ramboer, *Ze zetten kinderen aan tot gokken, maar worden zomaar verkocht: 8 op 10 games verkopen nog steeds "lootboxes" [They encourage children to gamble, but are simply sold: 8 out of 10 games still sell "loot boxes"]* (Gazet van Antwerpen, 13 August 2022) https://www.gva.be/cnt/dmf20220813_09388283, accessed 9 July 2023.

[78]Xiao, *Breaking Ban* (n. 37) 11.

[79]*E.g.,* Justin Carter, *Roblox Game Adopt Me Ends Netherlands Service Due to Loot Boxes* (Game Developer, 15 September 2022) https://www.gamedeveloper.com/pc/-i-roblox-i-game-i-adopt-me-i-ends-netherlands-service-due-to-loot-boxes, accessed 9 July 2023.

[80]Belgische Kansspelcommissie (n. 76) 7.

[81]Zendle and others, *Links between Problem Gambling and Spending on Booster Packs in Collectible Card Games* (n. 5).

[82]Belgische Kansspelcommissie (n. 76) 7, fn. 11.

[83]Ivy Taylor, *Belgian Gaming Commission Recommends Criminal Prosecution over Illegal Loot Boxes* (GamesIndustry.biz, 10 May 2018) https://www.gamesindustry.biz/belgian-gambling-commission-lays-out-recommendations-over-illegal-loot-boxes, accessed 10 July 2023.

[84]Thanks are due to David Zendle for raising this point when discussing the Belgian results with me.

[85]Gameswirtschaft, *Rechtskräftig: FIFA-Lootboxen Sind Illegales Glücksspiel (Update) [Legal: FIFA Loot Boxes Are Illegal Gambling (Update)]* (GamesWirtschaft.de, 5 April 2023) https://www.gameswirtschaft.de/wirtschaft/fifa-lootboxen-sony-klage-gluecksspiel-oesterreich-040423/, accessed 7 July 2023.

[86]*Ibid*; Wagner, *First Austrian judgment* (n. 26).

[87]Wagner, *Austrian Verdict Legally Binding* (n. 26).

would reasonably have expected one of the world's most well-resourced technology companies to appeal had there been any valid legal grounds to do so. This is because a successful appeal could have set an informal precedent that would strongly discourage other players from attempting (supposedly unmeritorious) litigation in the future.

Unfortunately, the judgment is not publicly available: the court has denied a media request citing that it is not legally allowed to publish the judgment.[88] The non-public nature of the judgment (likely stemming from it being a civil claim between private parties, i.e., the player and the game company/platform, rather than a public administrative or criminal case commenced by the regulator or prosecutor) has obvious negative consequences for open justice and may be unfairly advantaging the industry by depriving legal information from the public domain. The industry would presumably have access to paid-for legal advice, but players could not easily have access to the same knowledge.[89]

Interestingly, this case was brought against Sony (the platform provider and the party that took payment from the player for the loot boxes), rather than Electronic Arts (the developer and publisher of the game offering the illegal loot boxes), because the sales contract was concluded between the player and Sony.[90] It is not known whether Sony has sought compensation from Electronic Arts: whether the platform provider can ask the developer/publisher for a contribution in such claims is an interesting legal question. Further, the case was brought with the assistance of a litigation funder, who has publicly stated that more than 1,000 players have already contacted it to make potential claims that average around €800 (≈ £700) but may even be up to €85,000 (≈ £73,000) in extreme cases.[91] This suggests that the proverbial "floodgate" might have opened in relation to loot box litigation, at least in Austria and perhaps also other German-speaking jurisdictions where the gambling laws are very similar to

Austria's. Players from countries where litigation funding is less permissible might find it more difficult to make similar claims in practice even when they have a solid legal case.

In August 2023, GamesIndustry.biz reported that Electronic Arts and Sony have lost a different loot box case in Austria and were ordered to refund €10,800 to a player, and a statement provided by Electronic Arts claimed that it has actually previously won another loot box case in Austria.[92] This latter point is contrary to how the public has hitherto understood the legal situation because the cases were not reported when Electronic Arts won, but the litigation funder has successfully widely promoted their victory over Sony. I have since obtained copies of the relevant judgments, which I am unfortunately unable to make publicly available. However, the four cases (two of which have since been appealed, and one of which has since been refiled and ruled on, thus providing a total of seven judgments) are summarized in Table 1. In addition, an eighth case, in which the player successfully sued Valve to have the money they spent on loot boxes in *CSGO* refunded (i.e., the same claim but in the context of a second game has been upheld), is included.

A detailed analysis of all these cases is beyond the scope of this article. However, the main takeaway is that only three cases were fully determined in the sense that the court actually decided on the question of whether the *FIFA* loot boxes infringed Austrian gambling law. (The other cases were not decided on their merits but instead on procedural or technical issues.) Two cases were in the player's favor. In the Hermagor case, the player won at first instance, and the defendant did not appeal. In *Krautsieder*, the defendants won at first instance, but that decision was reversed on appeal, so the player eventually won. Electronic Arts has publicly maintained that the *Krautsieder* appeal judgment was wrongly decided on "both the facts and law" and stated that it nevertheless has decided not to appeal because

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[88]Erlass des Bundesministeriums für Justiz vom 23. Mai 2016 über die Zusammenarbeit mit den Medien (Medienerlass) [Decree of the Federal Ministry of Justice of May 23, 2016 on cooperation with the media (the Media Decree)].

[89]Thanks are due to Deirdre Leahy for raising this point in email discussions with me.

[90]Gameswirtschaft (n. 85).

[91]*Ibid.*

[92]Christopher Dring, *EA Loses Minor FIFA Loot Box Legal Case in Austria* (GAMESINDUSTRY.BIZ, 16 August 2023) https://www.gamesindustry.biz/ea-loses-minor-fifa-loot-box-legal-case-in-austria, accessed 13 September 2023.

TABLE 1. SUMMARY OF VARIOUS LOOT BOX LITIGATION IN AUSTRIA

Date	#	Court	Plaintiff	Defendant(s)	Outcome
26 February 2023	1 C 16/20x − 56	Hermagor District Court	[Anonymized]	Sony	Plaintiff won
24 November 2022	5 C 1816/21z − 43	Floridsdorf District Court	Krautsieder	Electronic Arts & Sony	Defendants won (since reversed)
27 June 2023	34 R 34/23m	Vienna Regional Civil Court	Krautsieder	Electronic Arts & Sony	Plaintiff won on appeal
4 February 2023	13 C 464/22f	Leopoldstadt District Court	Stancic	Electronic Arts	Defendant won on a technicality (since upheld)
2 August 2023	40 R 87/23z	Vienna Regional Civil Court	Stancic	Electronic Arts	Defendant won on a technicality
27 March 2023	25 C 307/22f	Hernals District Court	Mihajlovic	Electronic Arts	Defendant won on a technicality (since refiled)
17 November 2023	1 C 206/23k	Vienna District Court for Commercial Matters	Mihajlovic	Sony (& Electronic Arts intervening)	Defendant won
14 December 2023	6 Cg 3/23x	Leoben Regional Court	[Anonymized]	Valve Corporation	Plaintiff won

the judgment did not set a precedent.[93] It is curious that the defendants of both cases have decided not to appeal, if one is to believe that a further appeal by the companies would be meritorious, as surely an appeal court decision in their favor finding that loot boxes do not constitute illegal gambling (even though, strictly speaking, it would have no precedential value) would in practice deter future claims made with the assistance of litigation funders.

With that said, the most recent case (the refiling of *Mihajlovic*) was decided on its merits in the companies' favor, but some background as to previous proceedings is needed before delving into that judgment. When Electronic Arts asserted in August 2023 that it has previously won cases, it has only done so on technicalities in two instances. The first is *Stancic*, wherein the player was unable to prove that he actually spent the amount of money claimed on in-game purchases in *FIFA*. His claim (and appeal) failed on that technical basis, although the first instance Leopoldstadt District Court did also express some support for Electronic Arts' arguments that *FIFA* loot boxes are *not* illegal gambling under Austrian law but ultimately did not decide the point. The second is *Mihajlovic*, wherein the court decided that Electronic Arts is not the appropriate defendant for the player to sue because the relevant contracts were between the player and Sony, such that Electronic

Arts was not a party to those contracts. There are inherent conflicts between these various judgments, as there is no relevant system of precedence, such that the district courts would decide these cases on an individual basis. For example, in the appeal decision of *Krautsieder*, the court ordered Electronic Arts to refund an amount of money that the player spent using an Xbox game console through the Microsoft Store, even though the relevant contracts would have been concluded between the player and Microsoft only. The *Krautsieder* court did not demand that Microsoft be added as a party. This is directly contradictory to the court's reasoning in *Mihajlovic*, which would have required it.

Importantly, *Mihajlovic* was then refiled naming Sony (rather than Electronic Arts) as the defendant. The court decided that potential "illegal" financial gains derived from selling in-game content or entire player accounts containing loot box rewards on the black market (which has been prohibited by the game's Terms of Use) cannot be a "financial benefit" that would satisfy the relevant criterion of Austrian gambling law. This means that selling *FIFA* player packs is not offering gambling services. In addition, the facts that (i) loot boxes are not bought to make a profit and are instead used for entertainment and (ii) each loot box only costed a small amount of money (approximately €6) were taken into account. In

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[93]*Ibid.*

combination, these meant that the exception that games of chance which are played "just to pass the time and for small amounts" are excepted from Austrian gambling law applied to video game loot boxes. In short, the court decided that even Embedded-Embedded loot boxes are not illegal gambling under Austrian law so long as the game company is not offering them so that players would buy them to obtain a financial profit. This reasoning is clearly contrary to those of the Hermagor case and the *Krautsieder* appeal.

Finally, an eighth judgment has since been handed down permitting the player to claim a refund for money spent on loot boxes in a second game (*CSGO*) where the loot box rewards could be transferred between players. Considering these mixed results, it is difficult to predict how future Austrian courts will decide loot box cases in the coming years. Judgments could go either way. Companies are therefore advised to be cautious. In any case, the public should be conscious of how some stakeholders (e.g., the litigation funders) are incentivized to promote a certain narrative about loot box regulation in a certain country (e.g., that loot boxes are *definitely* illegal gambling to encourage more claimants to come forward). It is important to learn about the perspectives of all parties involved. Finally, when the claims did succeed in relation to the *FIFA* video games, the courts ordered for the money to be refunded but also for the obtained loot box rewards to be removed from the player's accounts (which would, of course, be fair). However, this process might be technically difficult to carry out, particularly considering how older versions of games might no longer be operational.

3.3. Finland: attempted criminal prosecution of loot boxes failed on jurisdiction

Between 2018 and 2019, an attempt to enforce gambling law against Embedded-Embedded loot boxes was also made in Finland. Upon request from a police department to determine whether the loot boxes in *CSGO* infringe Finnish gambling law, the Gambling Administration of the National Police Board (i.e., the Finnish gambling regulator) expressed its opinion in document "POL-2018-22730."[94] In summary, the Finnish regulator decided that *CSGO* loot boxes are a type of illegal lottery because the three relevant legal elements (stake, chance, and monetary gain) have been satisfied and the activity is unlicensed (and in fact can never be licensed because commercial lotteries for profit by private entities are not legally permissible).[95] However, despite that expression of opinion supporting prosecution, the Prosecutor's Office of Western Finland decided *not* to proceed with the prosecution. The reasoning for that decision was set out in the prosecutorial opinion "Dnro 041/14/18."[96] That document has not been widely reported on (if at all).

A legal technical point prevented prosecution: specifically, a jurisdiction point. The prosecutors acknowledged the input of the Finnish gambling regulator in POL-2018-22730 that the relevant legal elements of the offence of providing an illegal, non-money, goods lottery[97] may potentially have been satisfied by Valve Corporation's provision of loot boxes in *CSGO*.[98] However, the U.S.-based company operating *CSGO* has not committed a crime within Finland because (i) the physical place of commission of the alleged crime is outside of Finland and (ii) the provision of an illegal non-money, goods lottery offence does not have a consequence element,[99] such that the crime cannot be deemed to have been committed in Finland on the alternative "consequence" ground for deriving jurisdiction.[100] Accordingly, the prosecutor had no jurisdiction and could not proceed.[101] Other methods of deriving jurisdiction were also not possible[102] (such as the crime having been "directed at a Finnish person"[103]) because, *inter alia*, it is required that the offence must be

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[94]Gambling Administration of the National Police Board (Finland), *The Relationship between Loot Boxes and the Lottery Act POL-2018-22730* (22 August 2018) https://osf.io/d5xaf, accessed 19 July 2023.

[95]*Ibid* 3.

[96]Länsi-Suomen Syyttäjänvirasto [Prosecutor's Office of Western Finland] (n. 40).

[97]Rikoslaki [Criminal Code] 39/1889 (Finland), c. 17, s. 16b.

[98]Länsi-Suomen Syyttäjänvirasto [Prosecutor's Office of Western Finland] (n. 40) 4.

[99]Rikoslaki (n 95), c. 17, s. 16b.

[100]*Ibid*, c. 1, s. 10.

[101]Länsi-Suomen Syyttäjänvirasto [Prosecutor's Office of Western Finland] (n. 40) 8.

[102]*Ibid*.

[103]Rikoslaki (n. 95), c. 1, s. 5.

punishable with imprisonment of at least more than six months for such methods to be applicable, but the harshest possible penalty for the illegal goods lottery offence would be six months imprisonment.[104] In short, although foreign companies might be committing criminal offences, Finnish prosecutors cannot act against them.

This failed attempt at prosecution due to a jurisdiction issue reveals obvious shortcomings in Finnish criminal law, particularly in relation to offences involving the internet. If this situation is deemed unsatisfactory by Finnish policymakers, then criminal law should be amended. Finnish gambling regulation must be improved as illegal goods lotteries offered by foreign companies are basically never regulable at present, despite the potential for harm. The other relevant offence of providing an illegal game of chance,[105] which can potentially impose a harsher punishment of over six months imprisonment, would also not be applicable because the additional element of "where the possible loss is clearly disproportionate to the solvency of at least one of the participants" generally could not be satisfied by loot boxes and other gambling-like products, except in extreme situations. This jurisdiction point is also of relevance to a bill that was proposed in Finland in September 2022 that intended to amend the definition of gambling (but which has since died due to a new term of Parliament starting).[106] That bill is addressed under section 6.1.

3.4. The Netherlands: court strikes down enforcement and a forthcoming ban?

In April 2018, the Dutch gambling regulator published a report finding that both paid and non-paid loot boxes (i) whose results are randomly decided and (ii) whose content possessed "market value" or real-world monetary value constitute illegal gambling unless licensed.[107] Further, the regulator is unable to license video game loot boxes as a form of regulated gambling because they are not empowered to do so.[108] Thus, both Embedded-Embedded and, indeed, the much rarer category of Isolated-Embedded loot boxes contravene Dutch gambling law in all cases and are prohibited. In 2019, the Dutch regulator then enforced its interpretation of the law against Electronic Arts for implementing allegedly illegal loot boxes in the *FIFA* video games that were transferable between players and thus possess real-world monetary value.[109] In 2020, on appeal by Electronic Arts against the financial penalty imposed in 2019, the District Court of The Hague upheld the Dutch gambling regulator's legal interpretation.[110]

Electronic Arts then appealed again, and, in March 2022, the final judgment decided that before turning to determine whether the loot boxes contravened Dutch gambling law, it is necessary to consider the preliminary question of whether the entire video game or the loot boxes on their own should be assessed for potential infringement of gambling law.[111] Significant justification is required before the loot boxes can be separated out as an independent game for the legal analysis. For this preliminary question, according to the Council of State, the determinative factor is how the majority of players play the game.[112] The majority of players do not engage with the loot boxes in *FIFA* games as a separate element or an independent game and instead engage with them as part of the overarching game; therefore, it was decided that the loot boxes in *FIFA* cannot be assessed on their own as an independent game as to whether they infringe Dutch gambling law and instead the video game should be assessed as a

[104]*Ibid*, c. 17, s. 16b.

[105]*Ibid*, c. 17, s. 16.

[106]Tynkkynen (n. 30).

[107]Kansspelautoriteit [The Netherlands Gambling Authority], *Onderzoek naar loot boxes: Een buit of een last? [Study into Loot Boxes: A Treasure or a Burden?]* (2018) https://web.archive.org/web/20190503232356/https://kansspelautoriteit.nl/publish/library/6/onderzoek_naar_loot_boxes_-_een_buit_of_een_last_-_nl.pdf, accessed 19 July 2023.

[108]*Ibid* 4.

[109]Kansspelautoriteit [The Netherlands Gambling Authority], I*mposition of an Order Subject to a Penalty on Electronic Arts for FIFA Video Game* (29 October 2020) https://web.archive.org/web/20201127222346/https://kansspelautoriteit.nl/nieuws/nieuwsberichten/2020/oktober/imposition-an-order/, accessed 19 July 2023.

[110]*Electronic Arts Inc & Electronic Arts Swiss Sàrl v. Kansspelautoriteit* (2020) Rechtbank Den Haag [District Court of The Hague] (15 October 2020) https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RBDHA:2020:10428, accessed 11 March 2021.

[111]Afdeling Bestuursrechtspraak Raad van State [Administrative Jurisdiction Division of the Council of State] (The Netherlands) (n. 25).

[112]*Ibid* para 8.4.

whole.[113] It was not argued by the Dutch gambling regulator that the *FIFA* games as a whole infringed gambling law (in any case, they would not have), and, for that reason, the previously taken enforcement action was found to be unlawful and was overturned.[114] That judgment has been critiqued in detail elsewhere, including for failing to account for the experience of the minority of high-spending and vulnerable players,[115] but the judgment's implications are that video game loot boxes are not generally regulable under Dutch gambling law, such that nearly all implementations would be lawful.

Since then, in June 2022, unsatisfied with the judgment, members of the House of Representatives in the Netherlands have filed a motion asking for the government to consider a ban on loot boxes.[116] In June 2023, the Dutch minister in charge of consumer affairs sent a letter to the House of Representatives in which she stated that she will seek tougher regulation of commercial practices relating to video games at an EU-level.[117] In particular, she will seek to have loot boxes recognized as an unfair commercial practice "under all circumstances," [118] which likely means having them listed under Annex 1 of the EU UCPD (thereby prohibited per Article 5(5)) and then transposed to national implementations thereof. The associated press release also stated: "As far as the cabinet is concerned, there will in any case be a ban on [loot boxes],"[119] which appeared to suggest that besides EU-level regulation, national regulation in the Netherlands was also being sought. When asked to clarify, the Dutch Government has since confirmed to me that a national ban on loot boxes

is indeed being sought.[120] However, the exact details as to how this might be achieved and the relevant timeframe for adopting this ban have not been revealed. Said coalition Dutch Government has also since collapsed,[121] meaning that this ban might not be pursued further.

3.5. France: overly cautious and self-incriminating "compliance" action?

In June 2018, the then French online gambling regulator (ARJEL) briefly expressed its views on whether loot boxes are gambling by stating that only Embedded-Embedded loot boxes potentially could be.[122] The ARJEL was conservative and suggested that, depending on the factual circumstances, only companies that actively participate in turning the rewards from Embedded-Embedded loot boxes into real-world money ("il participe à cette monétisation") would be providing illegal gambling (i.e., either actively prohibiting this from happening or even inaction and mere acquiescence may be sufficient to escape liability).[123]

Very few video game companies actively allow players to convert their loot box prizes into real-world money: *Magic: The Gathering Online* (Wizards of the Coast, 2002) and NFT (Non-Fungible Token) games are rare exceptions.[124] However, turning loot box prizes into real-world money ("cashing-out") is always possible where those virtual items are transferable between players because an external transaction between the players to exchange real-world money could make up any difference in value

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[113]*Ibid* para 8.5.

[114]*Ibid* para 9.

[115]*See* Leon Y Xiao and Pieterjan Declerck, *Paid Video Game Loot Boxes Are Not Gambling Under Dutch Gambling Regulation? Shifting the Goalpost in Electronic Arts v. Kansspelautoriteit* (2023) 27 Gaming Law Review 445.

[116]Henri Bontenbal and others, "Motie van het lid Bontenbal c.s. over loot boxes in videogames ook in Nederland verbieden [Motion by members Bontenbal et al. on banning loot boxes in video games in the Netherlands as well]" (30 June 2022) https://www.tweedekamer.nl/kamerstukken/moties/detail?id=2022Z13703&did=2022D28235, accessed 16 July 2022.

[117]Micky Adriaansens, "Letter from Micky Adriaansens to the President of the House of Representatives, Re Nederlandse Consumentenagenda [Dutch Consumer Agenda]" (28 June 2023) 3, https://www.tweedekamer.nl/kamerstukken/brieven_regering/detail?id=2023Z12262&did=2023D29134, accessed 5 July 2023.

[118]*Ibid*.

[119]Ministerie van Economische Zaken en Klimaat [Ministry of Economic Affairs and Climate], "Consumentenagenda minister Adriaansens: aanpak deurverkoop,

eenvoudig online opzeggen [Consumer agenda minister Adriaansens: door sales approach, simple online cancellation]" (29 June 2023) https://www.rijksoverheid.nl/actueel/nieuws/2023/06/29/consumentenagenda-minister-adriaansens-aanpak-deurverkoop-eenvoudig-online-opzeggen, accessed 30 June 2023.

[120]Public Information Service, Government of the Netherlands, "Email Sent on Behalf of the Dutch Government to the Author, Re: EM2499804 [Official Confirmation A Loot Box Ban Is Being Pursued]" (3 July 2023) https://osf.io/jdqwb, accessed 4 October 2023.

[121]BBC, *Mark Rutte: Dutch Coalition Government Collapses in Migration Row*, BBC News (7 July 2023) https://www.bbc.com/news/world-europe-66139789, accessed 12 July 2023.

[122]Autorité de regulation des jeux en ligne (ARJEL) [Regulatory Authority for Online Games (France)], "Rapport d'activité 2017-2018 [Activity Report 2017–2018]" (2018) 6–7, https://web.archive.org/web/20200414184944/http://www.arjel.fr/IMG/pdf/rapport-activite-2017.pdf, accessed 9 July 2023.

[123]*Ibid* 7.

[124]*See* Xiao, *Sussing out the Cashing Out* (n. 67).

between the virtual items, thus facilitating the buying and selling of loot box prizes for real-world money. The French position is more restrictive by requiring the company to actively participate in the monetization, such that any external transactions even if they allow cashing-out would be deemed irrelevant. Other countries would have to decide what sub-types of Embedded-Embedded loot boxes are regulable under their gambling laws. This distinction is arguably artificial and inconsequential, such that it should not be taken into account for regulatory purposes: the potential harms of loot boxes (particularly as to gambling-like financial losses resulting from excessive purchasing) are not wholly caused or prevented by whether the video game company operating the game actively allows cashing-out.[125] The same type of harm would be present as long as turning loot box prizes into real-world money is *de facto* possible. Indeed, a game that allows conversion directly through the company is arguably safer as the player would not have to engage with a grey market that may involve scams and criminal proceeds.[126] Furthermore, when an official secondary market exists, some players would likely decide not to engage with loot boxes because they are no longer forced to do so (e.g., when they could only obtain their desired items from purchasing loot boxes) and simply directly purchase their desired items at a transparent price, thus reducing the potential harm those players might encounter.

Despite the ARJEL having provided an interpretation of French gambling law that is very friendly towards industry interests, notably, one company has decided to take "compliance" action. In September 2019, Valve Corporation decided that, in France only, *CSGO* loot boxes would have to be placed inside a so-called "X-ray Scanner" before they can be opened.[127] The X-ray Scanner reveals the loot box's content and so, ostensibly, the player would know exactly what they will receive when they purchase the loot box. However, importantly, the player must purchase/open the loot box that they placed into the X-ray Scanner before they can scan another

loot box.[128] This means that players are forced to open loot boxes that contain unsatisfactory rewards in order for them to try their luck on new loot boxes. Therefore, every time the player purchases a loot box, what they are receiving is not only the content from the latest loot box they scanned (which, by this point, is known and non-randomized) but also the opportunity to directly purchase the content from the next loot box (which is still randomized). Knowing that most loot boxes would contain prizes that are worth less than the purchase price (i.e., represents a loss), what the player is actually intending to purchase in this transaction is the randomization of the next loot box.

This particular loot box design simply puts one extra layer of delay between the purchase and the randomization but does not remove the gambling element or potential harms. It would be a sham to claim that the player is only directly purchasing the already known loot box content and somehow supposedly pays no heed to the randomization of the next loot box (which is what they are actually paying for). This method of purported "compliance," or more accurately attempted circumvention of the law, does not stand up to scrutiny and is unlikely to be recognized as somehow being capable of converting the loot box into a lawful, non-gambling product. Indeed, Valve cannot have its cake and eat it too. This attempt at circumventing the law can be viewed as an admission that the company is offering Embedded-Embedded loot boxes, which constitute illegal gambling in most countries. Those other countries should actively enforce their gambling laws.

3.6. UK and Australia: enforcement against skin betting/gambling websites

An issue that is adjacent to loot box regulation but does not actually involve finding loot boxes themselves to be illegal gambling or not, is the regulation of so-called skin betting or skin gambling websites. As discussed in the introduction, the virtual items

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[125]Zendle and others, *Paying for Loot Boxes Is Linked to Problem Gambling, Regardless of Specific Features like Cash-out and Pay-to-Win* (n. 9).

[126]Wesley Yin-Poole, *When It Comes to FIFA 18, You Can Most Definitely Cash Out* (Eurogamer, 23 October 2017) https://www.eurogamer.net/when-it-comes-to-fifa-18-you-can-most-definitely-cash-out, accessed 12 July 2023; Valve Corporation, "Key Change" (28 October 2019) https://blog.counter-strike.net/index.php/2019/10/26113/, accessed 12 July 2023.

[127]Valve Corporation, "Counter-Strike: Global Offensive Release Notes for 9/30/2019" (30 September 2019) https://blog.counter-strike.net/index.php/2019/09/25667/, accessed 9 July 2023.

[128]Valve Corporation, "CS:GO - X-Ray Scanner" (*Steam Support*, 2023) https://help.steampowered.com/en/faqs/view/7336-6EBC-1923-EE1B, accessed 10 July 2023.

obtainable from loot boxes are transferable between players in some games (e.g., *CSGO*). These virtual items can often be used to change the cosmetic appearance of certain things inside the game and are thusly known as "skins," although it is also possible to participate in skin betting/gambling with other, non-cosmetic, transferable virtual items that are not "skins" *per se* (such as virtual currencies). Websites that allow players to participate in traditional gambling activities by using skins as the stake have been popularized in recent years.[129] In the UK, 2% of 11–16-year-olds reported gambling (illegally) with virtual items on such websites in 2022.[130] The participation rate amongst adults is likely significantly higher: in one sample, approximately 70% of players who purchased loot boxes reportedly also used skins to gamble.[131]

In February 2017, the UK gambling regulator prosecuted two individuals for operating an unlicensed website (FutGalaxy.com) that offered illegal gambling.[132] On this website, players could participate in traditional gambling activities, such as sports betting, using a virtual currency that was purchased with real-world money.[133] This virtual currency can then be exchanged for the virtual currency from the *FIFA* video games and which can then in turn be converted into real-world money.[134] This case did not relate directly to loot boxes; however, it recognized that the virtual currency from the *FIFA* video games can be converted into cash and are therefore "money's worth." Factually, content from loot boxes in *FIFA* can also be converted into such virtual currency and then into cash.[135] Therefore, following the same logic adopted by the gambling regulator in the

FutGalaxy.com case, *FIFA* loot boxes are offering prizes that are "money's worth," within the UK legal definition of gambling.[136] The UK Government has applauded the gambling regulator for proactively taking enforcement actions against video game-related illegal gambling, specifically citing the *FutGalaxy.com* case (which is the *only* relevant instance of enforcement).[137] However, the regulator evidently has not been proactive with loot boxes, such as the player packs from the *FIFA* games, which are arguably unlicensed gambling. The regulator cannot be selective and must maintain the same legal interpretation by also enforcing the law against loot boxes that players purchase with real-world money and offer random prizes that can be converted back into cash (regardless of whether that conversion is done with or without the game company's permission, as this was deemed irrelevant in the *FutGalaxy.com* case).

In May 2023, similarly, the Australian online gambling regulator (Australian Communications and Media Authority; ACMA) investigated and concluded that the CS:GO Roll website contravened federal online gambling law by providing prohibited services.[138] Specifically, CS:GO Roll allowed players to deposit skins as stake to participate in gambling activities and then paid out any winnings in skins. The ACMA recognized that these skins could then be "converted into real money using third-party platforms"[139] and are thus "money or anything else of value"[140] within the Australian legal definition of gambling.[141] It then logically flows that loot boxes that randomly distributed those skins after payment of real-world money in the first place are also illegal

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[129]Anne Mette Thorhauge and Rune KL Nielsen, *Epic, Steam, and the Role of Skin-Betting in Game (Platform) Economies* (2021) 21 JOURNAL OF CONSUMER CULTURE 52.

[130]UK Gambling Commission, *Young People and Gambling 2022* (n. 16).

[131]Joseph Macey and Juho Hamari, *eSports, Skins and Loot Boxes: Participants, Practices and Problematic Behaviour Associated With Emergent Forms of Gambling* (2019) 21 NEW MEDIA & SOCIETY 20, 35.

[132]UK Gambling Commission, *Two Men Convicted after Offering Illegal Gambling Parasitic upon Popular FIFA Computer Game* (7 February 2017) https://web.archive.org/web/20190802193340/http://www.gamblingcommission.gov.uk/news-action-and-statistics/News/two-men-convicted-after-offering-illegal-gambling-parasitic-upon-popular-fifa-computer-game, accessed 12 July 2023.

[133]Cornerstone Barristers, *First Social Gaming Prosecution Succeeds* (LICENSING, PUBLIC LAW AND JUDICIAL REVIEW, 1 January 2018) https://cornerstonebarristers.com/first-social-gaming-prosecution-succeeds/, accessed 12 July 2023.

[134]*Ibid*.

[135]Yin-Poole (n. 126).

[136]Gambling Act 2005 (UK), s. 6(5)(a).

[137]DCMS (n. 34) para 131.

[138]Australian Communications and Media Authority (ACMA), *ACMA Takes Action against Illegal "Skins" Gambling Site* (17 May 2023) https://www.acma.gov.au/articles/2023-05/acma-takes-action-against-illegal-skins-gambling-site, accessed 12 July 2023.

[139]*Ibid*.

[140]ACMA, *Investigations into Online Gambling Providers* (2023) https://www.acma.gov.au/investigations-online-gambling-providers, accessed 19 July 2023.

[141]Interactive Gambling Act 2001 (Cth) (Australia) s. 4.

online gambling: not recognizing them as such would be an anomaly that demands explanation.

Importantly, these two instances are not enforcement actions against loot boxes *per se*. However, they are examples of the application of gambling law and provide support for prosecuting the sale of loot boxes as illegal gambling. Regulators have accepted that (i) the virtual prizes from loot boxes and (ii) the virtual currencies that those prizes can be converted into have real-world monetary value. They must therefore also act against illegal loot boxes on that basis. Taking action in relation to skin betting/gambling does not equate to taking action against loot boxes and should not be presented as such (as the UK Government has arguably done[142]). Indeed, enforcing the law against illegal loot boxes and thus removing the transferability of highly desirable virtual items from popular games would be an effective way to reduce skin betting/gambling by (i) removing the players' ability to use them as the stake and (ii) preventing such services from unfairly profiting from the popularity of those video games and those in-game items' inherent attractiveness.

4. APPLYING EXISTING EU CONSUMER PROTECTION LAW?

The second area of existing law that has been applied to address loot box harms is consumer protection law. The focus has been on the use of the EU UCPD (or rather national implementations thereof[143]) in EU (e.g., The Netherlands and Italy) and ex-EU countries (i.e., the UK). Similar options are also available in other jurisdictions but have not yet been acted upon (e.g., prohibition of, and enforcement against, unfair commercial practices in the U.S. by the Federal Trade Commission[144]).

4.1. Italy: information disclosure commitments obtained from companies

The Italian Competition Authority (AGCM), which enforces consumer protection law in the country, started investigating both Electronic Arts in December 2019[145] and Activision Blizzard in January 2020[146] for, *inter alia*, allegedly either providing misleading information on, or omitting material information about, the characteristics of, and the potential costs that may be incurred in, the video games implementing in-game purchases and loot boxes.[147] Both companies denied infringing consumer protection law[148] but committed to undertaking voluntary measures to address the AGCM's concerns.[149] These commitments included, *inter alia*:

(i) disclosing the presence of generic in-game purchases by prominently displaying the relevant PEGI pictogram (a hand holding a payment card, s*ee* Figs. 1 and 2);[150]

(ii) disclosing the presence of loot boxes with the dedicated PEGI text-based warning label of "In-game Purchases (Includes Random Items)" (or rather "Acquisti in-game (contiene elementi casuali))" (*see* Figs.1 and 2);[151]

(iii) for Electronic Arts only, displaying the PEGI in-game purchase pictogram 66% larger than previously shown to make it more visually prominent;[152]

(iv) for Electronic Arts only, attaching an additional text-based explanation about in-game purchases involving randomization;[153]

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[142]*See* DCMS (n. 34) para 131.

[143]*E.g.,* Consumer Protection from Unfair Trading Regulations 2008 (UK), SI 2008/1277 (CPUTR).

[144]Federal Trade Commission Act § 5, 15 USC § 45.

[145]AGCM, "PS11594 - Electronic Arts - Acquisti Nei Videogiochi, Provvedimento n. 28368 [PS11594 - Electronic Arts - Purchases in Videogames, Provision n. 28368]" (30 September 2020) para 9, https://www.agcm.it/dettaglio?tc/2025/10/&db=C12560D000291394&uid=B20A07DF6BC2F369C1258606004E6A61, accessed 8 July 2023.

[146]AGCM, "PS11595 - Activision Blizzard - Acquisti Nei Videogiochi, Provvedimento n. 28452 [PS11594 - Activision Blizzard - Purchases in Videogames, Provision n. 28452]" (17 November 2020) para 9, https://www.agcm.it/dettaglio?

tc/2025/12/&db=C12560D000291394&uid=B9FA711B7757E0B2C1258637005FA58A, accessed 8 July 2023.

[147]AGCM (n. 145) para 8; AGCM (n. 146) para 8.

[148]AGCM (n. 145) para 15; AGCM (n. 146) para 15.

[149]AGCM (n. 145) paras 20–38; AGCM (n. 146) para 20.

[150]AGCM (n. 145) para 20; AGCM (n. 146) para 20.

[151]AGCM (n. 145) para 20; AGCM (n. 146) para 20.

[152]AGCM (n. 145) para 20(b).

[153]*Ibid* para 20(c).

FIG. 1. The Current English PEGI Generic "IN-GAME PURCHASES" and Dedicated Loot Box "In-game Purchases (Includes Random Items)" Content Descriptors. © 2020 PEGI (Pan-European Game Information) Color images are available online.

(v) for Electronic Arts only, disclosing the aforementioned information also on the physical packaging of relevant games;[154]

(vi) providing parental control features, such as, for Electronic Arts, placing a spending limit of €0 by default on young people's accounts (i.e., prohibit in-game purchasing unless later deliberately approved by the parent)[155] and making the option of creating young people's accounts more prominent during the registration process,[156] and for Activision Blizzard, requiring the parent to deliberately unlock the option of making in-game purchases by young people before any money could be spent;[157]

(vii) for Activision Blizzard only, disclosing the probabilities of obtaining random rewards from loot boxes;[158] and

(viii) communicating these commitments to third-party platforms through which the companies' games are distributed.[159]

These commitments were accepted by the AGCM as sufficient to alleviate its concerns.[160]

However, notably, these information disclosure commitments in Italy only extended to the Italian versions of either companies' proprietary online video game store[161] (the Electronic Arts Origin Store and the Acti-

vision Blizzard Battle.net, respectively) and the relevant websites under their control.[162] This means that neither company was seemingly obliged to disclose the presence of loot boxes on third-party platforms through which they distribute their games, e.g., the Italian Apple App Store and Google Play Store. Indeed, they have not made the relevant disclosure on such platforms in relation to a number of games, including *Hearthstone* (Blizzard Entertainment, 2014), which was specifically named in the Italian enforcement action.[163] A summary review of the Italian Apple and Google stores revealed that, as of 9 July 2023, the two companies failed to make the necessary loot box presence disclosure in relation to some games as shown in Table 2. The situation on Google has only improved since January 2023 due to my study and subsequent communications with the age rating organizations, which meant that the disclosure was only very recently forcibly attached.[164]

Importantly, the distribution of mobile games relies heavily on these two platforms. The AGCM failed to consider the situation on mobile platforms and should not have so readily accepted the companies' commitments as sufficient to satisfy all concerns. Interestingly, both companies committed to communicating the voluntary measures to third-party platforms that distribute their games (Sony, Microsoft, and Nintendo were specifically named by Electronic Arts).[165] However, it seems this

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[154]*Ibid* para 22.

[155]*Ibid* paras 31–33.

[156]*Ibid* paras 34–35.

[157]AGCM (n. 146) para 20.

[158]*Ibid*.

[159]AGCM (n. 145) paras 36–37; AGCM (n. 146) para 20.

[160]AGCM (n. 145) paras 43–56; AGCM (n. 146) paras 25–37.

[161]AGCM (n. 145) paras 20–24; AGCM (n. 146) para 20.

[162]AGCM (n. 145) paras 25–28; AGCM (n. 146) para 20 and annex 1. (*E.g.,* www.ea.com/it and www.blizzard.com/it-it/).

[163]Xiao, *Beneath the Label* (n. 7).

[164]*Ibid*.

[165]AGCM (n. 145) para 54; AGCM (n. 146) para 34.

FIG. 2.   The Current Italian PEGI Generic "ACQUISTI IN-GAME" and Dedicated Loot Box "Acquisti In-Game (Contiene Elementi Casuali)" Content Descriptors. © 2020 PEGI (Pan-European Game Information) Color images are available online.

commitment related only to communicating and did not extend to requiring these two companies to also comply with these measures on those platforms. The AGCM has hoped that these communications would lead to better compliance across the industry,[166] but that appeared to have been overly optimistic given that the compliance situation has been poor across both mobile platforms[167] and the platforms operated by the three major hardware providers.[168] The AGCM should also have obtained assurances from Electronic Arts and Activision Blizzard that they would comply with these measures on all third-party platforms that distribute their games on (perhaps with an exclusion only in cases where their games are being re-sold by another party, e.g., on eBay by a private seller). That would likely have led to those third-party platforms implementing methods by which all companies can make these disclosures on product listings if so desired (e.g., by ticking a specific box about loot box presence when uploading a game), which would have improved industry-wide compliance by reducing the burden on companies. In any case, the commitments only covered Italy, which means that the regulators of other EU countries would also have to enforce the law nationally before the companies would act more responsibly more widely. A more unified EU approach to enforcement would be ideal given that the law is, or at least should be, harmonized, e.g., where one national regulator takes the lead on a specific issue by conducting the investigation and then coordinating EU-wide enforcement that other national

regulators would also agree to commence in their respective countries.

The primary takeaway from this pair of Italian enforcement actions is that information disclosures about whether a game contains (i) in-game purchases, (ii) loot boxes specifically, and (iii) the probabilities of obtaining random rewards from loot boxes are arguably already required by EU consumer protection law. The omission of such information may infringe national implementations of Article 7 of the EU UCPD. Indeed, the European Commission's Guidance on the interpretation and application of the UCPD has recognized the Italian enforcement actions and opined that the three matters listed above are indeed already required to be disclosed across the EU countries.[169] This may be a comparatively generous interpretation of the law, but it may therefore not technically be necessary to pass dedicated laws to require these, although adopting specific regulation would still bring clarity as other jurisdictions appear to disagree as to what information disclosure is required, as discussed below in relation to the Netherlands' and the UK's interpretations.

4.2. The Netherlands: probability disclosures and pricing in real-world money

In February 2020, the Dutch Authority for Consumers & Markets (ACM) published its "Guidelines

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[166]AGCM (n. 145) para 54; AGCM (n. 146) para 34.

[167]Xiao, *Beneath the Label* (n. 7).

[168]Leon Y Xiao, *Shopping Around for Loot Box Presence Warning Labels: Unsatisfactory Compliance on Epic, Nintendo, Sony, and Microsoft Platforms* [2023] ACM GAMES: RESEARCH AND PRACTICE, https://doi.org/10.1145/3630631, accessed 28 October 2023.

[169]European Commission, "Commission Notice – Guidance on the Interpretation and Application of Directive 2005/29/EC of the European Parliament and of the Council Concerning Unfair Business-to-Consumer Commercial Practices in the Internal Market (C/2021/9320) [2021] OJ C526/1" (29 December 2021) 105, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021XC1229(05), accessed 19 October 2023.

TABLE 2. COMPLIANCE WITH LOOT BOX PRESENCE DISCLOSURE REQUIREMENT BY ELECTRONIC ARTS AND ACTIVISION BLIZZARD
ON THE ITALIAN APPLE APP STORE AND GOOGLE PLAY STORE (N = 5)

Game (Publisher, Year)	Compliance on. . .	
	Google	Apple
Hearthstone (Blizzard Entertainment, 2014)	Not disclosed until recently	Not disclosed
Call of Duty: Mobile (Activision, 2019)	Not disclosed until recently	Not disclosed
The Simpsons: Tapped Out (Electronic Arts, 2012)	Not disclosed	Not disclosed
Star Wars: Galaxy of Heroes (Electronic Arts, 2015)	Not disclosed until recently	Not disclosed
FIFA Football (Electronic Arts, 2016)	Not disclosed until recently	**Disclosed** through a message in the game's description

Note. "Not disclosed until recently" means that the loot box presence was only disclosed since January 2023 due to active intervention by me and compulsory application by the age rating organizations following from an academic study.[299]

on the Protection of the Online Consumer,"[170] which has since been updated in March 2023.[171] The Guidelines required that the purchase price of all in-game purchases (including loot boxes specifically) must be stated in terms of real-world currency (i.e., euros).[172] The justification is that "[asking players to pay using fantasy in-game currency rather than euros] breaks the association with real money and causes users to spend more readily."[173] (Although this may be a genuine concern, as far as I am aware, there is no empirical evidence of this occurring in a video game context. The UK advertising regulator contrarily suggested that this information might even undermine consumer understanding of the price by blurring virtual currency with real money, which, as discussed below, is not convincing.) The probabilities of winning rare prizes (i.e., probability disclosures) were also recognized as an important feature of the product and were required to be published alongside the sale offer.[174]

These two information disclosure requirements were derived from the ACM's interpretation of the Dutch national implementation of Article 7 of the EU UCPD (which means that the Dutch court might disagree with it, such that it is not the law *per se*). The consumer protection law enforcers of other EU coun-

tries and the UK may or may not come to the same view. It is yet unknown whether companies have complied with the Guidelines by (i) displaying the purchase price of loot boxes in euros and (ii) making probability disclosures in the Netherlands. The evidence from the UK in mid-2021 was that only 64% of the highest-grossing iPhone games containing loot boxes disclosed probabilities, even though all were required to do so by Apple's platform self-regulation.[175] Very few games were showing loot box purchase prices in real-world monetary terms. It is unlikely for game companies to make dedicated national versions of the games that differ in their disclosure features, and thus it is likely that the Dutch versions of a number of popular games remain non-compliant with the Guidelines. The ACM is not known to have yet taken any enforcement actions.

4.3. UK: disclosure of the presence of in-game purchases and loot boxes

In September 2021, the Committee of Advertising Practice (CAP), which is responsible for drafting advertising rules in the UK,[176] published the "Guidance on Advertising In-game Purchases."[177] Companies were warned against giving consumers incorrect

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[170]ACM, "Leidraad Bescherming online consument [Guidelines on the protection of the online consumer] (published 11 February 2020) ACM/19/035689" (11 February 2020) https://web.archive.org/web/20200628081445/https://www.acm.nl/nl/publicaties/leidraad-bescherming-online-consument, accessed 8 July 2023.

[171]ACM, "Leidraad bescherming online consument [Guidelines on the protection of the online consumer] (updated 15 March 2023)" (15 March 2023) https://web.archive.org/web/20230708170835/https://www.acm.nl/nl/publicaties/voorlichting-aan-bedrijven/acm-leidraad/leidraad-bescherming-online-consument, accessed 10 July 2023.

[172]ACM (n. 170) 31; ACM (n. 171) 52–53.

[173]ACM (n. 170) 29.

[174]*Ibid* 31; ACM (n. 171) 52–53.

[175]Leon Y Xiao, Laura L Henderson and Philip Newall, *What Are the Odds? Lower Compliance with Western Loot Box Probability Disclosure Industry Self-Regulation than Chinese Legal Regulation* (2023) 18 PLoS ONE Article e0286681.

[176]Advertising Standards Authority and Committee of Advertising Practice, "About the ASA and CAP" (*Advertising Standards Authority*, 2023) https://www.asa.org.uk/about-asa-and-cap/about-regulation/about-the-asa-and-cap.html, accessed 10 July 2023.

[177]CAP and BCAP (n. 23).

[299]*Ibid*.

impressions about their chances of winning rare items, e.g., by presenting "near-misses" (whereby the player is shown to have *just* missed-out on winning the rare item).[178] Companies were also told not to falsely advertise offers as being time-limited when they are not (i.e., would be offered again later),[179] which would be a direct infringement of the national implementation of Article 5(5) (and Annex 1) of the EU UCPD.[180] Companies were also required to disclose that a video game contains in-game purchases and "random-item purchasing" (i.e., loot boxes) specifically through the use of the relevant PEGI labeling (*see* Fig.1) or otherwise.[181]

Many games were proven not to have made a loot box presence disclosure on the Google Play Store and Apple App Store in the UK in January 2023.[182] The Guidance is somewhat horizontally enforceable in the sense that a private party may make a complaint against an advertiser for alleged breach, which would be investigated by the advertising regulator (rather than requiring the regulator to exclusively act on its own initiative). Consequently, in May 2023, I made two complaints to the Advertising Standards Authority alleging breach of the Guidance to test the advertising regulator's willingness to enforce these published rules. The processing of this pair of complaints remains pending as of July 2023.

Two potential rules that the CAP decided not to draft into the Guidance (and are therefore not required) are also noteworthy. Firstly, it was proposed by some

respondents[183] (including me[184]) during the consultation process[185] for drafting the Guidance that probability disclosures should be required. These are likely already required[186] under Article 7 of the EU UCPD as "material information"[187] that must not be omitted,[188] as the Italian consumer protection regulator has impliedly agreed by accepting industry commitments to that effect and as the Dutch regulator has explicitly opined as detailed above. However, the CAP refused to adopt this requirement citing that, although some countries have now required this, there was "no sufficient basis" to require this at present because there was "no evidence" that this information is understood or used by players, affects player behavior, or reduces risk of potential harms.[189] Whilst probability disclosures do not appear to effectively reduce the spending of most players, it may help a minority of players to spend more responsibly.[190] Such information also provides transparency and accountability to the transaction. Players are known to collate loot box opening results to uncover the underlying probabilities and verify disclosures.[191] Such behaviors demonstrate that the information is important to at least some players and that this process can reduce the likelihood of companies implementing predatory probabilities (e.g., those that change according to spending behavior[192]), as these would then be embarrassingly discovered by players through their investigation. In any case, the legal "basis" (in the CAP's words) for requiring this would have been the UK Consumer Protection from Unfair Trading Regulations

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[178]*Ibid* 9–10.

[179]*Ibid* 10.

[180]CPUTR (n. 143) sch. 1, para 7.

[181]CAP and BCAP (n. 23) 10–11.

[182]Xiao, *Beneath the Label* (n. 7).

[183]CAP and BCAP, "Guidance on Advertising In-Game Purchases: CAP and BCAP's Evaluation of Responses" (20 September 2021), 4 https://www.asa.org.uk/static/8dd057b6-f9a2-4456-af1c90e3c6400a14/In-game-ads-guidance-Evaluation-table.pdf, accessed 10 July 2023; CAP and BCAP, "Practice Statement on New Guidance to Explain How the Advertising Codes Apply to the Marketing of In-Game Purchases in Apps and Video Games" (20 September 2021) 7, https://www.asa.org.uk/static/21e9a90d-a7ac-4499-a57c66729cd5c3e1/In-game-purchasing-statement.pdf, accessed 10 July 2023.

[184]Leon Y Xiao, Laura L Henderson and Philip Newall, *Written Response: The Committee of Advertising Practice's Consultation on the Draft "Guidance on Advertising in-Game Purchases"* (OSF Preprints, 19 January 2021) paras 23–30, https://osf.io/7fm2t/, accessed 10 July 2023.

[185]CAP and BCAP, "Consultation on Ads for In-Game Purchasing" (5 November 2020) https://www.asa.org.uk/resource/consultation-on-ads-for-in-game-purchasing.html, accessed 10 July 2023.

[186]George Spence-Jones and Leon Y Xiao, *Loot Boxes – Video Gaming Industry's Hidden Treasure or a Pandora's Box That Misleads Consumers?* (Gough Square Chambers, November 2020) https://goughsq.co.uk/wp-content/uploads/2020/11/Article-Loot-Boxes-November-2020.pdf, accessed 19 July 2023.

[187]CPUTR (n. 143), reg. 6(3).

[188]*Ibid* reg. 6(1).

[189]CAP and BCAP, "Evaluation of Responses" (n. 183) 4; CAP and BCAP, "Practice Statement" (n. 183) 7.

[190]Xiao, Fraser and Newall (n. 63) 654–655.

[191]*See e.g.,* Leon Y Xiao and Laura L Henderson, *Towards an Ethical Game Design Solution to Loot Boxes: A Commentary on King and Delfabbro* (2021) 19 International Journal of Mental Health and Addiction 177, 183; Xiao, *Drafting for Dummies* (n. 47) 371–373.

[192]Daniel L King and others, *Unfair Play? Video Games as Exploitative Monetized Services: An Examination of Game Patents from a Consumer Protection Perspective* (2019) 101 Computers in Human Behavior 131.

(CPUTR) implementing the EU UCPD; an incontrovertible scientific basis is not necessarily required but would have nonetheless been arguable.

Secondly, during the consultation,[193] the CAP itself proposed in the draft Guidance to require companies to provide the "equivalent real-world price" of in-game purchases where these are sold to players in terms of fantasy in-game currency.[194] This would have been identical to what the Dutch regulator has required as discussed above. However, two industry respondents to the consultation argued that there is supposedly conflicting prior advice from another UK consumer protection regulator.[195] In January 2014, the Office of Fair Trading (OFT) published the "Principles for Online and App-based Games."[196] The OFT's functions have generally been overtaken by the Competition and Markets Authority (CMA), which has indeed since adopted these Principles as its own.[197] The CAP has identified Principle 4 as the relevant section,[198] which states that, "The commercial intent of any in-game promotion of paid-for content, or promotion of any other product or service, should be clear and distinguishable from gameplay" (i.e., in-game purchases should be distinguishable from gameplay).[199] The CAP then concluded that "maintaining a separation between [virtual currencies and real currencies]" was more important than providing a statement about the "equivalent real-world price" of the in-game purchase.[200] Indeed, the CAP even went as far as to say that providing this information "may even undermine [consumer understanding of the price]" by blurring the line between virtual currencies and real money.[201]

This is an extreme shift to the CAP's original position prior to the consultation and appears to be a rather perverse interpretation of Principle 4. Contrary to what the CAP has argued, providing the "equivalent real-world price" would actually be a method for companies to signify that this is a real money purchase that is separate from regular gameplay. The presence of virtual currency makes it more difficult for players to separate real money transactions from gameplay, and this can be resolved by either removing virtual currencies or providing the real money price. The only case where the commercial intent might be unclear as a result of implementing this measure is if the in-game currency portrayed in the game happens to be a fantasy version of pound sterling, the legal tender in the UK (in which case that game should be prevented from implementing that as the virtual currency as a narrative design choice, rather than *vice versa*). There may be other practical reasons to decide against requiring this information to be provided. For example, the real money price is difficult to calculate because the virtual currency used to purchase loot boxes might be purchased using real-world money or earned through gameplay and thus be in a mixed pot, although it would still be incumbent on companies that decided to implement this complication when it is not necessary to cause this difficulty to resolve that. Regardless, the argument that providing this information would somehow undermine consumer understanding of the real-world monetary price of the purchase is illogical. In any case, those Principles were adopted nearly a decade ago, given how quickly the video game industry has developed (and how the average video game consumer makes spending decisions might have changed), they should be due for an update.

Revealingly, the industry response also stated that a private dialogue was held between the industry and the Dutch regulator during which the regulator supposedly "clarified" that, in the Netherlands, the requirement to display the price of in-game purchases in real money (as discussed above) does not

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[193]CAP and BCAP (n. 185).

[194]Committee of Advertising Practice and Broadcast Committee of Advertising Practice, "Draft Guidance for Advertising In-Game Purchases" (5 November 2020) https://www.asa.org.uk/static/b0c13026-825b-4015-8b5287d339813801/Guidance-on-advertising-in-game-purchases-draft.pdf, accessed 10 July 2023.

[195]CAP and BCAP, "Evaluation of Responses" (n. 183) 13; CAP and BCAP, "Practice Statement" (n. 183) 9.

[196]Office of Fair Trading (UK), "Principles for Online and App-Based Games: OFT1519" (30 January 2014) https://www.gov.uk/government/publications/principles-for-online-and-app-based-games, accessed 10 July 2023.

[197]*Ibid*.

[198]CAP and BCAP, "Practice Statement" (n. 183) 9.

[199]Office of Fair Trading (UK) (n. 196) 10.

[200]CAP and BCAP, "Practice Statement" (n. 183) 10.

[201]*Ibid*.

actually apply broadly and only applies "where the player is initially invited to make an in-game virtual currency purchase" and "not in any subsequent transaction involving such in-game virtual currency."[202] Had this "clarification" been true, then this requirement would not actually exist in the Netherlands because it would not be applicable to any transactions that might be confusing because they are priced in virtual currencies. The only type of transaction that it supposedly would then apply to would be the purchase of virtual currency using real-world money: that type of purchase can *only* be priced in real-world currency, so the requirement would be redundant. The specific advice on how loot boxes must be priced in real money terms[203] would also be inapplicable. Therefore, it seemed highly doubtful that this "clarification" could have been made.

I sought a response on this point from the Dutch regulator in July 2023. The ACM confirmed in September 2023 that discussions were indeed held with the industry on several occasions. However, the ACM has always conveyed the position that has been expressed publicly and formally through the Guidelines (that the requirement to display euro pricing applies to *all* in-game purchases). Importantly, "at no point in time has the ACM provided the alleged 'clarification' as mentioned in the [Ukie publication]." Given this forceful denial from the ACM, it would appear that the Association for UK Interactive Entertainment (Ukie) has misled the CAP during the consultation process for the draft Guidance (either intentionally or unintentionally due to a gross misunderstanding of the ACM's position). This arguably may be perceived as having compromised the consultation process because false information may have been taken into account; however, the documents provided by the CAP regarding what information it has taken into account and how that was used do not make direct reference to this particular point.[204] This misleading information is therefore unlikely to have affected the results of the consultation, which appear to have been most strongly influenced by the CAP's interpretation of the OFT Principles.[205]

5. AGE RATINGS AND WARNING LABELS

5.1. Germany: requiring age ratings to account for the presence of loot boxes

In April 2021, the German Protection of Young Persons Act (JuSchG) was amended to explicitly highlight, *inter alia*, "glücksspielähnliche Mechanismen [gambling-like mechanisms]" as "risks to the personal integrity of children and young people" (§ 10b(3)). The same amended subsection also requires the German video game age rating system, Unterhaltungssoftware Selbstkontrolle (USK), to take the presence of such mechanics (i.e., loot boxes) into account when deciding what age rating to give to video games. The USK amended its policies accordingly and began applying those from 1 January 2023: this includes also labeling any games containing loot boxes with the warning of "In-Game-Käufe + zufällige Objekte [In-game purchases + random items]."[206]

This measure has led to perceivable change in how games are rated in Germany. For example, Electronic Arts' series of football video games (which were formerly known as the *FIFA* series and are now marketed as *EA Sports FC* series) used to always consistently receive the lowest age rating of USK 0 (or approved with no restrictions). However, the newest rendition *EA Sports FC 24* (Electronic Arts, 2023) received USK 12 (or approved for young people aged 12 or above) on the basis that the game contains loot boxes and "pressures to act" (which is defined very widely as something stressful including,

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[202]Ukie (UK Interactive Entertainment) and Tim Scott, "Response to the Committee of Advertising Practice and the Broadcast Committee of Advertising Practice Consultation on 'Guidance on Advertising in-Game Purchases'" (21 January 2021) 9, para 43, https://ukie.org.uk/resources/ukie-response-to-the-committee-of-advertising-practice-and-the-broadcast-committee-of-advertising-practice-consultation-on-guidance-on-advertising-in-game-purchases, accessed 10 July 2023.

[203]ACM (n. 170) 31; ACM (n. 171) 52–53.

[204]CAP and BCAP, "Evaluation of Responses" (n. 183); CAP and BCAP, "Practice Statement" (n. 183).

[205]CAP and BCAP, "Practice Statement" (n. 183) 10.

[206]USK (Unterhaltungssoftware Selbstkontrolle), "In-Game-Käufe, Chats Und Lootboxen: USK Erweitert Prüfkriterien - Unterhaltungssoftware Selbstkontrolle [In-Game Purchases, Chats and Loot Boxes: USK Expands Test Criteria]" (14 December 2022) https://usk.de/usk-pressemitteilung-umsetzung-neues-jugendschutzgesetz/, accessed 13 September 2023.

e.g., a countdown timer for when in-game purchases would expire).[207] In contrast, PEGI rated *FC 24* PEGI 3 (or suitable for all age groups), and the ESRB gave it E (or suitable for everyone), as they have always done for previous editions. This measure affects the underlying age rating (in addition to merely signaling the presence of loot boxes, as the ESRB and PEGI have done) and therefore more prominently draws potential problems to the parent's attention, thus allowing German young people under 12 to be better protected from potential loot box harms.

Changing the USK's age rating criteria through legislative amendments is only possible in Germany because the national video game age rating system has a legal backstop and allows for external oversight. The same cannot be as easily achieved in other jurisdictions where the age rating system is entirely industry self-regulatory, e.g., the ESRB in North America and PEGI in Europe. Indeed, in countries where age ratings are advisory only and have no legal enforceability (and potentially never could have that due to constitutional reasons) at present, e.g., the U.S.,[208] this measure is not practical. Whether it is an appropriate policy to demand games that would otherwise be deemed suitable for very young children to receive a higher age rating that renders them suitable only for older teenagers only on the basis that loot boxes are present can, and should, be debated. On one hand, increased protection is provided; however, on the other hand, young children are being deprived of access to certain entertainment products (particularly considering that many of them may be able to enjoy the underlying game without engaging with any loot boxes). The information that parents need in relation to loot boxes is not necessarily that the game is only suitable for young people aged 12 or above, but is instead that the game contains loot boxes; how that might be a concern; and how that "feature" might be turned off. In addi-

tion to (or indeed instead of) forcing these games to bear a considerably higher age rating than what they would have received but for the presence of loot boxes, it may be wise to also demand that companies release a child-appropriate version of the same game without loot boxes to ensure that young people experience no potential detriment through this policy, rather than to permit companies to simply abandon the young children market.

5.2. Australia: mandatory minimum age ratings for games with loot boxes

In July 2021, it was reported that Andrew Wilkie MP intended to introduce a national bill to better regulate loot boxes.[209] This bill was finally introduced in November 2022.[210] Two measures were proposed. Firstly, any games containing loot boxes must be rated suitable for those aged 18 + only. Secondly, a warning that the game contains loot boxes must be provided as "consumer advice," which must, *inter alia*, be shown on the packaging.[211] Those proposals are not particularly remarkable but the definition for a "loot box" in the bill must be scrutinized. The term "loot box," according to the bill, "means a feature of a computer game where digital containers of randomized virtual items can be obtained for consideration."[212] Two issues are immediately evident.

Firstly, this definition refers restrictively to "digital containers." This is not sufficiently broad as to cover all in-game purchases with randomized elements as discussed in this article's introduction. A gacha character summoning mechanic, for example, cannot be said to be a "digital container" of randomized virtual items. Social casino games, which may well be more harmful than loot boxes because they earn more money from their highest spending players than games of other genres,[213] would also not be covered. Mechanics where the purchasing process is more convoluted are also not obviously included, such

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[207]Markus Böhm, *Prüfstelle Gibt Nachfolger von »Fifa 23« erst Ab Zwölf Jahren Frei [The Testing Agency Only Releases the Successor to "Fifa 23" from the Age of Twelve],* Der Spiegel (9 August 2023) https://www.spiegel.de/netzwelt/games/ea-sports-fc-24-usk-gibt-nachfolger-von-fifa-23-ab-zwoelf-jahren-frei-a-54c763bd-e66f-4ed3-ade1-a575043234b3, accessed 13 September 2023.

[208]*Brown v. Entertainment Merchants Association*, 564 US 786 (2011).

[209]Jeffrey Rousseau, *Australian Legislator to Propose Loot Box Law* (GamesIndustry.biz, 12 July 2021) https://www.gamesindustry.biz/articles/2021-07-12-australia-proposes-loot-box-law, accessed 19 July 2023.

[210]Wilkie (n. 31).

[211]*See* Classification (Publications, Films and Computer Games) Act 1995 (Cth) (Australia) s. 34.

[212]Wilkie (n. 31) sch. 1, para 2.

[213]David Zendle and others, *The Many Faces of Monetisation: Understanding the Diversity and Extremity of Player Spending in Mobile Games via Massive-Scale Transactional Analysis* (2023) 1 Games: Research and Practice Article 4, 16.

as in *Pokémon GO* (Niantic, 2016), wherein the player can pay real-world money to fight a Pokémon and, upon whose defeat, the player has a random chance of obtaining a rare and "shiny" version of said Pokémon (but the company has not made probability disclosures as to the likelihood of the Pokémon being shiny, and the age rating organizations do not recognize such mechanics as purchases with randomized elements[214]). Legal arguments might be attempted to say that these other mechanics should be interpreted by the court as being covered by the law anyway despite the drafting language; however, it would be helpful for the face of the law to not plainly exclude these other implementations of in-game purchases with randomized elements which the legislator is intended to cover. Indeed, the Explanatory Memorandum to the bill clarifies that: "It is intended this definition is wide enough to capture features with a randomized reward function even when strictly not a 'box' or a 'crate', for example a virtual prize wheel."[215] Given that is the case, the "digital container" wording should not be in the definition. This issue has been caught during the drafting process and should be fixed forthwith. In any case, regulation should not be overly restrictive so as to unwisely encourage companies to implement complex purchasing processes that further distance the spending of real-world money from the randomized rewards so as to circumvent the law. A loot box that is advertised as such is more transparent about what it is and likely safer for consumers.

Secondly, this definition refers to the fact that these loot boxes must be "obtained for consideration." This appears to be an attempt to draft the requirement that these loot boxes must be paid for with real-world money (including when cash is spent to purchase virtual currency, which is then used to buy loot boxes), rather than loot boxes that are obtained without any involvement of real-world money, as the Explanatory Memorandum to the bill clarifies.[216] "Consideration" is a well-known legal term in contractual contexts and could refer to non-monetary matters (e.g., virtual currency obtained solely from gameplay or completing an in-game task),[217] which are not intended to be covered by the bill. A better definition for a "loot box" for the purposes of the bill would be: "an element within a computer game that involves direct or indirect purchase with money and whose results are random."

Whilst the Wilkie Bill remains under consideration, a house committee conducted an inquiry into online gambling, including loot boxes and social casino games.[218] Before the inquiry report was published, in March 2023, the Australian Government announced that it will seek to change the video game classification regime to account for these gambling-like elements.[219] Games containing "simulated gambling" (i.e., social casino games and other games with simulated gambling features) would receive the mandatory minimum classification of Restricted (R 18 +), thus limiting them to adults 18 and over.[220] Games containing "paid loot boxes" would receive, at minimum, the Mature (M) rating, which would mean that they are "not recommended for persons under 15 years."[221] More information about this proposal (specifically a draft version of the Guidelines for the Classification of Computer Games 2023,[222] which I have commented on in detail elsewhere[223]) has since been provided in May 2023 through a consultation process.[224]

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[214]*See* Xiao, *Beneath the Label* (n. 7) 22.

[215]Explanatory Memorandum to the Classification (Publications, Films and Computer Games) Amendment (Loot Boxes) Bill 2022 (Australia) 3.

[216]*Ibid* 3.

[217]*See Chappel v. Nestle* [1959] UKHL 1, [1960] AC 87.

[218]House of Representatives Standing Committee on Social Policy and Legal Affairs (Australia), "You Win Some, You Lose More: Online Gambling and Its Impacts on Those Experiencing Gambling Harm [Inquiry Report]" (Parliament of Australia 2023) https://www.aph.gov.au/Parliamentary_Business/Committees/House/Social_Policy_and_Legal_Affairs/Onlinegamblingimpacts/Report, accessed 27 June 2023.

[219]Rowland, "Albanese Government Outlines Key Reforms to National Classification Scheme" (n. 36).

[220]*Ibid.*

[221]*Ibid.*

[222]Department of Infrastructure, Transport, Regional Development, Communications and the Arts (Australia), "Guidelines for the Classification of Computer Games 2023" (17 May 2023) https://www.infrastructure.gov.au/department/media/publications/guidelines-classification-computer-games-2023, accessed 13 September 2023.

[223]Leon Y Xiao, *Comments on the Australian Guidelines for the Classification of Computer Games 2023* (OSF Preprints, 31 July 2023) https://osf.io/vdrme/, accessed 13 September 2023.

[224]Department of Infrastructure, Transport, Regional Development and Communications and the Arts (Australia), "Proposed New Mandatory Minimum Classifications for Gambling-like Content in Computer Games" (17 May 2023) https://www.infrastructure.gov.au/have-your-say/proposed-new-mandatory-minimum-classifications-gambling-content-computer-games, accessed 13 September 2023.

Again, there are two issues. Firstly, and importantly, the minimum M age rating for games with paid loot boxes is only advisory: there would be no legal restrictions on them.[225] Another classification of Mature Accompanied (MA 15 +) exists and would place some legal restrictions on games so classified (e.g., cannot be sold to a minor under 15 without parental consent[226]). The MA 15 + is also overridable by the parent, like the advisory M rating. Therefore, it may be advisable to require the classification of all games with loot boxes MA 15 + , rather than M, at a minimum. This alternative provides more legal enforceability but also preserves parental discretion.

Secondly, the Australian Government proposal requires the delineation of "simulated gambling" from "paid loot boxes."[227] This would be difficult to implement in practice. The respective definitions would inevitably have to turn on some aesthetic features of the "simulated gambling" elements (e.g., how such mechanics' appearance emulates traditional gambling) which would be subjective, particularly in relation to borderline cases. This would likely lead to several companies disputing whether their mechanic should have been classified as simulated gambling or paid loot boxes, which might be costly for the classification board to resolve. Indeed, video games with simulated gambling features would be incentivized to remove traditional gambling motifs, thus making them less easily distinguishable as "gambling" and thereby potentially more insidious and harmful because players might find it more difficult to appreciate what they are engaging with. It would be easier to treat both as "in-game transactions with random elements" and regulate both under the same umbrella definition (with identical minimum age rating requirements).

The government announcement has somewhat pre-empted the house committee inquiry report. However, one highlight therein is that the committee recognized the importance of developing a more effective presence warning label for simulated gambling elements that is better than what the industry has adopted on its own (*see* Fig. 1),[228] which empirical research has shown that consumers do not understand and therefore is ineffective.[229]

The Guidelines have since been agreed by all states and territories[230] and, on 24 October 2023, were formally adopted.[231] No substantive changes were made, when compared to the May 2023 draft. The Guidelines will come into force on 22 September 2024 so as to "give industry time to adjust to the changes."[232] The relevant minister further stated that: "These changes will apply to games that are released from September next year and will not apply retrospectively."[233] What non-retroactivity means in this context has not yet been clarified. In October 2023, the Classification Reform Policy team in response to the author's request in September 2023 for further clarification stated that "the finer details of implementation" have not yet been finalized.

Unfortunately, following from what the minister has said, it appears likely that games that were initially released prior to September 2024 would never have their age ratings re-evaluated even though they might offer loot boxes and be highly popular (e.g., *Genshin Impact* (miHoYo, 2020) and *League of Legends* (Riot Games, 2009)) or, indeed, subsequently offer loot boxes for sale for the first time. Indeed, most of the highest-grossing games for many years to come would be "older" games released before September 2024.[234] This means that, despite the adoption of new regulations, consumer protection

[225]Australian Classification Board, "What Do the Ratings Mean?" (9 August 2019) https://www.classification.gov.au/classification-ratings/what-do-ratings-mean, accessed 12 July 2023.

[226]Classification (Publications, Films and Computer Games) Act 1995 (Cth) (Australia) s. 30(2).

[227]Rowland, "Albanese Government Outlines Key Reforms to National Classification Scheme" (n. 36).

[228]House of Representatives Standing Committee on Social Policy and Legal Affairs (Australia) (n. 218) 148, para 6.99.

[229]Eamon Garrett and others, *Current Loot Box Warnings Are Ineffective for Informing Consumers* [2022] COMPUTERS IN HUMAN BEHAVIOR 107534.

[230]Michelle Rowland, "New Mandatory Minimum Classifications for Gambling-like Games Content" (*Ministers for the Department of Infrastructure*, 23 September 2023) https://minister.infrastructure.gov.au/rowland/media-release/new-mandatory-minimum-classifications-gambling-games-content, accessed 4 December 2023.

[231]Guidelines for the Classification of Computer Games 2023 (Cth) (Australia).

[232]Rowland, "New Mandatory Minimum Classifications for Gambling-like Games Content" (n. 230).

[233]Michelle Rowland, "Transcript - Press Conference, Sydney [23 September 2023]" (23 September 2023) https://minister.infrastructure.gov.au/rowland/interview/transcript-press-conference-sydney, accessed 25 September 2023.

[234]*See* Xiao, *Beneath the Label* (n. 7) 21.

would not be provided in practice in relation to the most popular games. It would be ideal if older games would be required to get their age ratings reassigned according to the new criteria upon each new software update. This means that games that are continually being maintained and generating revenue through loot boxes must follow the most up-to-date rules and meet the current (higher) standard of consumer protection. If this would not be required, then alternatively, companies that wish to act more socially responsibly should at least be given the option to increase the age ratings for their own games offering loot boxes voluntarily. The Australian Classification Board should also encourage this by waiving any relevant service fees.

5.3. U.S.: Illinois loot box warning bill died like many other previous bills

In February 2021, a bill was filed in the U.S. state of Illinois intending to require the following warning label to be attached to games containing loot boxes:

> "Attention Parents: A Loot Box System exists in this game that permits an unlimited amount of REAL MONEY to be spent without any age restriction. REAL MONEY is exchanged for random digital items. This process has been linked to REAL LIFE GAMBLING ADDICTIONS in both children and adults. Please regulate your own spending as well as your children's spending."[235]

Said label has been critiqued elsewhere for likely exaggerating the harm of loot boxes and being reminiscent of tobacco product warnings,[236] although it remains a policy decision whether some amount of fearmongering is appropriate in order to address the public's concerns. This bill has since expired as a new session of the state legislature commenced in 2023.[237]

This non-outcome is similar to the fate of many other U.S. state and federal bills that have previously been attempted (mostly between 2018 and 2019) but have all since failed.[238] The various intended proposals are shown in Table 3. The drafting language of the various bills often seemingly borrowed from each other as they were highly similar. The suggested motions ranged from (more cautiously) requiring relevant authorities to further investigate the loot box issue to (more paternalistically) restricting the sale of loot boxes and games containing them to those aged 18 + or 21 +. A number of bills also wanted to require probability disclosures (*see* section 2 above) and sometimes provide auditing powers to relevant authorities. Other bills intended to require either (a) the mere disclosure of the presence of in-game purchases without requiring any further comment on their potential harms or (b) more interventionist warning labels that warned of potential harms. The proposed warning in New York was relatively tame and suggested "gambling-like mechanisms . . . may be harmful or addictive,"[239] but the proposed warning in Minnesota in contrast spoke rather worryingly of "a gambling-like mechanism that may promote the development of a gaming disorder that increases the risk of harmful mental or physical health effects, and may expose the user to significant financial risk."[240]

6. CHANGING THE DEFINITION OF GAMBLING

6.1. Finland: expanding the definition of "lotteries"

In September 2022, a bill was proposed by Sebastian Tynkkynen in the Finnish Parliament intending to expand the definition of a "lottery" (a type of gambling) so as to include loot boxes that offered only "virtually utilizable profits," in addition to those that offered a "monetary gain."[241] Tynkkynen has clarified that he intends to broadly regulate loot boxes that (i) cost money and (ii) offer random prizes, regardless of whether those prizes possess monetary value.[242] This is therefore an attempt to emulate the Belgian

[235]H.B. 2943, 102nd Gen. Assemb., Reg. Sess. (Ill. 2021) 3.

[236]Xiao, *Beneath the Label* (n. 7) 27.

[237]H.B. 2943 (n 235).

[238]*See* Xiao, *Drafting for Dummies* (n. 47) 355–359.

[239]A.B. 10075, 2017–2018 Leg., Reg. Sess. (N.Y. 2018); S.B. 8505, 2017–2018 Leg., Reg. Sess. (N.Y. 2018).

[240]H.F. 4460, 90th Leg., Reg. Sess. (Minn. 2018); S.F. 4042, 90th Leg., Reg. Sess. (Minn. 2018).

[241]Tynkkynen (n. 30).

[242]Hannah Heilbuth, *Exploring Finland's Proposed Loot Box Regulation* (GAMESINDUSTRY.BIZ, 15 December 2022) https://www.gamesindustry.biz/exploring-finlands-proposed-loot-box-regulation, accessed 16 July 2023.

TABLE 3. SUMMARY OF VARIOUS STATE AND FEDERAL LOOT BOX-RELATED BILLS PROPOSED IN THE UNITED STATES

No.	Jurisdiction	Date	Further investigate	Probability disclosure	Presence disclosure	Warning label	Restrict sales (age)
S. 1629	Federal[300]	2019	✓				✓ (18 +)
A.B. 2194	California[301]	2018			✓*		
H.B. 2686 S.B. 3024	Hawaii[302]	2018					✓ (21 +)
H.B. 2727 S.B. 3025	Hawaii[303]	2018		✓ (can audit)		✓	
H.B. 2943	Illinois	2021				✓	
S.B. 333	Indiana[304]	2018	✓				
H.F. 4062 S.F. 3715	Minnesota[305]	2018		✓			
H.F. 4460 S.F. 4042	Minnesota[306]	2018				✓	✓ (18 +)
A. 10075 S. 8505	New York[307]	2018		✓ (can audit)		✓	✓ (18 +)
S.B. 6266	Washington[308]	2018	✓				

Note. * = intended to require presence disclosure of generic in-game purchases only and not loot boxes specifically.

regulatory position on loot boxes. Such proposals must therefore duly consider whether the enforcement failure in Belgium and negative consequences thereof can somehow be avoided by the local regulator (*see* section 3.1).[243] This can potentially be achieved by allocating sufficient funding and manpower, rather than assuming that the (likely already underfunded) gambling regulator can simply take up this extra task.

Notably, Finnish gambling law differentiates between "money lotteries"[244] and "goods lotteries"[245] depending on whether prizes are literally cash. Loot boxes would in any case remain goods lotteries because they offer virtual items and not money. This means that the same jurisdiction difficulty that prevented the criminal prosecution of loot boxes that offered monetary gains (*see* section 3.3 above) would also prevent the prosecution of loot boxes that offers virtually utilizable profits even had the law passed. Without proposing to amend other aspects of Finnish criminal law, the bill would not achieve its intended

legislative goals of better regulating loot boxes. Were the bill to have passed as initially drafted, only Finnish companies, such as Supercell and Rovio, would be restricted from selling loot boxes and thereby commercially disadvantaged. Other foreign companies can continue to offer loot boxes for sale to Finnish consumers with impunity. The negative economic implications for the local Finnish game industry ought to be considered. The bill has since expired as a new session of Parliament began after elections were held in April 2023. Tynkkynen was re-elected and has confirmed to me that he intends to propose the bill again (hopefully with necessary amendments, as I have informed him of the aforementioned issues).[246]

6.2. Brazil: two competing bills intending either to legalize or criminalize

In July 2019, a bill was proposed in the Chamber of Deputies (the lower house of the legislature) that

[243]Xiao, *Breaking Ban* (n. 37).

[244]Arpajaislaki [Lottery Act] 1047/2001 (Finland), c. 1, s. 3.

[245]*Ibid*, c. 1, s. 3a(1).

[246]Sebastian Tynkkynen, "Email Sent on Behalf of Sebastian Tynkkynen to the Author, VS: Loot Box Bill LA 42/2022" (11 July 2023).

[300]S. 1629, 116 Cong. (2019).

[301]A.B. 2194, 2017–2018 Leg., Reg. Sess. (Cal. 2018).

[302]H.B. 2686, 29th Leg., Reg. Sess. (Haw. 2018); S.B. 3024, 29th Leg., Reg. Sess. (Haw. 2018).

[303]H.B. 2727, 29th Leg., Reg. Sess. (Haw. 2018); S.B. 3025, 29th Leg., Reg. Sess. (Haw. 2018).

[304]S.B. 333, 120th Gen. Assemb., 2d Reg. Sess. (Ind. 2018).

[305]H.F. 4062, 90th Leg., Reg. Sess. (Minn. 2018); S.F. 3715, 90th Leg., Reg. Sess. (Minn. 2018).

[306]H.F. 4460 (n. 240); S.F. 4042 (n. 240).

[307]A.B. 10075 (n. 239); S.B. 8505 (n. 239).

[308]S.B. 6266, 65th Leg., Reg. Sess. (Wash. 2018).

intends to require probability disclosures for loot boxes.[247] This bill would therefore recognize their presumed legality, as they have been available on the market anyhow. Non-compliance would be supervised by a competent body, and a channel would be set up for any member of the public (e.g., including competing companies) to report non-compliance.[248] Non-compliant companies would be punished with an initial warning that can then extend to an one-off fine or even a daily fine.[249] The fine can be between R\$5,000 and R\$100,000,000 ($\approx$ £500–£16,000,000) depending on the company's economic situation.[250] The very high maximum limit should be recognized as potentially providing strong deterrence against non-compliance even in relation to large international corporations (*cf.* PEGI's very low maximum fine discussed below under section 9.1). The bill remains under consideration as the latest update was provided in April 2023.[251]

However, in October 2022, another bill was proposed in the Federal Senate (the upper house) that intends to prohibit loot boxes and consider them to be "jogos de azar [games of chance]"[252] under criminal law.[253] It is not known how the conflict between the two bills would be resolved or even whether their respective proponents are aware of their counterparts. For example, when the Commission on Human Rights and Participatory Legislation was commenting and providing a positive opinion on the senate bill in June 2023, it did not refer to the conflicting chamber bill at all (e.g., argue why the more restrictive approach is preferable).[254]

7. DEDICATED LOOT BOX REGULATION

7.1. Spain: highly ambitious dedicated regulatory regime

Between February and March 2021, the Spanish Directorate General for the Regulation of Gambling (DGOJ) organized a public consultation on loot box regulation.[255] Subsequently, in July 2022, a draft law intending to regulate loot boxes was published alongside a separate consultation process seeking feedback.[256] Importantly, the draft law did not use the term "loot boxes" in its drafting language. Instead, the more neutral alternative terminology of "random reward mechanisms" was used, as recommended by the academic literature because the use of "loot boxes" might exclude other implementations of randomized in-game purchases.[257] Only Embedded-Embedded loot boxes that (i) the player paid real-world money for, (ii) provide randomized content, and (iii) whose content can either be transferred between players or be redeemable for real-world money would be regulable per Clause 3(c). Embedded-Isolated loot boxes were never intended to be covered by the draft law (this was confirmed to me by the DGOJ in a meeting on 20 June 2023).[258]

The consultation refers to this concept of "interchangeability [intercambiabilidad]" to describe how the prizes possess real-world economic value criterion that can be satisfied. I am of the view that "interchangeability" has the same meaning as the prizes being "money or money's worth," which is the criterion used in the gambling laws of many

[247]Freire (n. 32) art 3.

[248]*Ibid* art. 4.

[249]*Ibid* art. 5.

[250]*Ibid*.

[251]*Ibid* art. 3.

[252]Decreto-lei [Law Decree] N° 3.688, de 03.10.1941 (Brazil), art. 50, s. 3.

[253]Vieira (n. 32) art. 8.

[254]Commission on Human Rights and Participatory Legislation (Brazil), "Parecer (SF) [Federal Senate Opinion] N° 50, de 2023" (15 June 2023) 5, https://legis.senado.leg.br/sdleg-getter/documento?dm=9391781&ts=1688590967350&disposition=inline&_gl=1*1aa6nh4*_ga*MTk0MDMwOTU4My4xNjg2MDU1ODk5*_ga_CW3ZH25XMK*MTY4OTU4OTk4Mi4yLjEuMTY4OTU5MTkzNi4wLjA uMA.., accessed 17 July 2023.

[255]Ministerio de Consumo [Ministry of Consumer Affairs] (Spain), "Proceso Participativo Sobre La Futura Regulación de Los Mecanismos Aleatorios de Recompensa En Videojuegos (Cajas Botín) [Consultation on the Future Regulation of Random Reward Mechanisms in Video Games (Loot Boxes)]" (18 February 2021) https://www.ordenacionjuego.es/sites/ordenacionjuego.es/files/noticias/20210218_proceso_participativo_futura_regulacion_videojuegos_cajas_botin.pdf, accessed 19 July 2023.

[256]Ministerio de Consumo [Ministry of Consumer Affairs] (Spain) (n. 29).

[257]Nielsen and Grabarczyk (n. 8); Xiao, *Drafting for Dummies* (n. 47) 351–355.

[258]Emma Pinedo, *Spain to Crack down on Videogame "loot Boxes" Blamed for Pathological Behaviour*, REUTERS (1 June 2022) https://www.reuters.com/world/europe/spain-crack-down-videogame-loot-boxes-blamed-pathological-behaviour-2022-06-01/, accessed 17 July 2023.

countries (e.g., the UK[259]; *see* section 3.6 above). However, an alternative, more restrictive interpretation would be that to satisfy the "money or money's worth" definition would require the game company itself to provide a direct option to cash-out any loot box rewards into real-world money, and that mere interchangeability between players would not (even though the players can enter into a real-world money transaction external to the video game to achieve the purpose of cashing-out). The latter is the AREJL's French position described under section 3.5. The Spanish draft law provided clarity as to what is required of the prizes for the law to apply: future bills in other countries should also ensure that this criterion is clearly delineated.

Clause 6(1) of the draft law intends to prohibit access to loot boxes (whose rewards can be cashed-out) by minors (i.e., under 18). This would require companies to conduct real-world identity verification on players and not sell loot boxes to them until this has been done (Clause 6(2)). The advertising of loot boxes would be required to provide a warning about participating in moderation (Clause 7(2)) and be heavily restricted (Clause 7(3)), although the intended ambit of this was unclear. The advertisement of loot box content is often done without reference to how such content can only be obtained from loot boxes. For example, the advertising of new playable characters in *Genshin Impact* that can only be obtained from loot boxes through YouTube video trailers does not reference that fact.[260] Would such a video constitute loot box advertisement? If not, because loot boxes were not explicitly referenced, then the advertising restrictions would be easily circumventable. If so, because the intention is to encourage loot box purchase, then the restrictions would have applied very broadly to include even the general advertising of the underlying video game containing loot boxes.

Players would also be granted the right to access information on, *inter alia*, the probabilities of obtaining various rewards (Clause 8(b)), the real-world monetary cost of purchasing loot boxes displayed

in euros (Clause 8(c)), and their purchasing history and the amount of money already spent (Clause 8 (d)). The DGOJ would be able to require the aforementioned information to be disclosed in specific manners (Clause 9), thus addressing concern that companies might comply sub-optimally due to the probability disclosure requirements being unspecific and discretionary elsewhere (*see* section 2.3 above). Companies must also allow players to self-exclude from future participation (Clause 10); set spending limits (Clause 11); and make pre-commitments about how many loot boxes they intend to buy (Clause 12). Non-compliance by companies would be punishable, depending on the severity, with written warnings; fines of up to €3,000,000 ($\approx$ £2,600,000); or the termination of the provision of internet services.

The Spanish draft law is particularly ambitious by establishing an array of harm minimization features borrowed from the traditional gambling context. However, it has not progressed. A general election is to be held in July 2023. This regulatory effort may or may not be pursued further depending on the policies of the next government. In any case, the draft law is highly unlikely to become law by the originally intended effective date of 2 January 2024.

8. MISCELLANEOUS CIVIL LITIGATION

8.1. U.S. and Canada: numerous cases, including class actions

A comprehensive review of the current status and potential final disposal of numerous civil actions brought by players against video game companies (including many class action suits) in the U.S. and Canada is beyond the ambit of this article. Indeed, many remain in progress, so it would be difficult to comment. A general observation is that the litigation process is always protracted and that claimants have not managed to be easily successful. This is in part because some of the arguments being attempted are not arguable at all, and they are detracting from the potentially legitimate and viable claims.

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[259]Gambling Act 2005 (UK), s. 6(5)(a).

[260]*E.g.,* Genshin Impact, "New Character Demo - 'Eula: Flickering Candlelight'" (17 May 2021) https://www.youtube.com/watch?v=Go7SeJ-yOL4, accessed 20 July 2022.

For example, in *Sutherland v. Electronic Arts*,[261] the claimant attempted to argue that not only Embedded-Embedded *but also Embedded-Isolated loot boxes* involve "the opportunity to win or lose 'money or money's worth.'"[262] The claim is obviously bound to fail in relation to Embedded-Isolated loot boxes, but the pleading still included them alongside the potentially viable claim concerning Embedded-Embedded loot boxes only. Including irrelevant and unarguable points obviously distracted the court to the claimant's detriment. In addition, the preoccupation of the pleading with Embedded-Isolated loot boxes also caused the claimant to fail to plead relevant facts specifically concerning Embedded-Embedded loot boxes. For example, the claimant seemingly never pled that the virtual currency that loot box items can be sold for in the in-game auction house can then be transferred into real-world money (*see* section 3.6 above). Such omissions (and also the conflation of Embedded-Embedded and Embedded-Isolated loot boxes) led the judge to the partially incorrect conclusion that ". . .virtual currency can only be used to buy loot boxes or virtual items for use within the defendants' video games" and that ". . . virtual currency and virtual items in loot boxes can never be 'cashed out' to gain money or money's worth."[263] Those conclusions would be correct in relation to Embedded-Isolated loot boxes, but they are wrong in relation to Embedded-Embedded ones, as such those found in the *FIFA* games, which are indeed part of the *Sutherland v. Electronic Arts* case. The judge recognized that the pleading might be improved through being amended but decided against allowing the claimant to do so citing the importance of ensuring fair litigation through strict case management.[264] In any case, although successful in striking-

out part of the claim, Electronic Arts should be criticized in making the following public statement:

> "We're pleased that the trial court rejected, as a matter of law, the allegations of unlawful gaming. The court's decision reaffirms our position that nothing in our games constitutes gambling."[265]

This hearing was not the proper trial for the case (which is yet to come, as other parts of the claim were allowed to proceed), and the court did not reject the allegations of unlawful gaming *per se* and merely decided not to entertain them in this instance. Future litigation should properly focus on Embedded-Embedded loot boxes, particularly those found in games by companies that allow cashing-out within the game (e.g., *Magic: The Gathering Online*[266]).

One notable exception to the claimants being unsuccessful is Epic Games' settlement of both the U.S. and Canadian class action suits without any admission of liability. In the U.S.,[267] Epic agreed to distribute to all player accounts that have purchased loot boxes either US$7.99 (≈ £6) or US$9.98 (≈ £8) depending on the game.[268] In addition, Epic set up a settlement fund of US$26,500,000 (≈ £20,000,000) for U.S. players. Each player was permitted to claim for any damages to be paid either in virtual in-game currency (up to US$79.99 (≈ £61) or US$99.98 (≈ £77) in value, depending on the game) or in cash (up to US$75 (≈ £57)). Epic also agreed to refund any purchases made by minors without parental consent up to US$50 (≈ £40). In Canada, Epic agreed (with court approval in February and March 2023) to pay Canadian players who bought loot boxes a total of CA$2,750,000

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[261] 2023 BCSC 372 (Canada).

[262] *Ibid* [113]–[129] (Fleming J).

[263] *Ibid* [122] (Fleming J).

[264] *Ibid* [129] (Fleming J).

[265] Christopher Dring, *Canada Judge Rejects Unlawful Gambling Accusation in EA Loot Box Lawsuit* (GamesIndustry.biz, 21 March 2023) https://www.gamesindustry.biz/canada-judge-rejects-unlawful-gambling-accusation-in-ea-loot-box-lawsuit, accessed 17 July 2023.

[266] *See* Xiao, *Sussing out the Cashing Out* (n. 67).

[267] *Zanca v. Epic Games*, Case No 21-cv-000534 (Wake Co SC NC 2021).

[268] *See* Epic Games, "Fortnite: Save the World Loot Llama Purchasers to Receive 1000 V-Bucks" (*Fortnite Official Website*, 22 February 2021) https://www.fortnite.com/news/fortnite-save-the-world-loot-llama-purchasers-to-receive-1000-v-bucks, accessed 17 July 2023; Psyonix, "Players Who Purchased an Event Crate or a Key That Was Used to Open a Crate to Receive 1000 Rocket League Credits" (*Rocket League Official Site*, 22 February 2021) https://www.rocketleague.com/news/players-who-purchased-an-event-crate-or-a-key-that-was-used-to-open-a-crate-to-receive-1000-rocket-league-credits/, accessed 17 July 2023.

($\approx$ £1,600,000), with each person receiving up to CA\$25 ($\approx$ £15).[269]

9. INDUSTRY SELF-REGULATION

9.1. UK: Ukie's industry principles and guidance on loot boxes

In September 2020, the UK Government launched a call for evidence and consultation process on regulating loot boxes[270] after two committees from the House of Commons and from the House of Lords respectively raised their concerns.[271] The government response, published in July 2022, decided that "it would be premature to pursue legislative options . . . without first pursuing enhanced industry-led protections," even though potential legislation was not dismissed outright in the event industry self-regulation does not effectively reduce harm.[272] Precisely one year later, the UK trade body representing the video game industry (Ukie) published 11 principles and related guidance on loot boxes[273] that have been endorsed by the government.[274]

These principles do not break any new ground. Requiring companies to make loot box presence disclosures (Principle 4)[275] and probability disclosures (Principle 5)[276] and to provide robust parental control features (Principle 1) are measures that should already have been implemented as industry self-regulation several years ago.[277] Notably, the principles and guidance are not intended to be "prescriptive," meaning that there will unlikely be industry uniformity and consistency when following them.

For example, with probability disclosures, Principle 5 failed to establish an industry standard method of compliance. The shortcomings of mainland China's experience of requiring probability disclosures by law have not been taken into account (*see* section 2.3 above). Furthermore, Principle 5 would recognize a category-based disclosure as compliant, contrary to the regulations in Taiwan and South Korea (*see* sections 2.1 and 2.2 above). In many games, the perceived value of different rewards found within the same rarity differs widely: it is unhelpful to fail to inform players of their chances of obtaining specific individual items. Similarly, with parental control features, the guidance presents "industry best practice," such as setting a spending limit of £0 by default on child accounts. However, it fails to actually require companies to implement this. The industry was also given a whole year as an implementation period: it must be queried whether giving companies that much time to comply is really justified.

Importantly, these self-regulatory principles also have no in-built enforceability. Neither Ukie nor the government has stipulated what percentage of the highest-grossing games complying would be deemed as satisfactory self-regulation (I previously suggested 95%[278] of the 500 highest-grossing games by 1 September 2023 to them in January 2023 when asked to comment on a draft version of the principles). I previously published in the leading UK industry media venue on these potential issues so it cannot be said that Ukie and the government have not been put on notice to address these concerns.[279] Companies cannot be fined or delisted for non-

[269]*Johnston* v. *Epic Games et al*, 2020 SCBC VLC-S-S-220088 (Canada); *Bourgeois* v. *Electronic Arts et al*, 2020 QCCS 500-06-001132-212 (Canada).

[270]DCMS (n. 33).

[271]Digital, Culture, Media and Sport Committee of the House of Commons (UK), "Immersive and Addictive Technologies: Fifteenth Report of Session 2017–19" (2019) HC 1846 27–33, https://publications.parliament.uk/pa/cm201719/cmselect/cmcumeds/1846/1846.pdf, accessed 18 July 2023; Select Committee on the Social and Economic Impact of the Gambling Industry of the House of Lords (UK), "Report of Session 2019–21: Gambling Harm—Time for Action" (2020) HL 79 110–116, https://publications.parliament.uk/pa/ld5801/ldselect/ldgamb/79/79.pdf, accessed 18 July 2023.

[272]DCMS (n. 34) para 243.

[273]Ukie (UK Interactive Entertainment) (n. 35).

[274]DCMS, "Loot Boxes in Video Games: Update on Improvements to Industry-Led Protections" (18 July 2023) https://www.gov.uk/guidance/loot-boxes-in-video-games-update-on-improvements-to-industry-led-protections, accessed 18 July 2023.

[275]*See* Xiao, *Beneath the Label* (n. 7); Xiao, *Shopping Around* (n. 168).

[276]*See* Xiao, Henderson and Newall, *What Are the Odds?* (n. 175).

[277]*See e.g.*, Ben Kuchera, *Apple Adds New Rules for Loot Boxes, Requires Disclosure of Probabilities* (Polygon, 21 December 2017) https://www.polygon.com/2017/12/21/16805392/loot-box-odds-rules-apple-app-store, accessed 18 July 2023; Ethan Gach, *Google Now Requires App Makers to Disclose Loot Box Odds* (Kotaku, 30 May 2019) https://kotaku.com/google-now-requires-app-makers-to-disclose-loot-box-odd-1835134642, accessed 18 July 2023; Entertainment Software Association (ESA), "Video Game Industry Commitments to Further Inform Consumer Purchases" (*ESA Official Website*, 7 August 2019) https://www.theesa.com/perspectives/video-game-industry-commitments-to-further-inform-consumer-purchases/, accessed 18 July 2023; Pan European Game Information (PEGI), "PEGI Introduces Notice To Inform About Presence of Paid Random Items" (*PEGI Official Website*, 13 April 2020) https://pegi.info/news/pegi-introduces-feature-notice, accessed 18 July 2023.

[278]*See* Xiao, *Beneath the Label* (n. 7).

[279]*See* Leon Y Xiao, *How Should the UK Video Game Industry Self-Regulate Loot Boxes?* (GamesIndustry.biz, 20 September 2022) https://www.gamesindustry.biz/how-should-the-uk-video-game-industry-self-regulate-loot-boxes, accessed 18 July 2023.

compliance, unless a platform provider (such as Apple) or the age rating organization (PEGI) steps in. However, previous experience has shown that those stakeholders have not strictly applied their enforcement powers. For example, 36% of the highest-grossing iPhone games with loot boxes failed to make probability disclosures in mid-2021 but still remained available for download on the Apple App Store.[280] This high prevalence rate of non-compliant games shows that Apple has not actively enforced its own rules. Another example is PEGI's recent enforcement action. My study identified that some companies failed to disclose to PEGI the presence of loot boxes in their games, which resulted in PEGI incorrectly failing to label these games as containing loot boxes.[281] For committing a "serious" breach of the PEGI Code of Conduct (which this was deemed to be),[282] two companies were fined €5,000 (≈ £4,300) each.[283] Even though the fine could have been between €5,000–€20,000 (≈ £4,300–£17,000), PEGI chose to apply the lowest possible fine. For context, one of the games that was fined generated US$525 (≈ £400) million in revenue in the one year since its release,[284] such that the fine represented only 0.001%. The highest fine for a third breach in the "serious" category is only €75,000 (≈ £64,000), as loot box-related failures can never fall within the "very serious" category because they are never capable of affecting the numerical age rating.[285] PEGI should consider giving itself the power to imposing higher fines, including GDPR (General Data Protection Regulation)-type, percentage-based fines on global turnover. This example shows that PEGI does not have sufficient deterrence powers nor is it willing to use the little power that it does have to its potential maximum to punish bad actors. Hopefully stakeholders like Apple and PEGI will better enforce their own rules in the future,

but as it stands, the Ukie principles and guidance, whose policing relies on these self-regulators that have not previously been assertive, lack accountability.

The Ukie principles and guidance also did not deal with social/simulated casino games, which the Australian Government has recognized as more concerning than traditional loot boxes by requiring them to have a higher minimum age rating (*see* section 5.1 above). It has been PEGI policy since 2020 to rate any games with "simulated gambling" or "gambling" PEGI 18 (i.e., suitable for adults only).[286] However, the current problem is that, on both the Google and Apple stores (*see* Fig. 3), some older but very popular and high-grossing games in the "casino" category are not rated adults only and are instead rated 12 + or even lower. It may be sensible for PEGI to not go back and change the very low age rating for every historical game.[287] However, these casino games on iOS and Android are still generating significant amounts of revenue today, potentially from underage players. This loophole needs to be stopped. Such games would have received a PEGI 18 rating had they been submitted after 2020. It should be simple to apply the highest age rating mandatorily to all games tagged with the casino category or with gambling or simulated gambling content descriptors.[288]

Finally, neither the Ukie principles and guidance nor the UK Government have discussed how these commitments would be communicated to non-Ukie member companies. Many popular games, particularly on mobile platforms, are operated by smaller companies based in other parts of the world that may not have access to proper legal advice. After my study finding that the Belgian "ban" on loot boxes was not complied with by 82 out of the 100 highest-grossing iPhone games,[289] companies behind games like *Roblox* (Roblox Corporation, 2006) and *Empires & Puzzles* (Small Giant Games,

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[280]Xiao, Henderson and Newall, *What Are the Odds?* (n. 175).

[281]Xiao, *Beneath the Label* (n. 7).

[282]PEGI, "The PEGI Code of Conduct" (*Pegi Public Site*, 2023) https://pegi.info/pegi-code-of-conduct, accessed 18 July 2023.

[283]PEGI, "Complaints and Enforcement Cases" (*Pegi Public Site*, 2023) https://pegi.info/page/complaints-and-enforcement-cases, accessed 19 July 2023.

[284]Randy Nelson, "Diablo Immortal Blazes Past $500 Million Generated in Its First Year on Mobile" (*data.ai*, 15 June 2023) https://www.data.ai/en/insights/market-data/diablo-immortal-500-million/, accessed 20 June 2023.

[285]PEGI, "The PEGI Code of Conduct" (n. 282).

[286]Andrew Robertson, *PEGI Rating For Gambling Descriptor Is Now Always 18 +* (Askaboutgames *From the Video Standards Council Rating Board*, 2 August 2021) https://www.askaboutgames.com/news/pegi-rating-for-gambling-is-now-always-18, accessed 18 July 2023.

[287]*Ibid.*

[288]PEGI, "What Do the Labels Mean?" (2022) https://pegi.info/what-do-the-labels-mean, accessed 18 July 2023.

[289]Xiao, *Breaking Ban* (n. 37).
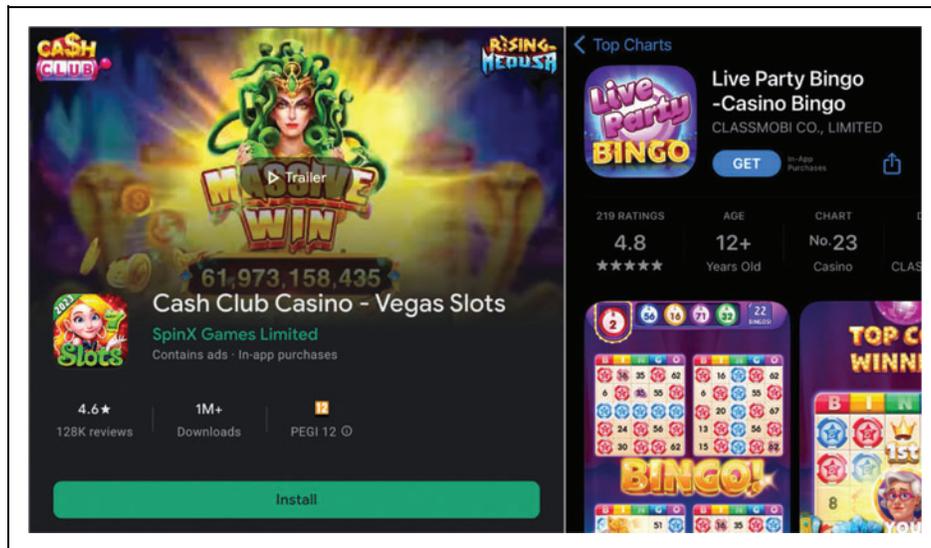
FIG. 3.   Social Casino Games That Are Rated Suitable for Minors (Specifically, 12 +) on the Google Play Store and Apple App Store. © 2023 SpinX Games & CLASSMOBI Color images are available online.

2017) took compliance action by changing the Belgian versions to remove loot boxes.[290] This demonstrates that at least some cases of non-compliance were due to a lack of knowledge, rather than malicious. It is important that the UK rules are widely disseminated, and this should be one of the focus areas during the 12-month implementation period. Done well, players in other parts of the world might also benefit from these measures. Why would a responsible company remove consumer protection features from other countries' versions, right?

10. BANS ON ONLINE GAMES OF CHANCE

10.1. India: attempted bans on online games of chance struck down as unconstitutional

India has no regulation explicitly dealing with loot boxes inside video games, although the national Public Gambling Act 1867 in theory prohibits, with some exceptions, any games that are not a "game of mere skill"[291] and there are state laws to the same effect.[292] Loot boxes as a standalone mechanic are evidently

not games of skill and must therefore be caught. However, gambling law has not yet been so applied to deal with loot boxes. Indeed, there have been no attempts through other laws to directly address loot boxes either. Notwithstanding, the States of Karnataka,[293] Kerala,[294] and Tamil Nadu[295] have all respectively attempted to more strictly regulate certain online games of chance (in particular, rummy and poker). Intentionally or not, the state laws of Karnataka and Tamil Nadu were both drafted with such broad language that video game loot boxes are undoubtedly captured and banned as a result.

Notably, these state laws have all since been struck down by the relevant High Court as unconstitutional because, *inter alia*, contrary to Western perspectives,[296] rummy and poker are viewed as games of skill, rather than games of chance, such that attempting to regulate them under the guise of regulating gambling is *ultra vires*.[297] A Supreme Court ruling is reportedly expected on this point in the imminent future. Tamil Nadu has already adopted new legislation in an attempt to draft a constitutionally

[290]*E.g.,* Carter (n. 79); Traggeter and Petri, "Can't Purchase Anything Anymore Because i'm in the Region Belgium" (*Empires & Puzzles Community Forum*, 25 August 2022) https://forum.smallgiantgames.com/t/cant-purchase-anything-anymore-because-im-in-the-region-belgium/277607/1, accessed 2 July 2023.

[291]S. 12.

[292]*E.g.,* Kerala Gaming Act 1960, s. 14.

[293]Karnataka Police (Amendment) Act 2021.

[294]Notification of 23 February 2021 issued under Kerala Gaming Act 1960.

[295]Tamil Nadu Gaming and Police Laws (Amendment) Ordinance 2020; Tamil Nadu Gaming and Police Laws (Amendment) Act 2021.

[296]*E.g.*, Gambling Act 2005 (UK), s. 6(2)(a)(i).

[297]*Junglee Games v. State of Tamil Nadu* (2021); *Head Digital Works v. State of Kerala* (2021); *All India Gaming Federation v. State of Karnataka* (2022).

permissible version of the intended regulation, including establishing a Tamil Nadu Online Gaming Authority with the mandate to regulate online games regardless of whether they involve elements of chance (i.e., including video games).[298] In any case, that particular point which caused the state laws to be struck down is not relevant to loot boxes, which on their own do not involve any element of skill. States are not prevented by the Constitution to regulate loot boxes. If the aforementioned state laws are upheld by the Supreme Court or if alternative, constitutionally compliant versions are adopted (as seemingly already done in Tamil Nadu), then loot boxes would likely fall within their ambit and be banned. However, whether the laws would be so enforced is another question.

11. CONCLUSION

This article has sought to provide a whistle-stop tour around the world of loot box regulation. A diverse range of approaches are being considered and have been presented. The Belgian experience of failing to "ban" the mechanic has shown that a particularly restrictive approach is unlikely to work perfectly effectively; however, that should not dissuade policymakers from taking action if they deem doing so to be appropriate. Being realistic about what can be achieved (given the known difficulties of regulating technology) and providing sufficient funding to meet those goals are important. Considering the developing evidence base, it is unacceptable to not intervene to at least ensure transparency and fairness in the consumer experience through the proper enforcement of existing laws. Whenever gambling or consumer protection laws are breached, the relevant enforcers must take proactive action. The industry is conscious of the threat of regulation and should act more responsibly to prevent overly paternalistic regulation that is detrimental to all stakeholders. As it stands, in countries where players (particularly minors) are not being adequately protected by regulation (either due to a lacuna in the law or the lack of enforcement), it would be prudent for players and parents to take care in learning more about loot boxes and how to prevent their potential harms. In principle, the burden should never be on the individuals to protect themselves from harmful commercial products, but when confronted without sufficient regulatory protection, individuals need to be pragmatic and protect themselves as needed.

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[298]Tamil Nadu Prohibition of Online Gambling and Regulation of Online Games Ordinance 2022, s. 4(1)(a); Tamil Nadu Prohibition of Online Gambling Act 2022, s. 4(1)(a).

Paper 3: Belgium's so-called 'ban' on loot boxes

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Data deposit link: https://doi.org/10.17605/OSF.IO/7KJS9.

Breaking Ban: Belgium's Ineffective Gambling Law Regulation of Video Game Loot Boxes

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Collabra: Psychology

Loot boxes in video games are gambling-like mechanics that players buy to obtain randomised rewards of varying value. Loot boxes are conceptually and psychologically similar to gambling, and loot box expenditure is positively correlated with self-reported problem gambling severity. Citing consumer protection concerns, the Belgian Gaming Commission opined that such mechanics constitute gambling under existing law and effectively 'banned' loot boxes by threatening criminal prosecution of non-compliant companies implementing paid loot boxes without a gambling licence. The effectiveness of this ban at influencing the compliance behaviour of video game companies (and, by implication, consumers', including children's, exposure to and consumer protection from loot boxes) was assessed. Paid loot boxes remained widely available amongst the 100 highest-grossing iPhone games in Belgium: 82.0% continued to generate revenue through a randomised monetisation method, as did 80.2% of games rated suitable for young people aged 12+. The Belgian 'ban' on loot boxes has not been effectively enforced. Although the initial imposition of this measure promoted public discussion and debate about loot box regulation (both domestically and internationally) and likely provided better consumer protection in relation to specific games operated by well-known companies, an unenforced 'ban' has many negative consequences, including (i) giving consumers, parents, and policymakers a false sense of security and (ii) allowing non-compliant games to replace games that have been removed from the national market by more socially responsible companies. Indeed, even an effectively enforced ban has potential disadvantages. Finally, technical measures taken by companies to comply with the ban were easily circumvented, and some highly dedicated players (who are likely to be the highest spending and most vulnerable) could reasonably be expected to do so. Therefore, the complete elimination of the loot box mechanic from a country may not be practically achievable. Belgium should re-evaluate its regulatory position. A blanket ban approach to loot box regulation cannot be recommended to other countries. Other less restrictive approaches to loot box regulation should be considered. Preregistered Stage 1 protocol: https://doi.org/10.17605/OSF.IO/5MXP6 (date of in-principle acceptance: 7 April 2022).

Lootboxes in videospellen zijn *gambling-like* mechanismen die spelers kopen om willekeurige beloningen van verschillende waarde te krijgen. Lootboxes zijn conceptueel en psychologisch vergelijkbaar met gokken, en uitgave voor lootboxes is positief gecorreleerd met zelfgerapporteerd probleemgokken. Omwille van zorgen rond consumentenbescherming oordeelde de Belgische Kansspelcommissie dat dergelijke mechanismen volgens de bestaande wetgeving gokken zijn en heeft het loot boxes daadwerkelijk 'gebannen' door te dreigen met strafrechtelijke vervolging van niet-conforme bedrijven, die zonder gokvergunning betaalde lootboxes implementeren. De doeltreffendheid van deze ban bij het beïnvloeden van het nalevingsgedrag van

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  https://sites.google.com/view/leon-xiao/

videogamebedrijven (en, bij implicatie, de blootstelling van consumenten, inclusief kinderen, aan en de bescherming van consumenten tegen lootboxes) werd beoordeeld. Betaalde lootboxes bleven op grote schaal beschikbaar onder de 100 best verdienende iPhone-games in België: 82,0% bleef inkomsten genereren via een gerandomiseerde monetisatiemethode, net als 80,2% van de games die als geschikt voor jongeren vanaf 12 jaar worden beschouwd. De Belgische "ban" op lootboxes is niet daadwerkelijk gehandhaafd. Hoewel de oorspronkelijke maatregel de publieke discussie en het debat over de regulering van lootboxes (zowel nationaal als internationaal) heeft bevorderd en de consument waarschijnlijk beter heeft beschermd met betrekking tot specifieke games van bekende bedrijven, heeft een niet-gehandhaafde "ban" veel negatieve gevolgen, waaronder (i) consumenten, ouders en beleidsmakers een vals gevoel van veiligheid geven en (ii) toestaan dat niet-conforme games de plaats innemen van games die door maatschappelijk verantwoordelijkere bedrijven van de nationale markt zijn gehaald. Zelfs een effectief gehandhaafd verbod brengt immers mogelijke nadelen met zich mee. Ten slotte zijn de technische maatregelen die bedrijven hebben genomen om aan het verbod te voldoen gemakkelijk te omzeilen en kan redelijkerwijs worden verwacht dat sommige zeer toegewijde spelers (die waarschijnlijk de hoogste uitgaven doen en het kwetsbaarst zijn) dit zullen doen. Daarom is de volledige verwijdering van het lootbox-mechanisme in een land praktisch wellicht niet haalbaar. België moet zijn regelgevend standpunt herevalueren. Een algemeen verbod op de regelgeving inzake lootboxes kan niet aan andere landen worden aanbevolen. Andere, minder restrictieve benaderingen van de regelgeving inzake lootboxes moeten worden overwogen. Vooraf geregistreerd protocol van fase 1: https://doi.org/10.17605/OSF.IO/5MXP6 (datum van principiële aanvaarding: 7 april 2022). [Translated by Maarten Denoo]

En jeu vidéo, les lootbox (boites à butin) sont des dispositifs semblables au jeu de hasard que les joueurs achètent pour obtenir des récompenses aléatoires de valeur variable. Conceptuellement et psychologiquement, les lootbox sont comparables au jeu de hasard, et l'achat de lootbox est corrélé positivement avec le niveau de sévérité auto-rapporté de jeu d'argent problématique. Invoquant des préoccupations liées à la protection des consommateurs, la Commission belge des jeux de hasard a émis l'avis que de tels dispositifs relèvent du jeu de hasard en regard de la législation existante, et a effectivement « interdit » les lootbox en menaçant de poursuites les sociétés qui ne se conforment pas à cet avis et proposent des lootbox payantes sans posséder une licence pour le jeu de hasard. Nous avons mesuré l'effectivité de cette interdiction à influencer l'observation par l'industrie du jeu vidéo (et, découlant de cela, l'exposition des consommateurs, y compris les enfants, aux lootbox ainsi que leur protection par rapport à celles-ci). Les lootbox payantes sont restées largement accessibles au sein des 100 jeux pour iPhone générant le plus de revenus en Belgique : 82,0% ont continué à générer des revenus via des techniques de monétisation basées sur le hasard, un pourcentage qui s'élevait à 80,2% pour les jeux classés comme adaptés aux jeunes à partir de 12 ans. "L'interdiction" belge des lootbox n'a donc pas été appliquée dans les faits. Bien qu'initialement, l'imposition de la mesure ait favorisé le débat public autour de la régulation des lootbox (tant au niveau domestique qu'international), et qu'elle ait probablement fourni une meilleure protection des consommateurs quant à certains jeux spécifiques proposés par des firmes connues, une "interdiction" qui n'est pas appliquée a de nombreuses conséquences négatives, en ce compris de (i) donner aux consommateurs, parents et décideurs un sentiment erroné de sécurité et de (ii) permettre à des jeux non conformes de remplacer des jeux qui ont été retirés du marché national par des sociétés plus socialement responsables. Enfin, nous avons aisément contourné les mesures techniques mises en place par les firmes pour respecter l'interdiction, et on peut raisonnablement s'attendre à ce que certains joueurs hautement passionnés (qui sont susceptibles de dépenser le plus et d'être les plus vulnérables) fassent de même. Dès lors, il se peut que l'élimination complète de la mécanique de jeu "lootbox" au sein d'un pays ne soit pas réalisable dans la pratique, et la Belgique serait avisée de revoir sa position sur la régulation des lootbox. Nous ne pouvons pas recommander aux autres pays d'approcher celle-ci sous l'angle de l'interdiction systématique ; d'autres approches moins restrictives de la régulation des lootbox devraient être envisagées. Lien vers le

protocole de niveau 1 : https://doi.org/10.17605/OSF.IO/5MXP6 (acceptation de principe en date du 7 avril 2022). [Translated by Bruno Dupont]

1. Introduction

Paid loot boxes are randomised monetisation methods in video games that are purchased by players to obtain randomised rewards of varying value (Xiao, Henderson, Nielsen, et al., 2021). Loot boxes are prevalent in video games internationally and across different hardware platforms (Rockloff et al., 2020; Xiao, Henderson, Yang, & Newall, 2021; Xiao, Henderson, & Newall, 2021; Zendle et al., 2020). The loot box purchasing process hides what rewards the player will actually receive (and their value) until after the purchase decision and payment have already been made, which is why paid loot boxes have been identified as being structurally similar to gambling (Drummond & Sauer, 2018; Nielsen & Grabarczyk, 2019; Xiao, 2021a) and why they have been considered 'predatory' and potentially abusive of consumers (King & Delfabbro, 2018; Nielsen & Grabarczyk, 2019; Xiao, 2021b, 2022b). Loot boxes have also been identified as sharing certain psychological similarities with gambling (DeCamp, 2020; Larche et al., 2021). Indeed, loot box purchasing has been found to be positively correlated with problem gambling severity in 16 studies in various countries (Garea et al., 2021; Spicer et al., 2021), including the US (Drummond et al., 2020; Zendle & Cairns, 2019), Canada (Brooks & Clark, 2019), the UK (Wardle & Zendle, 2021; Zendle, 2019a), Spain (González-Cabrera et al., 2021), Germany (von Meduna et al., 2020), Denmark (Kristiansen & Severin, 2019), Australia (Drummond et al., 2020; Rockloff et al., 2021) and Aotearoa New Zealand (Drummond et al., 2020), and internationally in general (Hall et al., 2021; W. Li et al., 2019; Macey & Hamari, 2019; Zendle, Cairns, et al., 2019; Zendle, Meyer, et al., 2019; Zendle, 2019b; Zendle & Cairns, 2018). Specifically, players that self-reported higher scores on problem gambling severity scales tend to buy more loot boxes, the theorised implication of which is that video game companies are likely disproportionally profiting from such potentially at-risk players (Close et al., 2021). The same correlation has also been found within samples of underage players, and it has been suggested that young people might be a group that is particularly vulnerable to potential harms (Wardle & Zendle, 2021). Many countries have considered, or are considering, whether to regulate loot boxes because of their potentially harmful link to problem gambling, and because of consumer protection concerns, particularly in relation to vulnerable groups, such as children (Castillo, 2019; Cerulli-Harms et al., 2020; Harvey, 2021; Honer, 2021; Hong, 2019; Liu, 2019; Moshirnia, 2018a; Schwiddessen & Karius, 2018; Xiao, 2021b).

The predominant regulatory approach, adopted by gambling regulators (Autorité de regulation des jeux en ligne (ARJEL) [Regulatory Authority for Online Games (France)], 2018; Belgische Kansspelcommissie [Belgian Gaming Commission], 2018b; Kansspelautoriteit [The Netherlands Gambling Authority], 2018; Spillemyndigheden [Danish Gambling Authority], 2017; UK Gambling Commission, 2017) and policymakers (Digital, Culture, Media and Sport Committee of the House of Commons (UK), 2019; Federal Trade Commission (US), 2019; Parliament of the Commonwealth of Australia House of Representatives Standing Committee on Social Policy and Legal Affairs, 2020; Parliament of the Commonwealth of Australia Senate Environment and Communications References Committee, 2018; Select Committee on the Social and Economic Impact of the Gambling Industry of the House of Lords (UK), 2020) in many countries, has been to consider whether to regulate paid loot boxes as gambling: particularly, whether different types of loot boxes that have already been implemented in various video games fall afoul of existing gambling law (Cerulli-Harms et al., 2020; Xiao, 2021b, 2022b). If paid loot boxes constitute gambling, then video game companies would be prohibited from offering loot boxes for sale unless they possess a gambling licence (and therefore be regulated under gambling laws, and would be prohibited from selling them to underage players in most countries even with a licence). Regulators in different countries have come to divergent conclusions on this particular legal point because the definitions for gambling in law varies from jurisdiction to jurisdiction depending on the drafting language of the law in each country (Cerulli-Harms et al., 2020; Xiao, 2021b, 2022b).

To summarise, paid loot boxes (*i.e.*, those that require players to pay real-world money to buy) can be divided into two types: firstly, those containing rewards which can be transferred to other players (and therefore possess real-world monetary value) and, secondly, those containing rewards which *cannot* be transferred to other players (and therefore do *not* possess direct real-world monetary value) (Nielsen & Grabarczyk, 2019; Xiao, Henderson, Nielsen, et al., 2021; Xiao, 2022b). The first type constitutes gambling under existing law in many countries, as recognised by various European national gambling regulators, including in the UK, Denmark, and Belgium (Autorité de regulation des jeux en ligne (ARJEL) [Regulatory Authority for Online Games (France)], 2018; Belgische Kansspelcommissie [Belgian Gaming Commission], 2018b; Spillemyndigheden [Danish Gambling Authority], 2017; UK Gambling Commission, 2017), although only the Belgian regulator has actively enforced the law (Xiao, 2021b). In contrast, the Dutch gambling regulator also previously opined that the first type constitutes gambling (Kansspelautoriteit [The Netherlands Gambling Authority], 2018) and has enforced the law by imposing a financial penalty on Electronic Arts for allegedly illegal loot box implementation in its *FIFA* games (*Electronic Arts Inc & Electronic Arts Swiss Sàrl v Kansspelautoriteit (2020) Rechtbank Den Haag [District Court of The Hague]*, 2020; Kansspelautoriteit [The Netherlands Gambling Authority], 2020); however, that interpretation has since been successfully appealed and was overruled by the highest Dutch administrative court. Therefore, the Netherlands is the first country where the first type of loot box has been confirmed not to constitute gambling.

However, as far as can be discerned, the second type constitutes gambling only under existing Belgian law (Belgische Kansspelcommissie [Belgian Gaming Commission], 2018b) and Manx law (Hood, 2017; Isle of Man Gambling Supervision Commission, 2017) and not in other jurisdictions (Cerulli-Harms et al., 2020; Xiao, 2021b). Belgium has been popularly referred to as a country that has 'banned' both types of loot boxes (BBC, 2019): this is technically incorrect because the law did not change and the Belgian gambling regulator merely announced its interpretation of the law and declared an intention to enforce it by criminally prosecuting non-compliant video game companies for contravening existing gambling law (Belgische Kansspelcommissie [Belgian Gaming Commission], 2018b). Offering either type of paid loot box would be illegal under the gambling law of the Isle of Man unless licensed because the definition of 'money's worth' differs between Manx and UK law (Hood, 2017; Isle of Man Gambling Supervision Commission, 2017). However, this paper does not focus on Manx law because it is effectively identical to the Belgian position but practically it appears that video game companies simply treat the Isle of Man as the UK and have not taken dedicated Manx compliance action, in contrast to taking exclusive compliance action in Belgium, as discussed in detail below.

In order to comply with Belgian gambling law (the Gambling Act of 7 May 1999),[1] as interpreted by the Belgian gambling regulator (which the academic literature recognises as the correct legal interpretation (Cerulli-Harms et al., 2020; Xiao, 2021b, 2022b), even though video game companies have expressed their disagreement with this interpretation (2K Games, 2018a; Blizzard Entertainment, 2018; Electronic Arts, 2019) but have not attempted to appeal it), a number of prominent video games companies have reported either disabling players' ability to purchase both types of loot boxes in Belgium (2K Games, 2018a; Blizzard Entertainment, 2018; Electronic Arts, 2019) or even removing their games from the jurisdiction outright and having stopped providing the video gaming service (including the sale of loot boxes) to Belgian players (Nintendo, 2019). These are demonstrations of how enforcement of Belgian gambling law has caused at least some video game companies to behave differently in Belgium as they do in other countries. Therefore, Belgian players will likely find it more difficult to purchase loot boxes (if they are able to do so at all) than players from other countries who continue to have unrestricted access. Belgian consumers are thereby likely better protected from the potential harms of loot boxes: players who cannot spend any money at all on loot boxes could not 'overspend' and would not suffer potential financial harms.

However, the restrictive course of action taken by Belgian policy is potentially overregulation because not all consumers will be harmed by loot boxes, yet now all Belgian players, both children and adults alike, cannot buy loot boxes. Loot boxes and other newer monetisation methods, compared to the old model of selling the software, allow for many players (including some who might not be able to afford purchasing the software) to gain access to entertainment and play certain games for free (Xiao, 2021b). The Belgian ban has arguably infringed upon the freedom and right to choose of players who would never have been harmed (Xiao, 2022d). Indeed, in contrast to this prohibiting approach, other alternative regulatory approaches that better ensure consumer choice (although potentially providing less consumer protection) are available. For example, China legally requires video game companies to disclose the probabilities of obtaining randomised loot box rewards, thus providing a degree of transparency and consumer protection, whilst not restricting the player's freedom to purchase loot boxes, nor the video game companies' commercial interests in selling loot boxes (Xiao, Henderson, Yang, & Newall, 2021; Xiao & Newall, 2022). Researchers have also suggested restricting loot box sales only to a certain extent by limiting players' spending on loot boxes to a 'reasonable' amount, e.g., US$50 (Drummond et al., 2019; King & Delfabbro, 2019b), and designing more 'ethical' loot boxes that players are less likely to overspend on (King & Delfabbro, 2019a; Xiao & Henderson, 2021; Xiao & Newall, 2022).

Despite a loot box 'ban' being (arguably overly) paternalistic, two UK parliamentary committees have recommended that the second type of loot boxes (currently only illegal in Belgium) should also be regulated in the UK through an amendment of its gambling law by expanding the definition of what constitutes gambling (Digital, Culture, Media and Sport Committee of the House of Commons (UK), 2019; Select Committee on the Social and Economic Impact of the Gambling Industry of the House of Lords (UK), 2020), and this was being considered by the UK Government when this study protocol was preregistered (Department for Digital, Culture, Media & Sport (UK), 2020). Other countries are also considering adopting a similar prohibition of the second type of loot boxes that would mirror the current restrictive position in Belgium: as demonstrated by Bills proposed in the US that have since failed (Xiao, 2022f) and by a Bill that an Australian Member of Parliament intended to propose (Rousseau, 2021) that would restrict loot box sales to underage players.

Given that there is significant interest in emulating this regulatory approach, it is important to assess whether this Belgian 'ban' on loot boxes has been effective. One objective measure is to assess whether loot boxes have been effectively removed from games marketed in Belgium. A preliminary examination of the top-grossing iPhone games list in Belgium (more than three years after the ban was

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1 Wet van 7 mei 1999 op de kansspelen, de weddenschappen, de kansspelinrichtingen en de bescherming van de spelers [Act of 7 May 1999 on games of chance, betting, gaming establishments and the protection of players].

confirmed by the Belgian Gaming Commission [Belgische Kansspelcommissie [Belgian Gaming Commission], 2018b]) revealed that a number of games occupying prominent positions on the top-grossing list were found to contain loot boxes in the UK (Xiao, Henderson, & Newall, 2021; Zendle et al., 2020) and in the People's Republic of China (Xiao, Henderson, Yang, & Newall, 2021) and whose revenue likely mostly derived from loot box sales. It is not known whether these games are monetising using methods which do not involve loot boxes in Belgium, or whether these games are continuing to sell loot boxes in Belgium. If the latter is true, then these video game companies are either operating contrary to Belgian gambling law and liable for criminal prosecution or operating under a gambling licence (which appears unlikely as none are known to have been granted to video game companies at the time of writing).

Belgium is the appropriate jurisdiction to study in this context because the other two candidate jurisdictions (the Isle of Man and the Netherlands) are less suitable. Firstly, in relation to the Isle of Man, the jurisdiction is a Crown Dependency of the UK that, although it has its own laws, is not necessarily recognised as a separate jurisdiction in practice by video game companies. The jurisdiction's small population of approximately only 80,000 residents and geopolitical status potentially give rise to certain idiosyncrasies (Economic Affairs Division of the Cabinet Office (Isle of Man), 2017). It is unlikely that video game companies would actively seek to comply with Manx law by making a special 'national' version of their software. Indeed, there is no Manx Apple App Store (where such an adapted 'national' version of the game could potentially be published) based on which a highest-grossing list might be captured for research purposes. This is in contrast to Belgium which has a much larger population of more than 11.5 million legal inhabitants (Belgian Federal Government, 2021) and where video game companies have reportedly taken dedicated, national compliance action (2K Games, 2018a; Blizzard Entertainment, 2018; Electronic Arts, 2019; Nintendo, 2019).

Secondly, the legal position in relation to loot boxes in the Netherlands changed in March 2022 (Afdeling Bestuursrechtspraak Raad van State [Administrative Jurisdiction Division of the Council of State (The Netherlands)], 2022). Previously, the Dutch gambling regulator *incorrectly* interpreted the law and has actively enforced existing gambling law to regulate the first type of loot boxes by sanctioning allegedly non-compliant companies (specifically, imposing a financial penalty on Electronic Arts for allegedly illegal loot box implementations in its *FIFA* games [*Electronic Arts Inc & Electronic Arts Swiss Sàrl v Kansspelautoriteit (2020) Rechtbank Den Haag [District Court of The Hague]*, 2020; Kansspelautoriteit [The Netherlands Gambling Authority], 2020]). This is unlike other countries (*e.g.*, the UK) whose regulators came to the same interpretation of their gambling laws but have not sought to take enforcement actions against potential contraventions. The present Dutch position is that the first type of loot box is confirmed to be generally lawful (Afdeling Bestuursrechtspraak Raad van State [Administrative Jurisdiction Division of the Council

of State (The Netherlands)], 2022). The Dutch Apple App Store would therefore likely be experiencing change to reflect that new regulatory position, which would render it inappropriate to study for answering the present research question. Even assuming that the regulatory change did not take place, it would not have been appropriate to study the Netherlands because the previously enforced Dutch regulation focused on the presence of the ability for players to transfer loot box rewards to other players in exchange for real-world money (Cerulli-Harms et al., 2020; Xiao, 2021b, 2022b). A previous loot box prevalence study attempted to assess the presence and prevalence of this so-called 'cashing out' process: however, Zendle *et al.* (2020) importantly failed to reliably do so, possibly due to video game companies actively preventing this from happening such that the availability of third-party cashing out platforms is extremely transient. Even if the presence of cashing out features could have been reliably assessed, the previous Dutch regulatory position meant that only a reduction in the prevalence of 'cashing out' features would have been observable and that a reduction in paid loot box prevalence was not necessarily observable and, indeed, highly unlikely to have been true because the removal of paid loot boxes was not legally required. This is contrasted with Belgium, where a reduction in paid loot box prevalence should be observable as an outright removal of the feature is required to comply with the law, as compared to only amendments to a certain aspect of some loot boxes' implementation that Dutch law previously required. This is demonstrated by how the same video game company removed paid loot boxes entirely from a game in Belgium (2K Games, 2018a), but did not remove paid loot boxes from the same game in the Netherlands and only changed them such that cashing out is no longer possible (2K Games, 2018b).

Therefore, a survey replicating the methodology of previous loot box prevalence studies (Zendle et al., 2020; Xiao, Henderson, Yang, & Newall, 2021; Xiao, Henderson, & Newall, 2021) was conducted in Belgium to assess: (i) the effectiveness of the Belgian Gaming Commission's threat to criminally prosecute video game companies for implementing paid loot boxes without a gambling licence (*i.e.*, the Belgian 'ban') (Belgische Kansspelcommissie [Belgian Gaming Commission], 2018b) and (ii) whether the loot box prevalence rate in Belgium is consequently lower than in other Western countries where no loot box regulation has been enforced, *e.g.*, the UK. Doing so sheds light on whether the Belgian ban has effectively changed video gaming companies' behaviour. In addition, potential circumventions of the Belgian ban on paid loot boxes were attempted: specifically, the UK version of certain games that are known to contain paid loot boxes was downloaded and loot box purchasing using those games within geographical and jurisdictional Belgium was attempted.

The following research questions were addressed.

> Research Question 1: Has the Belgian ban succeeded in eliminating paid loot boxes from mobile games?
> Research Question 2: Has the Belgian ban on paid loot boxes been effective?

Research Question 3: Is it possible for a player to circumvent the Belgian ban on paid loot boxes and purchase them from within the country?

Because loot boxes have been effectively banned by the Belgian Gaming Commission's public pronouncement of its interpretation of Belgian gambling law (Belgische Kansspelcommissie [Belgian Gaming Commission], 2018b), no loot boxes should be found amongst video games available in Belgium:

Hypothesis 1: None of the 100 highest-grossing iPhone games in Belgium will contain paid loot boxes.
Hypothesis 2: None of the games within the 100 highest-grossing iPhone games in Belgium that received an Apple Age Rating of 4+, 9+, or 12+ (*i.e.*, *not* 17+) will contain paid loot boxes.

Notably, the results of Hypothesis 1 cannot be conclusive proof that any of those games that were found to contain paid loot boxes infringed Belgian gambling law and were operating illegally, because the companies operating those games might possess a gambling licence granted by the Belgian Gaming Commission. The list of games and their operating companies was sent to the Belgian Gaming Commission to request that the Commission confirm whether any of those companies were duly licensed. Permission to publish the Commission's response, if any is received, was sought and, it was planned for a summary to be made available at the data deposit link (https://doi.org/10.17605/OSF.IO/7KJS9). However, departing from the registered study protocol, the Commission's response is instead described in the Results section. Hypothesis 2 is included in case the Commission did not respond (although it in fact did): the offering of gambling services to young people under the age of 18 or 21 is illegal depending on the type of gambling, per Article 54 of the Belgian Gambling Act of 7 May 1999. Therefore, the offering of paid loot boxes in any game that is rated to be suitable for children aged 4+, 9+ and 12+ (*i.e.*, not rated 17+) should be illegal and a stronger case of suspected criminality can be put against any such games found to contain paid loot boxes.

Assuming that the Belgian ban on loot boxes has been effective to some perceivable degree, then the availability of loot boxes in Belgium should be lower than previously observed in other countries that have not actively regulated this mechanic (*e.g.*, the UK):

Hypothesis 3: Of the highest-grossing iPhone games, fewer will contain paid loot boxes in Belgium than in countries that have not banned loot boxes.

The 100 highest-grossing games were chosen to form the sample for Hypotheses 1–3, following the methodology of previous studies (Zendle et al., 2020; Xiao, Henderson, Yang, & Newall, 2021; Xiao, Henderson, & Newall, 2021), because these are the most popular games that generate the most amount of revenue for video game companies. Globally, the 100 highest-grossing mobile games reportedly accounted for 53.5% of all player spending on those platforms in 2020 (Chapple, 2021). Generally, players are most likely to encounter and engage with these games, and the

Belgian Gaming Commission should be most heavily scrutinising these games when undertaking compliance actions. Relevant stakeholders, including players, parents and regulators, would be most interested in the compliance situation amongst these best commercially performing games. Previous studies have noted that the highest-grossing games should be the most compliant and therefore do not necessarily reflect the compliance situation with lower grossing games (and this limitation is recognised in the Discussion section); however, the 100 highest-grossing games do represent the most objective and reasonably practicable sample (Xiao, Henderson, & Newall, 2021; Xiao, Henderson, Yang, & Newall, 2021). For Hypothesis 3 in particular, a sample size of 100 games allowed for the present study to be directly comparable to the Zendle *et al.* (2020), the Xiao, Henderson, Yang, & Newall (2021), and the Xiao, Henderson, & Newall (2021) samples of the 100 highest-grossing iPhone games and remove any potential biases that might arise from choosing a differently justified and constituted sample of a potentially different size.

For the Belgian ban on loot boxes to be deemed fully effective, it must not only reduce loot box availability through the usual domestic channel of downloading iPhone games from the *Belgian* Apple App Store but also prevent potential technical circumventions (*e.g.*, downloading the games from the UK Apple App Store from within Belgium and purchasing loot boxes in that version of the game). Preventing such circumventions appears technically difficult and is therefore unlikely to have been accomplished:

Hypothesis 4: UK iPhone games known to contain paid loot boxes will continue to offer them for sale even when the phone is within geographical and jurisdictional Belgium.

The contribution from the present study also has wider implications for other regulatory domains because it empirically examines and assesses companies' compliance with criminal law, specifically in relation to the challenging regulation of novel technologies and new media: have companies changed their corporate behaviours because of a specific legal development? Such an exercise is nearly impossible to do objectively in most other contexts. However, the highest-grossing list of video games provides for an impartial way to assess compliance with gambling law amongst the best commercially performing companies that would be far more difficult, if not impossible, to do in relation to, *e.g.*, physical, traditional gambling venues or online (including cryptocurrency) gambling websites (whose relative popularity and financial performance are more difficult to measure and compare).

2. Method

Replicating the established methodology of Xiao, Henderson, Yang, & Newall (2021) and aiming to collect data from a relatively diverse range of video games, the 100 highest-grossing iPhone games on the Belgian Apple App Store on 28 May 2022 as reported by App Annie (since rebranded to data.ai), an authoritative independent analytics company, were selected to form the sample. If a game on

the captured list was (i) no longer available for download by the data collection period or (ii) a duplicate of a higher-ranked game whose data was already collected (two exclusion criteria applied in Xiao, Henderson, Yang, & Newall (2021)), then it would have been excluded from the sample and replaced with the next highest-ranking game, *e.g.*, the 101th highest-grossing game in the first instance. In total, 100 games were coded.

The Country/Region setting of the Apple ID that was used on the coder's iPhone was set to Belgium to ensure that the Apple App Store that loads is the Belgian Apple App Store. This guarantees that the game that was downloaded from then on was the Belgian version of the game specifically uploaded to and made available on the Belgian Apple App Store (regardless of whether or not the video game company actually made it different from the version(s) uploaded to other country's Apple App Stores). In addition, the coder physically travelled to Belgium to ensure that he was within the Belgian geographical and legal jurisdiction when conducting the data collection. This was preferable to, for example, using a VPN (Virtual Private Network) to spoof the coder's IP (Internet Protocol) address to be in Belgium even though the coder has remained physically in a non-Belgian jurisdiction, because such a coder would technically not be under the jurisdiction of Belgian gambling law (as he is not physically within the country), even if he is playing the Belgian version of the game downloaded from the Belgian Apple App Store.

The following variables were measured:

Apple age rating

This variable was coded using the relevant age rating information displayed on the game's Belgian Apple App Store page.

Presence of paid loot boxes

A 'paid loot box' was defined as being either an Embedded-Isolated random reward mechanism (which is a video game mechanic that players must pay real-world money to activate and which provides randomised rewards that do *not* possess direct real-world monetary value) or an Embedded-Embedded random reward mechanism (whose activation also must be paid for by players with real-world money but which *does* provide randomised rewards that possess direct real-world monetary value), as defined by Nielsen & Grabarczyk (2019). An amendment must be made to the methodology of Xiao, Henderson, Yang, & Newall (2021), which assessed this variable based firstly on 40 minutes of gameplay and, if no such mechanic was found within that time, then based on up to 2 hours of internet browsing of video streams and screenshots. This is because it is not possible to rely upon internet browsing at all for the present study as the coder cannot know whether the video streams or the screenshots that he observes were captured from a Belgian version of the game. Only by playing a Belgian version of the game can the coder be confident that he is coding the correct, national version of the game that was possibly amended to comply with the law. Therefore, to avoid

video streams and screenshots of non-Belgian versions of the games from biasing the results, the coder spent up to an hour playing the video game instead. If a paid loot box cannot be identified within that timeframe, then the game was coded as not containing paid loot boxes.

This design decision may cause the Belgian loot box prevalence rate that was found by the present study to be lower than the true value. However, this is unavoidable and justifiable. Firstly, the present study is more concerned with finding a non-zero value rather than the true value: the presence of paid loot boxes in even one high-grossing game severely challenges the effectiveness of the Belgian ban. Secondly, in the most recent loot box prevalence research of Xiao, Henderson, & Newall (2021), of the 77 games amongst the 100 highest-grossing UK games that were found to contain loot boxes, 73 games' loot boxes were identified through gameplay (94.8%), whilst only 4 games' were determined through internet browsing (5.2%), so the potential bias caused by coding games that must be coded through internet browsing as not containing loot boxes would be very minor (Xiao, Henderson, & Newall, 2021). Thirdly, it was always potentially possible for a game to have been thusly inaccurately coded as not containing paid loot boxes even when it did because the coder could always have been unable to identify such a mechanic even during the combined 40 minutes of gameplay and 2 hours of internet browsing. This was accepted as a justifiable inaccuracy because this meant that a new player engaging with the game (whose experience the previous literature attempted to replicate [Xiao, Henderson, & Newall, 2021; Xiao, Henderson, Yang, & Newall, 2021]) would highly likely have not encountered a paid loot box either. Fourthly, this approach is also 'fairer' towards the video game industry in the sense that if games whose paid loot box presence could not be determined would instead be excluded from the sample and replaced with the next highest-grossing game until a game whose loot boxes could be found is assessed, then the loot box prevalence rate would be artificially inflated to be higher than the true value.

Further, if a so-called 'sand box' game, such as *Minecraft* (Mojang, 2011) or *Roblox* (Roblox Corporation, 2012), that contains a significant amount of third-party user-generated content was included in the sample, then that game was assumed by the coder to contain paid loot boxes without the need for the coder to identify and screenshot such a mechanic (because choosing to base the coding on which specific third-party content would be subjective). However, the game was deemed compliant with the law and coded as not containing paid loot boxes if an official online post can be found where the developer or publisher of that game specifically states that user-generated content that is paid loot boxes should not be offered in Belgium, similar, for example, to the guidelines requiring loot box probability disclosures that Roblox Corporation (2019) published.

Finally, it is noted that the coder only accessed and screenshotted the loot box purchase screen and the Apple App Store payment pop-up screen for the paid loot box. The coder did not go through with the transaction by paying real-world money in exchange for paid loot boxes and

confirm that the sale would indeed process. This is because doing so would be illegal under Belgian gambling law. Article 4(2) of the Belgian Gambling Act of 7 May 1999 states that: 'It is prohibited for anyone to participate in a game of chance … when the person involved knows that it concerns the operation of a game of chance or a gaming establishment which is not licensed in accordance with this Act.' The coder, being an academic researcher of loot box regulation, possessed the knowledge that the relevant video game company likely did not have a gambling licence and therefore would arguably have been committing a crime if he completed the loot box purchasing transaction.

Date and time of data collection

The date and time, based on Central European Summer Time (or Central European Time, depending on which was used by Belgium at the data collection period), on and at which paid loot boxes were searched for was recorded.

Two previous studies, whose methodology the present study is replicating, calculated for inter-rater reliability by dual-coding 15.0% of the sample (Xiao, Henderson, & Newall, 2021; Xiao, Henderson, Yang, & Newall, 2021). The methodology has therefore been previously refined and been found to be reliable (near-perfect or perfect agreement was achieved). Therefore, the present study did not calculate for inter-rater reliability. The raw data and a full library of screenshots showing, *inter alia*, the Apple App Store age rating and in-game loot box purchase pages for each game is available via https://doi.org/10.17605/OSF.IO/7KJS9 for public scrutiny.

An alpha level of .05 was used for all statistical tests.

Hypothesis 1 would have been accepted had zero, one, or two of the 100 highest-grossing games that were coded contained paid loot boxes.

Hypothesis 2 would have been accepted had zero, one, or two of the games, within the 100 highest-grossing games that were coded, that received an Apple Age Rating of 4+, 9+, or 12+ (*i.e.*, *not* 17+) contained paid loot boxes.

A Belgian loot box prevalence rate of 0.0% should be found amongst all games studied and amongst those games studied that were deemed suitable for underage players. However, considering that one previous loot box prevalence study identified an 1.0% false positive rate through its data collection process (Zendle et al., 2020), to provide for type 1 error control, Hypotheses 1 and 2 would have been accepted even had up to two Belgian games studied are identified as containing paid loot boxes (*i.e.*, a prevalence rate of up to 2.0% would have been deemed as effective elimination of loot boxes from the Belgian market). Considering that some video games might contain loot boxes which are duly licensed by the Belgian Gaming Commission (whose confirmation was sought by the present study, as explained below), any games that were so licensed would have been excluded from the sample for the purposes disconfirming Hypotheses 1 and 2.

Hypothesis 3 was tested using a binomial test (two-sided test) to identify whether the percentage of the 100 highest-grossing iPhone games containing loot boxes in Belgium that was found by the present study was significantly different from a hypothetical loot box prevalence rate of 65.0%, which a Western country that has not restricted loot box sales is assumed to have.

The hypothetical 65.0% figure is derived from a holistic consideration of historical loot box prevalence rates in other countries found by the prior literature. Zendle *et al.* (2020) found the UK iPhone loot box prevalence rate amongst the 100 highest-grossing games in February 2019 to be 59.0% (Zendle et al., 2020); Rockloff *et al.* (2020) found the Australia loot box prevalence rate amongst the 82 'best selling' games on various platforms (*e.g.*, PC, console, and mobile) between August and October 2019 to be 62.0% (Rockloff et al., 2020); Xiao, Henderson, Yang, & Newall (2021) found the Chinese iPhone loot box prevalence rate amongst the 100 highest-grossing games in June 2020 to be 91.0% (Xiao, Henderson, Yang, & Newall, 2021); and Xiao, Henderson, & Newall (2021) found the UK iPhone loot box prevalence rate amongst the 100 highest-grossing games in June 2021 to be 77.0% (Xiao, Henderson, & Newall, 2021). The comparatively high Chinese 91.0% prevalence rate appears to be an outlier that has been influenced by Far East Asian cultural factors that would not affect a hypothetical Western country that has not regulated paid loot boxes; therefore, little reliance is placed on that datum. The Rockloff *et al.* Australian 62.0% is derived from games on various consoles, whilst it is known that games on mobile platforms (*e.g.*, the iPhone platform which the present study assessed) tend to contain more loot boxes (Zendle et al., 2020); therefore, the 62.0% value might not reflect the contemporaneous Australian loot box prevalence rate amongst mobile games specifically, which likely would have been higher. A comparison of Zendle *et al.* (2020)'s 2019 UK data with Xiao, Henderson, & Newall's 2021 UK data suggest that the loot box prevalence rate have increased due to a variety of reasons, including that the 2019 59.0% datum might have been an underestimation, due to certain paid loot box implementations not having been recorded (Xiao, Henderson, & Newall, 2022). Xiao, Henderson, & Newall's 2021 77.0% figure is the closest comparator for the present study, in terms of data collection time; however, in context, it is comparatively higher than other values previously observed in Western countries. Accordingly, a hypothetical value of 65.0%, which is slightly higher than the previously observed Zendle et al. UK 59.0% and Rockloff et al. Australian 62.0% values (which were likely slight underestimations), but which is lower than the comparatively high Xiao, Henderson, & Newall. UK 77.0% value, was used. This 65.0% value errs on the side of caution and avoid potentially overestimating the reduction effect of the Belgian ban, although unavoidably it is possible that the effect might consequently be underestimated.

In the absence of any prior guidance on what effect size would constitute a 'legally meaningful' and 'socially beneficial' regulatory measure, a smallest effect size of interest of Hedges' $g = -.15$ is proposed based on the potential usefulness of the results to the end users (Dienes, 2021). The intended end users would be the policymakers in other countries who might be considering taking the same regulatory action that Belgium has already taken: importantly, besides

the Belgian Gaming Commission having issued its interpretation of Belgian gambling law and thereby threatened criminal prosecution of non-compliant companies implementing paid loot boxes, little else appears to have been done by the Belgian Gaming Commission in terms of enforcement; therefore, thus far, the costs that have been incurred by Belgium in its attempt to regulate loot boxes have been relatively low. Accordingly, realistic policymakers seeking to expend a similarly low amount of resources to regulate loot boxes would likely not expect a particularly high reduction to loot box prevalence in Belgium (*e.g.*, for the loot box prevalence rate to be reduced by at least 50 percentage points, *i.e.*, to 15.0% or lower). Nonetheless, these policymakers would likely still expect some perceivable reduction (*e.g.*, for the loot box prevalence rate to be reduced by at least 10 percentage points, *i.e.*, to 55.0% or lower) before being persuaded to emulate the Belgian ban, considering that some regulatory costs have been incurred by Belgium and that Belgian consumers have been given the (potentially incorrect) impression that loot boxes have been effectively eliminated from the market. Recognising that some policymakers might be more hesitant to restrict players' freedom to purchase loot boxes and video game companies' commercial interests and therefore be more cautious when relying on the results (*e.g.*, they might view a reduction of 10 percentage points or less as being insufficiently persuasive), it is proposed, conservatively, that the vast majority of policymakers would likely consider a reduction of at least 15 percentage points (*i.e.*, for the loot box prevalence rate to be 50.0% or lower) as demonstrating the effectiveness of Belgium's loot box ban (as implemented in its relatively low-cost manner) and be persuaded to potentially emulate the Belgian regulatory actions in their own countries. Accordingly, setting the Hedges' g at $-.15$, a priori power analysis using G*Power has determined, given an α value of .05: the present sample of 100 games would achieve .86 power in a two-sided test for finding a statistically significant difference between the Belgian and the hypothetical 65.0% prevalence rates (see Figure S1) (Buchner et al., 2020).

As to interpretation, had the Belgian value been significantly lower than 65.0%, then Hypothesis 3 would have been accepted and the present study would have concluded that it is *possible* that the Belgian 'ban' may have been effective at reducing paid loot box prevalence in Belgium and that this measure could be considered for adoption in other countries, although it must also be recognised that national differences between Belgium and the previously assessed Western countries (*i.e.*, the UK and Australia), and the passage of time between the data collection points, may also have contributed to the results. The present study would have then recommended other countries' policymakers and regulators to consider adopting a similar measure if they desire to reduce paid loot box prevalence rates in their country: how strongly this recommendation would have been put by the present study in the Discussion section would have depended on the Belgian loot box prevalence rate that would have been identified (a reduction to below 50.0% would have been deemed as effective, whilst a

reduction to below 25.0% would have been deemed as very effective). In contrast, had the Belgian value been significantly higher than 65.0%, then Hypothesis 3 would have been rejected and the present study would have concluded that the Belgian ban has been ineffective, noting the same abovementioned limitations. The present study would have then cautioned against other countries' policymakers and regulators from making the assumption that a loot box ban will necessarily be effective, and concluded that the Belgian measure should not be adopted by other countries unless effective enforcement can be guaranteed or some other improvements are made. Further, reasoned criticism of the apparent lack of enforcement actions by the Belgian Gaming Commission would also have been made. However, had no significant difference been found, then the present study would have stated that no sufficient evidence that the Belgian ban affected paid loot box prevalence in Belgium has been found, thus Hypothesis 3 can be neither confirmed nor disconfirmed. Alternative research methodologies for future studies would have been discussed.

For Hypothesis 4, firstly, the coder arrived in geographical and jurisdictional Belgium with an iPhone pre-installed with UK versions of the following three popular and high-grossing games (known to contain paid loot boxes in the UK) that reflect operating companies from various regions of the world: *Hearthstone* by the US company Blizzard Entertainment, *Brawl Stars* by the European, Finnish company Supercell Oy, and *Genshin Impact* by the Chinese company miHoYo Co., Ltd.. The sample size was limited to three highly popular games due to practical constraints on research resources. These three popular games were chosen because they have been widely published across the world (including in both the UK and China) and have consistently performed well financially. Importantly, engagement with loot boxes is a fundamental and arguably unavoidable and inalienable aspect of all three games' gameplay and monetisation because the vast majority of in-game content (*e.g.*, playable characters) *requires* engagement with loot boxes to unlock (at least in the UK version of the games). These three games also represent how companies from three different regions of the world might have taken technological steps to comply with Belgian law and prevent potential circumvention. In the unlikely event that any of these three games becomes unavailable for download and online gameplay (*e.g.*, removed from the Apple App Store), another popular game developed by a company from the same region as the unavailable game; known to contain paid loot boxes in the UK; and in which paid loot boxes represent a fundamental aspect of the game's gameplay and monetisation would be chosen to replace that game. With the Country/Region setting of the Apple ID initially set to the UK, the coder then attempted to access the paid loot box purchase screen and the Apple App Store payment pop-up screen and record their experience from within Belgium. Then, the Country/Region setting of the Apple ID was changed from the UK to Belgium, and the coding process was repeated. Thusly, the two potential possibilities of setting the phone's geographic location to either Belgium or a non-Belgian country were tested. Subsequently, the three games

were deleted from the iPhone. Secondly, whilst within geographical and jurisdictional Belgium, the coder changed the Country/Region setting of the Apple ID to the UK and attempt to access the UK Apple App Store to download the UK versions of those three games within Belgium. Then, the coder attempted to access the paid loot box purchase screen and the Apple App Store payment pop-up screen and record their experience again. Therefore, two potential ways to circumvent the Belgian ban were tested: firstly, by bringing non-Belgian version of the games into the country and using them to purchase loot boxes, and, secondly, by downloading non-Belgian version of the games from within Belgium and using them to purchase loot boxes. Hypothesis 4 would have been accepted, had loot box purchase been possible within one or more of the games using any of the abovementioned methods. The interpretation would have been that the law can be easily circumvented by dedicated players; the Belgian Gaming Commission should therefore consider ways to force video game companies to better enforce compliance with the law. However, had loot box purchase been not possible within one or more of the games using any of the abovementioned methods, then the interpretation would have been that the law could not be circumvented in the simple ways that have been attempted, although other potential circumventions remain untested and possible. The present study would have concluded that companies might have taken *some* technological measures to prevent circumventions of the Belgian ban, although further evidence would be required to confirm this (*e.g.*, contacting the relevant company to request for confirmation of the compliance actions that have been taken).

In accordance with the *Danish Code of Conduct for Research Integrity* (Ministry of Higher Education and Science (Denmark), 2014), as adopted by the IT University of Copenhagen, the present study did not require research ethics assessment and approval because no human participants or personal data were involved and only publicly available information was examined and recorded.

3. Results

Statistical analysis was conducted using Stata, version 15.1, except for the 95% confidence intervals, which were calculated using R, version 4.2.1.

3.1. Confirmatory analysis

3.1.1. Paid loot box prevalence in Belgium and effectiveness of the 'ban'

Of the 100 highest-grossing Belgian iPhone games on 28 May 2021, 82 games contained loot boxes (82.0%). Their Apple App Store age ratings are summarised in Table 1.

Game 36 (*The Lord of the Rings: War* (NetEase, 2021)) could no longer be downloaded by the time of data collection and was therefore replaced with the next highest-grossing game, Game 101 (*Bingo Frenzy-Live Bingo Games* (Gluon Interactive, 2020)), as preregistered. Further discussion of how the commencement of the present study may

**Table 1. Apple App Store age rating of games containing loot boxes (cumulative; *N*= 100)**

Apple App Store Age Rating	Total number of games (cumulative)	Number of games that contain loot boxes (cumulative)	Percentage containing loot boxes [95% CI]
4+	24	13	54.2% [34.3%, 74.1%]
9+	42	29	69.0% [55.0%, 83.0%]
12+	86	69	80.2% [71.8%, 88.6%]
17+	100	82	82.0% [74.5%, 89.5%]

have caused the removal of Game 36 is set out in Appendix 3.

Game 8 (*Roblox*) was duly coded as containing loot boxes as preregistered because, although loot boxes were not encountered through gameplay, it is known that loot boxes are implemented by third parties as user-generated content in this game and the developer and publisher of Roblox did not explicitly require that such user-generated loot boxes be blocked from purchase in Belgium.

Game 50 (*Governor of Poker 3 – Friends* (Youda Games & Azerion, 2016)) and Game 78 (*DRAGON BALL Z DOKKAN BATTLE* (Akatsuki & Bandai Namco Entertainment, 2015)) implemented Isolated-Isolated random reward mechanisms, as defined by Nielsen & Grabarczyk (2019), that provided randomised rewards, but the player did not have to pay real-world money to engage with them. These mechanics would have been capable of constituting a paid loot box (specifically, an Embedded-Isolated random rewards mechanism); however, both games took technical measures to prevent loot box purchase from within Belgium using real-world money. Specifically, the coder was prevented from spending real-world money to purchase the 'premium' virtual currency that would then be used to purchase loot boxes. The Apple App Store payment pop-up screen was rendered inaccessible. In Game 50, a pop-up window appeared indicating that 'Buying virtual items is no longer possible in Belgium,' as shown in Figure 1. In Game 78, the in-game shop simply did not display any premium currency as being purchasable without providing any explanation, as shown in the left pane of Figure 2. These two games were therefore compliant with Belgian law (due to the inability of the coder to purchase loot boxes using real-world money) and accordingly coded as not containing paid loot boxes. Exploratory analysis was conducted to attempt to circumvent the technical measures implemented in both games, as detailed below.

Hypothesis 1 was rejected because 82 (which is more than two) of the 100 highest-grossing Belgian iPhone games contained paid loot boxes.
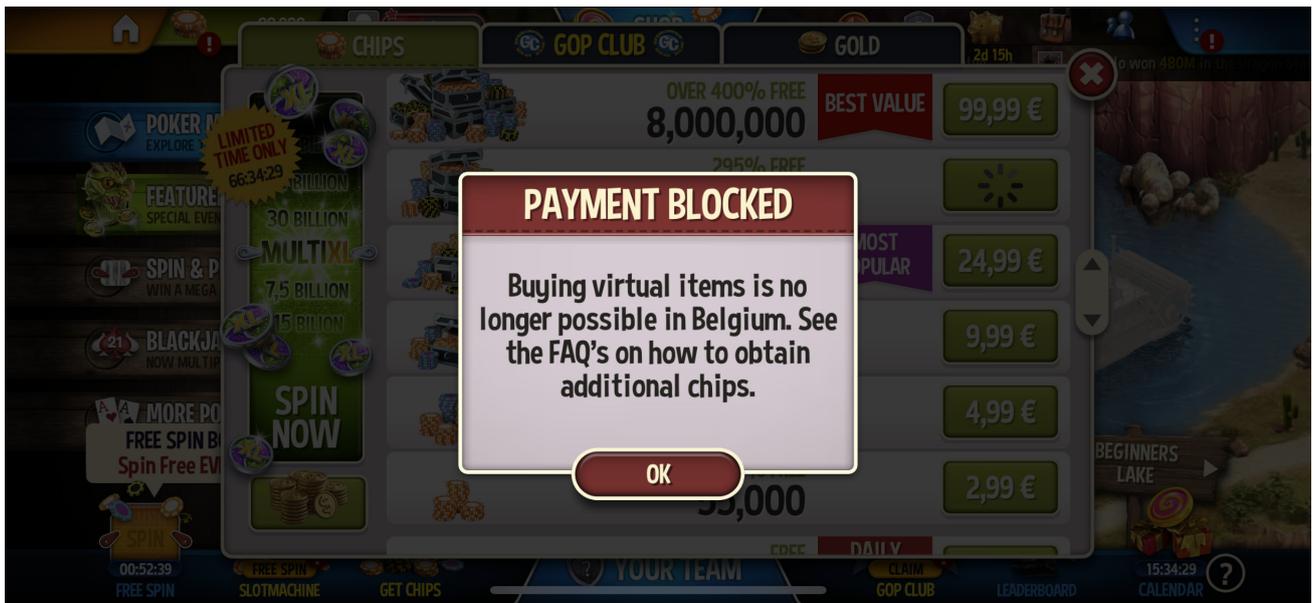
Figure 1. **A pop-up window appeared to prevent any in-game purchase in Game 50 (*Governor of Poker 3 – Friends*) when this was attempted in geographical and jurisdictional Belgium without attempting any circumvention.**

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Hypothesis 2 was rejected because 69 (which is more than two) of the 86 highest-grossing Belgian iPhone games that received an Apple Age Rating of 4+, 9+, or 12+ (*i.e.*, *not* 17+) contained paid loot boxes.

In response to the author asking for the Belgian Gaming Commission to confirm whether any of the games found to contain loot boxes were duly licensed in an email dated 20 June 2022, the Commission did not provide a written response to that inquiry (and therefore none could be made available at the data deposit link as stated in the registered protocol). Instead, the Commission met with the author on 24 June 2022 and stated that this could be manually checked by the author and referred the author to public resources provided by the Belgian Gaming Commission (specifically, an exhaustive list of companies that are licensed to provide gambling services in Belgium [Belgische Kansspelcommissie [Belgian Gaming Commission], 2022b]). Using that list, it was determined that none of the 82 games found to be offering loot boxes for sale in Belgium (0.0%) were duly licensed. *Identity V*, the game operated by the same company as the removed Game 36 (discussed below), was also not licensed. Indeed, under the current gambling law regulatory regime in Belgium, the Belgian Gaming Commission is not legally empowered to be able to approve and license the provision of loot boxes or any randomised monetisation methods in video games as gambling (given that these cannot fit under any recognised licence categories), so no video game company can even apply for a licence, let alone successfully obtain one. The Belgian Gaming Commission has confirmed this legal point in the same meeting with the author on 24 June 2022.

Hypothesis 3 was rejected using a binomial test (two-sided test), which revealed that the Belgian loot box prevalence rate of 82.0% was significantly higher ($p < .001$) than the hypothetical 65.0% prevalence rate.

3.1.2. Potential circumvention of the ban

Hypothesis 4 was accepted because all three preregistered potential circumventions of the Belgian ban in the three examined games were successful. Pre-downloaded UK versions of the games worked without any hindrance and allowed loot box purchase within geographical and jurisdictional Belgium, regardless of the Apple ID's Country/Region settings being set to the UK or Belgium. The coder was also able to download the UK versions of the games from within Belgium and access the in-game loot box purchase pages and Apple App Store payment pop-up screens.

3.2. Exploratory analysis

3.2.1. Another game operated by the same operator as the removed Game 36

NetEase, the company operating Game 36, also operated another relatively popular game, *Identity V* (NetEase, 2018), that was not within the highest-grossing list studied. *Identity V* was known to contain loot boxes in the UK and in China but has not been removed from any countries' Apple App Store as of 7 June 2022. Exploratory analysis revealed that the Belgian version of *Identity V* continued to contain paid loot boxes in Belgium.

3.2.2. Excluding simulated casino games from the analysis for Hypothesis 3

In relation to Hypothesis 3, to err on the side of caution, an exploratory test was conducted to address the potential concern that the considerable prevalence of 'social casino games' or 'simulated casino games' (which are video games in which 'players can spend real-world money to buy more stakes to continue participating in simulated gambling'

Figure 2. Left pane: The premium currency used to purchase loot boxes did not appear in the in-game shop and could not be bought using real-world money in Game 78 (*DRAGON BALL Z DOKKAN BATTLE*) when the coder was physically in geographical and jurisdictional Belgium with a Belgian IP (Internet Protocol) address. Right pane: The premium currency appeared in the in-game shop and became purchasable when a Japanese VPN (virtual private network) was used to spoof the coder's IP address to be non-Belgian.

[Xiao, Henderson, & Newall, 2022]) amongst the sample may have overly exaggerated the prevalence of 'loot boxes' (widely defined) in Belgium. The Belgian Gaming Commission has confirmed in the same meeting with the author on 24 June 2022 that it does recognise the randomised monetisation methods in 'simulated casino games' as legally constituting 'gambling' (*i.e.*, there is *no* distinction between the two concepts in Belgium in contrast to in most other countries where the two are treated differently in law as 'simulated casino games' are not seen as gambling and not recognised as legally constituting 'gambling' elsewhere). However, there is debate within the academic literature as to whether 'simulated casino games' should, by definition, be deemed as 'containing loot boxes' or an Embedded-Isolated random reward mechanism (Xiao, Henderson, & Newall, 2022; cf. Zendle et al., 2022). The coder deemed 15 of the 100 games to be 'simulated casino games' (15.0%). This was defined as any games that allowed the player to spend real-world money to participate in simulated traditional gambling activities, *i.e.*, 'games of chance' or 'mixed games of chance and skill,' such as slot machines, poker,

bingo, belote, and craps. Particular attention is drawn to Game 77 (*UNO!*™ (Mattel163, 2018)), which was coded as a simulated casino game because it involved players competing against each other to win or lose premium virtual currency (similarly to simulated casino games involving poker) whilst playing a simulated version of the tabletop game *UNO* (Robbins, 1971), which itself is a mixed game of chance and skill that has reportedly been played physically as a form of gambling (Awtaney, 2012). Amongst the other 85 non-'simulated casino games,' 68 contained loot boxes (80.0%; 95% CI: [71.5%, 88.5%]). A binomial test (two-sided test) revealed that the Belgian loot box prevalence rate amongst non-'simulated casino games' of 80.0% was still significantly higher (p = .003) than the hypothetical 65.0% prevalence rate. For clarity, this 80.0% prevalence rate is not comparable to the 59.0% derived from Zendle *et al.* (2020)'s UK data collected in 2019 because in that study simulated casino games were generally coded as not containing loot boxes (Xiao, Henderson, & Newall, 2022; cf. Zendle et al., 2022), whilst this exploratory analysis instead excluded simulated casino games.

3.2.3. Circumvention of the removal of games from the Belgian market

One further potential circumvention was attempted successfully through exploratory analysis. The three games that were preregistered to be examined all continued to be available on the Belgian national Apple App Store. Some games (*e.g.*, *Fire Emblem Heroes* (Nintendo, 2017) and *Animal Crossing: Pocket Camp* (Nintendo, 2017)) were known to have been removed from the Belgian store entirely. It was not known whether such games could still be downloaded from within geographical and jurisdictional Belgium by setting the Apple ID's Country/Region settings to a country where those games remain available, *e.g.*, the UK. During the data collection period, Blizzard Entertainment decided not to publish *Diablo Immortal* (Blizzard Entertainment & NetEase, 2022) in Belgium and the Netherlands, citing 'the current operating environment for games in those countries,' (Phillips, 2022) which can reasonably be inferred to mean these two countries' loot box regulation (Partis, 2022).[2] The coder was indeed unable to find or download *Diablo Immortal* from the Belgian Apple App Store. However, the coder was able to do so by setting the Apple ID's Country/Region settings to the UK and downloading the game from the UK Apple App Store whilst within geographical and jurisdictional Belgium. The premium currency used to purchase the loot boxes implemented in *Diablo Immortal* was also purchasable using real-world money from within Belgium. This shows that any corporate actions to remove or not publish a certain game containing loot boxes in Belgium specifically can be easily circumvented if that game continues to be available on another country's Apple App Store.

3.2.4. Games that actively prevented loot box purchase

Of the 84 games that were potentially capable of selling loot boxes in exchange for real-world money (the 82 games containing paid loot boxes plus Games 50 and 78), only two games (2.4%) took technical measures to prevent loot box purchase with fiat currency.

Game 50 prevented *all* in-game purchases: cosmetic items that were entirely unrelated with any randomised monetisation methods were also not purchasable with real-world money. Attempts to make *any* in-game purchases in Game 50 failed. This state-of-affairs was illogical, because if all in-game purchases were blocked, then this game could not therefore gross *any* money at all and so surely should not be capable of being the 50th high-grossing game on the Belgian Apple App Store. The present study could not determine what exact technical measures were taken to block in-game purchase from within Belgium. However, two methods to circumvent the technical measures were attempted to make an educated guess. Firstly, using a VPN

from within Belgium to spoof one's IP address to be non-Belgian, and secondly, taking the Belgian version of the game outside of the country. Whilst within geographical and jurisdictional Belgium, Proton VPN was used to change the coder's IP address to Japan. Purchases for the premium currency were then attempted on the same Belgian Apple ID and user account, and these were not blocked (as the pop-up window shown in Figure 1 did not appear) and were instead allowed to advance to the Apple App Store payment pop-up screen. Turning off the VPN promptly made virtual items unpurchasable again. Secondly, the phone containing the Belgian version of the game and with Belgian Apple App Store settings was physically brought outside of geographical and jurisdictional Belgium. When the coder was in Warsaw, Poland, in-game purchasing was possible, similarly to when a VPN was turned on. Game 50 did not ask for, and did not have, permission to access the coder's phone's geographical location. Therefore, it is likely that the technical measure that has been taken was a simple IP address check to confirm whether the player is within Belgium. This block on in-game purchase being easily circumventable may partially explain why Game 50 still managed to gross money through the Belgian Apple App Store, despite Belgian players being (in theory) prevented from purchasing anything. The fact that Game 50 remains a high-grossing game suggests that a considerable number of Belgian players are likely circumventing this technical measure. Regardless of its imperfect efficacy, Game 50 should still be commended for at least attempting to implement a technical block on loot box purchase from within Belgium because it might have successfully prevented some players from spending money: analysing user reviews of the game, which is beyond the ambit of the present study, may shed further light on that point. Turning on a Japanese VPN and being physically in Poland similarly allowed the coder to purchase the premium currency required to buy loot boxes in Game 78, as shown in the right pane of Figure 2.

Immediately prior to the coder's physical departure from geographical and jurisdictional Belgium on 2 July 2022, in-game purchasing was attempted again in both Games 50 and 78 whilst at Brussels International Airport. For reasons unknown, in-game purchase was possible in Game 50 temporarily without any attempted circumventions (*e.g.*, no VPN was switched on). The pop-up window shown in Figure 1 did not appear, and the coder was able to access the Apple App Store payment pop-up screen. Relevant screenshots are available at the data deposit link. This again demonstrates that the technical measures taken might fail at times. In-game purchasing was again rendered not possible in Game 50 when attempted 10 and 40 minutes after the initial successful attempt at Brussels International Airport. In-game purchasing remained not possible in Game 78 when no circumvention was attempted. Temporary failures of the technical measures, without the player intentionally trying to circumvent them, represent another potential rea-

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2 For the Dutch law position on loot boxes in video games, see Xiao & Declerck (2022).

son why these two games have continued to nonetheless generate revenue from Belgium.

3.2.5. Comparability with previous studies in other countries

Peer review comments of the present study's stage 1 registered report manuscript suggested that context should be provided as to how comparable the present results are to those of previous studies (Karhulahti et al., 2022). The 100 highest-grossing iPhone games in the UK on 28 May 2022 was compared with the Belgian list (including Game 36, which was, however, excluded from the present study's sample): 70 games (70.0%) appeared on both lists. Amongst the 50 highest-grossing games, the overlap of 42 games (84.0%) was even more apparent. This demonstrates that there is a substantial degree of similarity between the two countries' highest-grossing lists, and that the results from these two countries are reasonably comparable, if done with some caution. Additionally, the 50 highest-grossing list of Android games in Belgium on 21 June 2021 (Xiao, Henderson, & Newall (2021)'s UK data collection date) and the list on 28 May 2022 were compared: 35 games (70.0%) appeared on both lists. This further supports the direct comparison of the UK results of Xiao, Henderson, & Newall (2021) with that of the present study. Data for the Android platform was used because the relevant historical iPhone data were no longer accessible. Zendle *et al.* (2020) has previously found near identical loot box prevalence rates on the Android and iPhone markets in 2019. For reference, 70.0% of the 100 and 88.0% of the 50 highest-grossing games on the iPhone and Android platforms in Belgium overlapped on 28 May 2022.

4. Discussion
4.1. No reduction to Belgian loot box prevalence

As of mid-2022, 82.0% of the highest-grossing iPhone games in Belgium continued to sell loot boxes for real-world money and seemingly continued to heavily rely on such randomised mechanics to monetise and generate revenue. For the avoidance of doubt, in each of these 82 games, players were able to either directly spend real-world money, or indirectly spend premium currency that is purchasable using real-world money, to engage with a randomised monetisation method whose results are unknown at the point of purchase. The Belgian Gaming Commission has confirmed that 'loot boxes' as defined by the present study's Method section would legally be recognised as 'gambling' in Belgium according to the Commission's interpretation in a meeting with the author on 24 June 2022.

The Belgian 'ban' on loot boxes, as instituted by the Belgian Gaming Commission through the pronouncement of its interpretation of the law and its threat of criminal prosecution of non-compliant companies in April 2018 (Belgische Kansspelcommissie [Belgian Gaming Commission], 2018b), did not appear to have an effect on the prevalence of paid loot boxes four years after the event. Certain well-known companies have taken compliance actions by either removing the ability to purchase loot boxes with real-world

money from their games or removing their games (that rely on loot boxes to generate revenue) from the Belgian market entirely (2K Games, 2018a; Blizzard Entertainment, 2018; Electronic Arts, 2019; Nintendo, 2019). As recently as June 2022, Blizzard Entertainment actively complied with the ban by not publishing *Diablo Immortal* in Belgium (Phillips, 2022). However, these widely reported instances of compliance by well-known companies appear to be the exceptions rather than the rule. Other companies have had four years to comply with the law and evidently have yet to do so.

The mid-2022 Belgian loot box prevalence rate of 82.0% is numerically higher than the mid-2021 UK loot box prevalence rate of 77.0% (where no effective loot box regulation has been imposed or enforced) (Xiao, Henderson, & Newall, 2021). However, this could simply be due to loot boxes becoming increasingly more prevalent due to the passage of time, which is a general trend that has previously been observed amongst UK iPhone games (Xiao, Henderson, & Newall, 2022). Therefore, no point is taken in relation to this higher value in Belgium. It should *not* be suggested that loot box prevalence has somehow become higher due to, or despite, the ban. The present study provides evidence that the Belgian ban does not appear to have effectively *reduced* loot box prevalence.

In short, the Belgian 'ban,' as implemented, has not been effective at reducing the broad availability of opportunities to purchase loot boxes. The high loot box prevalence rate on the Belgian Apple App Store shows that loot boxes continue to be widely available and easily accessible to video game players, including children. Table 1 shows a trend that games are more likely to contain loot boxes as their age ratings increase; however, notably 54.2% of the games deemed suitable for children aged 4+ (the lowest available age rating) still contained loot boxes.

Importantly, although the ban may have caused some games containing loot boxes to be removed, those removed games' positions on the highest-grossing list appear to have simply been replaced by non-compliant games from other companies that continue to contain loot boxes. It is likely that some previous players of compliant games chose to 'migrate' to instead spending money on non-compliant games (although not all players would have done so). Compliant companies are making less or no revenue: assuming that the amount of money spent by players on video games did not change following the ban, the non-compliant companies have dishonestly taken a share of that revenue away from compliant companies by implementing illegal loot boxes. This represents the first negative consequence of this unenforced 'ban.' The (generally more well-known) companies that did comply with the law by removing or not publishing their games likely cared more about protecting their reputations and ensuring compliance with the law than lesser-known companies. It would seem that the since 'vacated' positions on the highest-grossing list were then replaced with games from more unscrupulous (or at least less well-resourced) companies that either actively decided not to comply with the law or were unaware of their legal responsibilities to comply with the ban. It is not unreasonable to suggest that the since re-

moved and unpublished games likely would have been more compliant with other legal requirements (*e.g.*, data protection law) and offered better consumer protection measures in relation to loot boxes than the non-compliant games currently do, for example, in terms of potentially making more prominent and accessible loot box probability disclosures (Xiao, Henderson, Yang, & Newall, 2021) and providing better customer service (*e.g.*, being more responsive to parents' refund requests for unpermitted spending by children). Whether more established video game companies (*e.g.*, those that have international legal, compliance, and localisation teams and are more heavily scrutinised by players, policymakers, and the press) might generally offer better consumer protection than smaller companies should be assessed by future research. In summary, contrary to improving the consumer protection provided to Belgian players as intended, the 'ban' might have had the unintended, opposite effect of creating a more dangerous environment for players. The market has shifted towards higher risk illegal providers. Crime must not pay; the law should never put companies in a position whereby breaking the law becomes more profitable than following it.

Other variables, such as the operators' country of origin, might also affect whether a company is more or less likely to comply: for example, it is worth noting that Game 50 (one of two games that took technical measures to prevent loot box purchase in Belgium) was developed and published by Youda Games and Azerion, both of which are based in Amsterdam, the Netherlands, a neighbouring country that shares close cultural and linguistic links with Belgium, and in which the potential illegality of loot boxes has been recently highlighted. These two Dutch companies might have more actively complied with the Belgian ban because they were more aware of the regulatory environment in Belgium. Note, however, that Game 78 (the other game that blocked loot box purchase in Belgium) was developed and published by Japanese companies, although the publisher, Bandai Namco Entertainment, is one of the largest multinational video game companies in the world in terms of revenue (Newzoo, 2022) and therefore likely was well-resourced and had a knowledgeable compliance team. It is worth noting here that maybe some (or even many) of the companies found to still be selling loot boxes in Belgium did not maliciously and knowingly chose not to comply with the law but simply lacked sufficient local awareness and resources to be aware of the ban. Follow-up research on the individual companies as to their compliance decisions (or lack of them) might prove fruitful at revealing what measures could be taken to ensure that they become better informed of, or better able to comply with, their legal responsibilities.

Finally, a previous study has also noted that the likelihood and effectiveness of the companies' compliance might also be affected by game 'genre' and the relative importance of loot boxes as a monetisation method when compared to other in-game microtransactions in a particular game (both financially and in relation to the 'core game loop' [Sicart, 2015] (*i.e.*, the essential sequence of actions that are repeated by the player over and over again to engage with

the game)) (Xiao, Henderson, & Newall, 2021). Player communities might expect more from, and exert more pressure on, certain games. Game 50 is a simulated casino game in which using the purchased premium currency to engage with simulated gambling activities (*i.e.*, the 'loot boxes') forms the core game loop. (As an aside, besides the fact that Game 50 is still grossing a significant amount of money from Belgium despite the technical block, one reason why the game remains available in the market and was not removed despite technically not being able to generate any revenue from Belgium is that this game is a multiplayer game. The non-paying Belgian players do provide something of value to the company: these players' presence and participation allow other paying players from other countries to compete against human players (rather than bots) and potentially have more 'fun'). Game 78 is a so-called 'gacha' game in which loot boxes are the principal monetisation method and the player's gameplay progression revolves around engaging with the loot box mechanic (Woods, 2022). Loot box mechanics are fundamental to these two games' designs, which might explain why the companies operating these two games were more mindful about complying with the Belgian ban. However, note also that many of the non-compliant games identified by the present study would also fall broadly within the definition of a simulated casino game or a gacha game.

4.2. A toothless 'ban' that is not really a 'ban' in practice

The Belgian 'ban' on loot boxes is not, at its essence, a true 'ban' of the product. The Belgian Gaming Commission did issue a report opining that loot boxes that require payment of real-world money to purchase constitute gambling and are illegal if offered without a gambling licence (Belgische Kansspelcommissie [Belgian Gaming Commission], 2018b). However, that report was issued only on the basis of the in-depth examination of four then-popular video games (Belgische Kansspelcommissie [Belgian Gaming Commission], 2018b, p. 18). The Belgian Gaming Commission has not reportedly taken any further action in relation to loot boxes since then, which means that the Belgian courts have not had the opportunity to confirm whether that interpretation is indeed valid. Contrast here with how the Dutch gambling regulator's previous interpretation of the law, which sought to outlaw certain implementations of loot boxes, has been applied in practice but has since been overruled by the Dutch court (Xiao & Declerck, 2022). The Dutch regulatory position on loot boxes is therefore certain. In contrast, the Belgian Gaming Commission's interpretation has neither been enforced nor challenged in court, which means that its correctness is uncertain, despite support by the academic legal literature (Cerulli-Harms et al., 2020; Xiao, 2021b, 2022b). Besides merely pronouncing its interpretation of the law and threatening criminal prosecution of non-compliant companies (Belgische Kansspelcommissie [Belgian Gaming Commission], 2018a), the Belgian Gaming Commission has not attempted to *actively* enforce that interpretation in practice by actually criminally prosecuting non-compliant companies for im-

plementing loot boxes or seeking to otherwise remove loot boxes from the national market. The Belgian Gaming Commission has only *passively* waited for companies to comply: a few did, but most did not. It is entirely unsurprising that merely stating that the sale of a product (in this case, loot boxes) is illegal under existing law, without also actively taking enforcement actions, did not lead to widespread compliance. Consider here, in contrast, how enforcement actions are actively taken by the police of many countries in relation to criminalised or otherwise controlled products and services. Indeed, the Belgian Gaming Commission does take active enforcement actions against websites offering more traditional forms of illegal gambling (*e.g.*, blackjack) by identifying them on a published list in addition to threatening a fine (Belgische Kansspelcommissie [Belgian Gaming Commission], 2022a, 2022c). Loot boxes, however, were not subjected to similar enforcement actions.

4.3. The positives: encouraging public debate and providing some protection

In terms of the benefits of the Belgian regulatory approach as it stands, the initial publication of the Belgian 'ban' on loot boxes by the Belgian Gaming Commission led to popular reporting and public discussion and debate of the loot box issue in Belgium and in other countries (Gerken, 2018), which were of benefit to the consumers of all countries by facilitating better awareness of this issue and the potential harms of loot boxes. Indeed, policymakers, (Digital, Culture, Media and Sport Committee of the House of Commons (UK), 2019, p. 33, paras 92-93; Select Committee on the Social and Economic Impact of the Gambling Industry of the House of Lords (UK), 2020, p. 111, para 427) regulators (Ministerio de Consumo [Ministry of Consumer Affairs] (Spain), 2021, p. 6), the media (BBC, 2019), and some players (see Macey & Bujić, 2022) in other countries often pointed to Belgium as a good example of taking proactive action to address loot box harms and argued for their own countries to emulate the Belgian approach. Undoubtedly, the Belgian 'ban' has advanced the international debate on whether loot boxes should be regulated as gambling or otherwise, and this positive impact of the 'ban' should be duly recognised.

Further, it must be recognised that (i) loot boxes have been removed from Belgian versions of some popular games (e.g., 2K Games, 2018a) and (ii) a number of other popular games have been removed from, or were not published in, the Belgian market (e.g., Nintendo, 2019; Partis, 2022; Phillips, 2022). Some Belgian players might therefore have been successfully prevented from being able to purchase loot boxes from these games, and potential opportunities to be exposed to loot boxes generally (particularly in relation to children and young people) may have been reduced, despite other games containing loot boxes continuing to be available. However, what percentage of Belgian players that represents is unknown and by how much (if any) average loot box spending has reduced remains the subjects of further research. Although referred to as a 'ban,' perhaps the complete elimination of the product from the

Belgian market is not necessarily a goal that the measure must achieve for it to be deemed 'successful.' Even when imperfectly enforced, a 'ban' that potentially leads to reduced exposure to loot boxes and thereby provides better protection is still arguably of benefit to many consumers.

4.4. The negative: a false sense of security

However, the manner in which the 'ban' was then subsequently enforced (or rather, not enforced at all) has a number of potential negative consequences that arguably render the ban worse than doing nothing at all. Firstly, by supposedly imposing a 'ban,' the Belgian Gaming Commission gave video game consumers (including children and parents of young players) the false impression that Belgian players are now safe from loot boxes because the mechanic has been deemed illegal under gambling law, 'banned,' and therefore eliminated from the Belgian market. In reality, loot boxes are evidently still widely available for purchase, and their potential harms have not been removed from the country and may have reduced only to a limited extent (which is due to the actions of the finite number of compliant companies). This unfortunate state of affairs is potentially harmful because consumers might have been lulled into a false sense of security because they might think that the loot box 'problem' has been completely resolved by the 'ban' imposed by the Belgian Gaming Commission. For example, a player choosing to be less careful with their in-game spending or a parent deciding not to educate their child about loot boxes because they have been falsely assured that there is no longer any risk of harm.

More concerningly, Belgian policymakers and the Belgian Gaming Commission itself might also have been under the same wrong impression that Belgian consumers are already adequately protected. For example, Belgian legislators might be less willing to update the country's gambling law to specifically regulate loot boxes because they might deem the situation as having already been resolved. The Belgian Gaming Commission might also have not been more active with enforcing the law because it has not monitored whether its 'ban' has been effective, potentially because of the same incorrect assumption.

As an aside, this regulatory approach of merely pronouncing an interpretation of the law that recognises certain loot box implementations as illegal but then not actively enforcing that interpretation against non-compliant companies (and thereby potentially creating a false impression that the law has been duly enforced) is what the relevant gambling regulators have done in the UK and Denmark (and other countries) in relation to loot boxes that require real-world money to purchase and provide rewards that can be transferred to other players in exchange for real-world monetary value (Xiao, Henderson, Nielsen, & Newall, 2022). This lack of enforcement action is likely why certain games, *e.g.*, *Magic: The Gathering Online* (Wizards of the Coast, 2002), containing loot boxes that arguably infringe relevant gambling laws as interpreted by the national regulators remain available and have not been forcibly removed from those markets (Xiao, 2022a).

4.5. Criminalisation: the 'forbidden fruit effect' and stigmatisation

Moving beyond how the 'ban' has been practically applied in Belgium, consideration should also be given to the negative consequences of this restrictive approach on a theoretical level, even if the ban is perfectly enforced. The very act of prohibiting a product potentially leads to a number of adverse effects. The so-called 'forbidden fruit effect' has been identified in relation to media content (Bushman & Stack, 1996; Gosselt et al., 2012), including video games specifically (Bijvank et al., 2009). Products that are prohibited becomes more appealing to young people precisely because they are deemed 'forbidden.' This might apply to loot boxes in the sense that some Belgian children might now be more interested in purchasing loot boxes because these products have been deemed 'illegal' or 'banned.' The same might even be true in relation to adults because no video game loot boxes have been duly licensed as regulated gambling by the Belgian Gaming Commission (as the regulator is not legally empowered to approve and license any randomised monetisation methods in video games, specifically) and therefore all video game loot boxes remain unlicensed and technically 'illegal,' even when engaged with only by adults.

Indeed, the criminalisation of the purchasing of loot boxes is problematic. It must be recalled that Article 4(2) of the Belgian Gambling Act of 7 May 1999 states that: 'It is prohibited for anyone to participate in a game of chance … when the person involved knows that it concerns the operation of a game of chance or a gaming establishment which is not licensed in accordance with this Act.' In relation to unlicensed websites offering more traditional forms of illegal gambling, the Belgian Gaming Commission warns would-be punters that 'Gambling on an illegal gambling site is even punishable by law! Players can be fined between €26 and €25,000 (multiplied by a multiplication factor) if they knowingly played on an illegal gambling site (Belgische Kansspelcommissie [Belgian Gaming Commission], 2022a).' Most Belgian loot box purchasers can likely escape liability by arguing that they were not aware of the video game company not having been duly licensed to provide gambling services, and it would appear highly unlikely for any Belgian loot box purchaser to be criminally prosecuted simply for fairness reasons (due to the unclarity and uncertainty of the Belgian legal position on loot boxes, given that the law does not explicitly say that loot boxes constitute illegal gambling and that the Belgian Gaming Commission merely provided its, as yet unchallenged, interpretation of the law that has not been confirmed by the court). However, given that any and all loot box purchasing is technically criminalised, players experiencing excessive loot box engagement and suffering harms from overspending might be less willing to seek help and treatment. This stigmatisation of loot box purchasing potentially increases the severity of the harms that at-risk players might experience. How gambling behaviours will now potentially develop differently in Belgian young people and emerging adults especially, as compared to those of other countries, due to Belgium's

unique regulatory position, should be studied. Other potential disadvantages of an effectively enforced ban should be subject to future studies (*e.g.*, the potential loss and unfair distribution of economic opportunities for companies and negative impacts on players' gameplay experience, including rendering Belgian players uncompetitive particularly in relation to esports games that require loot box purchasing to gain gameplay advantages).

4.6. How can the Belgian Gaming Commission do better?

Belgium might wish to double down on this restrictive approach (as it does presently appear to have popular support, although that might dissipate when the approach's various disadvantages and the heavy financial costs of fully enforcing the law are brought to the electorate's attention).

Recognising that some companies might have failed to comply only due to not knowing about their responsibilities (rather than maliciously), it has to be questioned whether the Belgian Gaming Commission has promoted the fact that a loot box ban is in effect in the country sufficiently widely, especially to video game companies in distant countries, *e.g.*, China. A promotional campaign, where the Belgian Gaming Commission collaborates with major hardware and platform providers (*e.g.*, Nintendo, Microsoft, Sony, Apple, and Google), could attempt to highlight the ban prominently (*e.g.*, a pop-up warning as part of the process for submitting a game to the Apple App Store, if the company chooses Belgium as a national store where the game should be published). Apple, for example, already asks companies to self-declare how frequently certain content appears in a game in order to provide an Apple Age Rating. As part of that process, specifically in Belgium, Apple could ask the question of whether loot boxes are sold in a game. If the company responds positively, Apple should inform the company about Belgium's ban on loot boxes and reject the game from the submission process. Apple already requires loot box probability disclosures (Apple, 2021), so evidently it is concerned by and willing to address the issue to some extent (albeit that Apple has seemingly not enforced its own self-regulation to ensure games do make probability disclosures [Xiao, Henderson, & Newall, 2021]).

Regardless, to achieve a better compliance rate, the Belgian Gaming Commission must then need to carry out its threat of criminal prosecution of non-compliant companies. Doing so would likely forcibly remove many loot boxes from the market. Note that actually enforcing the law here is likely to lead to a legal challenge of the Belgian Gaming Commission's interpretation of the law by one of the prosecuted companies. That legal challenge might be decided either way. The court might approve the Commission's position or reject it. If the former happens, then the Belgian Gaming Commission can continue to enforce its interpretation. However, even if the latter happens, this will resolve the current confusion as to what the Belgian regulatory position on loot boxes truly is. If existing Belgian law cannot be interpreted as outlawing all paid loot boxes, then the Belgian Gaming Commission cannot be allowed to purport to take enforcement actions *ultra vires* or beyond its pow-

ers and without legal authority. An amendment of gambling law by the legislature to criminalise paid loot boxes should then follow if the ban is to truly be imposed. Indeed, even if the ban can no longer be maintained, this would provide legal certainty and likely lead to the more compliant companies re-entering the market and thereby providing players with more game options and likely better consumer protection as compared to what is currently being offered by non-compliant companies.

The main problem with enforcing the law is, however, whether it would be practical or cost effective to do so. This undertaking requires significant financial resources, man-power, and technical expertise, which the Belgian Gaming Commission arguably does not sufficiently possess, particularly in relation to non-traditional forms of gambling like video game loot boxes. This is evident in the lack of enforcement action, despite obvious loot box contraventions being widely available and highly popular. The recovery of any costs incurred by the Commission's enforcement actions through fines is likely difficult in relation to international companies with little to no corporate presence in Belgium. Further, it does not seem realistic to expect the Belgian Gaming Commission to examine every single video game on every platform (and every subsequent update to those games) and then to criminally prosecute each non-compliant case. As of June 2022, there are already over 1,000,000 individual games on the Apple App Store alone (PocketGamer.biz, 2022). Note, however, that direct criminal prosecution of *all* illegal loot box implementations is only one (very costly) potential approach to enforcement. Less direct and cheaper approaches, such as issuing correspondence addressed to individual companies prior to litigation requesting changes to game design and threatening prosecution might be sufficient at ensuring compliance and be more cost effective.

The regulator could perhaps work in closer collaboration with academic researchers: the present study's results have been shared with, and were indeed of great interest to, the Belgian Gaming Commission and was ironically funded by 'regulatory settlements applied for socially responsible purposes' received by the UK Gambling Commission. Enforcement could also potentially be 'crowdsourced' in the sense that players are provided with a channel to report non-compliant games, thus reducing the Commission's workload. What the Belgian Gaming Commission could alternatively consider is an *ex ante*, whitelist, licensing system, rather than an *ex post*, blacklist, enforcement system, similar to the regulatory approach taken by China in relation to the publication of video games. Instead of allowing any games to be published on these app stores or hardware platforms and then seeking to remove and prosecute non-compliant games afterwards, only games on a pre-approved list are allowed to be published in the first place. The relevant Chinese regulator, the National Press and Publication Administration (国家新闻出版署), therefore has the opportunity to review any video games, both domestic and international, before they are published and allowed potentially to cause harm to players (国家新闻出版署 [National Press and Publication Administration (PRC)]., 2021, 2022).

Indeed, charging a fee for this pre-approval process and for maintaining a licence would allow the regulator to recoup the costs associated with reviewing the game and taking enforcement action. Such a system would also provide opportunities to assess companies' compliance with other obligations (*e.g.*, whether probability disclosures were made).

Another manner by which the Belgian Gaming Commission could seek to enforce the law is to place the burden on ensuring compliance on platform providers, such as Apple, rather than going after individual video game companies. Apple, for example, is arguably facilitating the sale of illegal loot boxes by providing a platform for this to happen on a large scale. Indeed, loot box sales would not generally be possible through Apple's propriety iOS platforms, unless Apple allows it. Further, Apple generally receives a 30% commission on most in-app purchase made (although this is lower in some limited cases) (Campbell & Alexander, 2021). In Belgium, Apple is therefore profiting on the illegal sale of loot boxes whenever a purchase is made. This could arguably be recognised as Apple aiding and abetting the commission of a criminal offence and its receiving and handling of criminal proceeds, which may fall within the ambits of money laundering regulation. The Belgian Gaming Commission could consider enforcing the law against Apple (as an accessory to the crime, arguably), or if that is not yet legally possible, impose new laws to require Apple and other platform providers to ensure that only games without loot boxes can be published. There are even precedents on this point. When put under regulatory pressure, Apple removed all unlicensed and non-whitelisted games from China at the end of 2020: reportedly, only 0.5% of the top paid games were duly licensed and 'survived the purge' (P. Li, 2020). Apple also specifically implements the national video game age rating system in Brazil, in addition to its own age rating (Apple, 2019). Evidently, Apple is capable of and willing to take national compliance actions when required.

Seeking to regulate more strictly or asking the platform providers to assist in regulating might work in most cases to prevent players from unknowingly encountering loot boxes and being potentially harmed (although it should be queried what percentage of these players could actually potentially be harmed and whether a vast majority of them can enjoy loot boxes 'safely' [Xiao, 2022g]). However, on other more open platforms, such as PC and Android, an installation file that does not need to be downloaded from 'official' app stores and can be easily obtained by potential players through any online channels, such as an .apk (Android Package) file, could be used to play games. These games would be even more difficult to monitor and enforce against, as platform-based regulation would not be possible.

Therefore, besides identifying and prosecuting non-compliant companies still offering loot boxes in Belgium, consideration should also be given to the separate issue of how to deal with players that knowingly try to circumvent the ban. The negative stigma-related consequences of individually prosecuting players for purchasing loot boxes

have already been addressed. Indeed, even if the Belgian national versions of the platforms, such as the Apple App Store, are hypothetically scrubbed clean of any games containing loot boxes, either through the Commission's actions or the platforms' actions, players who wish to do so would still be able to easily circumvent these technical measures using extremely basic and free methods (*e.g.*, changing the Apple App Store's country setting to another country or activating a VPN), as the present study has shown. For context, research on underage online pornography use has found that 46% of 16- and 17-year-olds use VPNs and similar age-verification circumvention tools (Thurman & Obster, 2021). When a Belgian player seeking to actively circumvent the ban has managed to download, play, and pay for loot boxes in a video game that the company has purposefully chosen not to publish in Belgium due to the country's loot box ban, it becomes difficult to argue that the company or platform provider should still be deemed culpable in such cases, provided that reasonably strong technical measures have been implemented to prevent such circumvention. The Google Play Store, for example, only allows users to change their country settings once per year (Google, 2022), and is therefore arguably doing better at preventing potential circumvention than the Apple App Store, which places no restrictions on changing country settings (although Google is also arguably constraining consumer rights more by more strictly restricting what users can do, which governments might not wish to further encourage). Belgium should therefore consider requiring companies and platform providers to implement sufficiently difficult-to-circumvent technical measures. However, this might be difficult to enforce in practice: the IP address checks implemented by Games 50 and 78 should not be deemed as satisfactory, and it might be the case that no such technical measures are yet available or that requiring the implementation of such a measure and the active development of ways to thwart new circumventions is not economically feasible. Indeed, in a related context, digital rights management (DRM) technology for video games is used only to provide temporary intellectual property right protection against piracy during the initial sales window and is not designed to be permanently uncrackable (given that the development of which is likely impossible) (Moshirnia, 2018b). The development of an impervious loot box purchase-blocking technical measure might similarly not be possible. Any regulation should also be cautious as to not mistakenly identify a player against whom the technical measures have failed without said player intending to attempt circumvention (*e.g.*, the author's experience at Brussels International Airport in relation to Game 50 detailed in the Method section) as a player who has *intentionally* tried to circumvent the technical measures.

Importantly, the most dedicated and highest-spending loot box purchasers, who are arguably most at risk of harm and therefore most in need of consumer protection, would likely choose to circumvent any 'ban.' Therefore, it must be duly noted that any approach that seeks to forcibly remove loot boxes may be unlikely to be of assistance to the most vulnerable players. This is similar to how technical bans of online gambling in many countries can be easily circumvented by dedicated gamblers and how an effective blanket ban is not feasible (Parke & Griffiths, 2004). Further research should consider the perspectives of high-spending Belgian players and, in particular, their views on circumvention and whether they have attempted to do this.

4.7. Some reflections for the Belgian public and Belgian policymakers

The Belgian Gaming Commission instituted the ban through applying pre-existing gambling law that did not envisage technological developments, such as video game loot boxes. This means that, technically, the Belgian 'ban' on loot boxes was applied executively by the regulator (albeit based on duly passed legislation). Therefore, it cannot be said that the ban itself was truly approved through a democratic process. Neither the Belgian electorate nor their representatives specifically voted on this policy question. It is not known whether the ban has popular support, especially if the present evidence on the ineffectiveness of the ban as currently applied is made known. Importantly, Belgian policymakers should not consider the loot box issue as having been 'solved' and should not be dissuaded from updating existing gambling law to address current and developing issues. Indeed, other gambling-like products are being actively invented, including video game loot boxes that contain NFTs (non-fungible tokens) that can be freely bought and sold between players for real-world monetary value in *Gods Unchained* (Immutable, 2021) and virtual packs of NFTs that do not even relate to a video game, such as NBA Top Shot (Xiao, 2022c). Some consideration should also similarly be given to older gambling-like products that have seemingly escaped regulatory scrutiny despite literally contravening gambling law, *e.g.*, booster packs of randomised collectible and trading cards (Xiao, 2022c; Zendle et al., 2021). The uneven manner by which loot boxes have been targeted with a ban and physical card packs (real-life loot boxes) have not been addressed at all is arguably discriminatory against the video game industry (Xiao, 2022g).

Indeed, the Belgian public should not assume that their consumer protection is now guaranteed: it is not. Belgian consumers should continue to demand policy change in relation to loot boxes, other gambling-like products and gambling regulation in general, if they deem these to be appropriate and necessary. Finally, note that Belgian policymakers and consumers should consider the economic benefits of providing duly licensed video game loot boxes to adults (*e.g.*, tax revenue), given that duly licensed traditional gambling is permitted. Presently, Belgian gambling law does not allow loot boxes to be licensed at all; the Belgian Gaming Commission is not empowered to offer such licenses. There is therefore discrimination against the video game industry as compared to the traditional gambling industry, which is allowed to provide products and services costing real-world money and involving 'randomisation.' If video game companies are willing and technologically able to provide verifiably 'fair'—in the sense of being transparent and reliable, and not necessarily in the sense of ethical loot box design (King & Delfabbro, 2019a; Xiao & Hender-

son, 2021; Xiao & Newall, 2022)—loot boxes (and this does appear to be the case), then Belgium should consider legalising licensed loot boxes (at least for sale to adults) as long as traditional gambling remains lawful.

4.8. Should other countries emulate Belgium's 'ban' on loot boxes?

Many stakeholders (Digital, Culture, Media and Sport Committee of the House of Commons (UK), 2019, p. 33, paras 92-93; Select Committee on the Social and Economic Impact of the Gambling Industry of the House of Lords (UK), 2020, p. 111, para 427; BBC, 2019; Ministerio de Consumo [Ministry of Consumer Affairs] (Spain), 2021, p. 6; see Macey & Bujić, 2022) have argued that other countries should also follow Belgium's lead and ban loot boxes. However, doing so might not work as well as intended. Notably, as the present study has proven, the Belgian 'ban' on loot boxes has not been actively enforced. Another country emulating the Belgian regulatory position as it currently stands is unlikely to achieve a significantly better result. The present study cannot provide empirical evidence on whether an actively enforced ban could be effective at reducing loot box prevalence. However, any country considering also banning loot boxes should consider whether its gambling regulator (or relevant enforcer of the law) is capable of ensuring that the ban is actually effectively enforced. Unless another country has a regulator that is much better resourced than the Belgian Gaming Commission, it also does not appear likely that a loot box ban would work in that country. Further, regardless of whether a ban works in that country, potential circumventions would be similarly difficult to prevent, and the negative consequences of this restrictive approach and the economic benefits of legalising loot boxes detailed above must be duly considered (particularly in territories where traditional gambling is legal).

4.8.1. Alternative harm-reduction approaches to a 'ban'

Given that a ban is costly to enforce; may not work effectively against the most dedicated and highest-spending players who will likely circumvent it; and leads to a number of potential negative consequences for all stakeholders, other countries should consider adopting a less restrictive approach to loot box regulation (Xiao, 2022g). Loot boxes cannot easily be banned, and they are likely to remain an important aspect of video game monetisation for years to come. Citing the 'significant limitations' (including financial strains on the gambling regulator and the need to amend other laws) of a restrictive approach to loot box regulation (Department for Digital, Culture, Media & Sport (UK), 2022, paras 34-36), the UK Government has, for example, decided against regulating loot boxes as gambling (and outlawing their sale to children) and is instead exploring a non-restrictive, industry self-regulatory approach (whose success remains to be assessed) (Department for Digital, Culture, Media & Sport (UK), 2022, paras 232, 241-243). Some stakeholders might find this to be unsatisfactory and difficult to accept, but one ought to consider how to reg-

ulate loot boxes in light of this. A public health approach to the issue allows for a whole range of other potential approaches of varying levels of restriction to be considered (Xiao, Henderson, Nielsen, & Newall, 2022). The adoption of 'ethical game design' has been one suggested approach: specifically, (i) particularly harmful aspects of loot box design could be removed (as Japan has done in relation to the so-called 'kompu gacha,' which required players to collect a complete set of loot box rewards to then obtain a further reward [Derrington et al., 2021, pp. 311–312]) and (ii) other loot box designs that appear less likely to be harmful could be trialled (as some companies have done, albeit perhaps more for commercial reasons, rather than to provide better consumer protection) (King & Delfabbro, 2019a; Xiao & Henderson, 2021; Xiao & Newall, 2022). However, such an approach that seeks to mandate ethical game design by law or industry self-regulation still faces the same enforcement issues as attempting to implement a ban (Xiao & Henderson, 2021). Crowdsourcing (*e.g.*, player activism) and obtaining support from academic researchers, as previously recommended to the Belgian Gaming Commission for enforcing the ban, might help.

Further or alternatively, recognising the enforcement limitations of any consumer protection measure, countries should consider dedicating resources to educational campaigns and other preventative programmes that would better inform consumers to be mindful of the potential harms of loot boxes, *e.g.*, classes in school (not only for young people, but also for their parents and guardians) dedicated to enhancing 'ludoliteracy' (or knowledge about video games). Previous experience from other industries providing potentially harmful products, *e.g.*, alcohol, tobacco, and traditional gambling, has suggested that these educational programmes might be at risk of being 'hijacked' by industry interests and thereby fail to promote an unbiased narrative, *e.g.*, normalising alcohol use (van Schalkwyk et al., 2022). Therefore, when designing and implementing such programmes, countries ought to be mindful of potential industry influences and ensure that the relevant audience is not potentially misled. For example, how much and what kind of (potentially valuable) input the video game industry should be allowed to provide to such programmes should be carefully considered.

4.9. Limitations

The present study interpreted 'loot boxes' broadly as including any in-game transaction involving randomised elements. For example, in relation to Game 100, *League of Legends: Wild Rift* (Riot Games, 2020), a loot box was positively identified because the player was able to spend real-world money to purchase a 'season pass,' (Joseph, 2021) which allowed the player to obtain additional rewards through gameplay (Laserface, 2022), and some of the rewards obtained through the paid season pass allowed to player to engage with a loot box mechanic. There is debate within the academic literature as to how broadly the term 'loot boxes' should be interpreted (Xiao, Henderson, & Newall, 2022; cf. Zendle et al., 2022). Had a more restrictive defin-

ition for 'loot boxes' been applied, a lower prevalence rate would have been observed.

Inversely, similarly to previous loot box prevalence studies adopting the same methodology, the present study might have observed a loot box prevalence rate that was lower than the true value because some games might have implemented loot boxes that could only be encountered after a significant length of gameplay, beyond the time limit (*i.e.*, one hour) that the present study's methodology allowed for. It is highly likely, for example, that Game 96, *DomiNations* (Nexon & Big Huge Games, 2015), contained loot boxes (specifically, the Council Recruitment system) that were accessible only after a few dozen hours of gameplay given that suspected loot box probability disclosures were found in said game.

In addition, as with previous loot box prevalence studies, the present study examined the highest-grossing video games and so the results might differ if the sample was selected randomly amongst all available iPhone games. On one hand, it is possible that the highest-grossing games are more likely to comply because they are the most popular and frequently scrutinised by players, fellow companies and the regulator. On the other hand, it is possible that more compliant games that removed loot boxes are now performing worse financially and not appearing in the highest-grossing list. The present results should be treated as a snapshot of the situation as it stands with the most popular games and not as a reflection of the whole situation on the Belgian Apple App Store.

In addition, the present study and previous loot box prevalence studies have treated the country that the specific Apple App Store belongs to as reflecting the national situation. However, the present study has shown that it is easy to switch to a different country's store and also to spend money in a country different from the store's national identity (and still have the revenue count towards the national store's total revenue). Therefore, a due amount of caution must be exercised when interpreting the present results as perfectly reflecting the Belgian national situation because it is possible that many Belgian players are spending money in other countries' Apple App Store (*e.g.*, the Dutch or French Apple App Stores) and that Belgian players, when abroad, might also be contributing towards the Belgian Apple App Store's revenue even though they are in a different country. The national store cannot be used to determine the actual location of players but merely what Country/Region settings were used by the player at the relevant time. Finally, the present study examined only iPhone games. The situation on other platforms might be different: the 'big three' home console providers (Nintendo, Microsoft, and Sony), as platform providers, likely exercise stricter control on the availability of loot boxes in the limited number of console games published in Belgium, as compared to Apple, which cannot realistically individually assess the more than 1,000,000 games available on its market.

5. Conclusion

Many video game companies are 'breaking the ban' in Belgium (maliciously or unknowingly) by continuing to offer loot boxes for sale in exchange for real-world money. Players in Belgium are able to 'break the ban' by easily circumventing any technical measures put into place to prevent loot box purchase (*e.g.*, IP address checks and removal of games from the Belgian national market). Belgian's loot box 'ban' is 'breaking' because it has not been effective at reducing the prevalence of loot boxes in the country as the national gambling regulator has not actively enforced the law and merely passively waited for companies to comply. Finally, a blanket 'ban' approach to loot box regulation may be inherently 'broken' as it has many disadvantages that arguably outweigh its one advantage of providing better consumer protection.

The Belgian ban on loot boxes is not working at present due to its poor implementation. With better enforcement, this approach could potentially be more effective and reduce loot box prevalence, thus enhancing consumer protection from potential harms. However, even had the ban been perfectly enforced domestically, it likely would not have blocked some highly dedicated players, who are arguably most at risk of potential harms and in need of consumer protection, from easily circumventing the ban. Belgium should re-evaluate its current regulatory position: either enforce the law as promised or repeal this in-name-only 'ban' and pursue alternative regulatory options. Put simply, either 'buff' enforcement or 'nerf' the ban. Other countries are recommended to consider adopting other less restrictive approaches to loot box regulation that more effectively balance the potential harms and benefits of loot boxes.

6. Postscript

For context, since the publication of the preprint version of the present study on 28 July 2022, several media websites have reported the findings. A Flemish piece published in both *Het Nieuwsblad* (Ramboer, 2022a) and *Gazet van Antwerpen* (Ramboer, 2022b) on 13 August 2022 included an official response from the Belgian Minister of Justice, Vincent Van Quickenborne. A relevant translated excerpt of that piece is provided below for context:

> The Gaming Commission admits that there is a problem, but says it has too few resources. "It is not possible to control for all small-scale games of chance." Furthermore, the [compliance checking procedure] was said to be too slow.
> ...Van Quickenborne ... emphasizes that ... strict action [was taken] in the past... FIFA18 had to get on its knees and remove loot boxes. "But taking action against disguised games of chance such as these is not obvious. We want to better arm the Gaming Commission by reforming the law." [...]

In addition, since publishing the preprint, in relation to Game 8, 'a Roblox-led program to comply with laws in The Netherlands and Belgium,' has reportedly caused the re-

moval of user-generated content involving loot boxes from *Roblox* in Belgium (Carter, 2022).

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Data Accessibility Statement

The raw data, a full library of video game screenshots showing, *inter alia*, any identified loot boxes, and the data analysis script and output are openly available in the Open Science Framework at https://doi.org/10.17605/OSF.IO/7KJS9.

Positionality Statement

When drafting and revising the stage 1 registered report and when conducting fieldwork in Belgium, the author was open to the idea that a 'ban' approach to loot box regulation might potentially be effective and worth pursuing, although he was slightly sceptical. However, after the results have been analysed and the disadvantages of a 'ban' were considered and after meeting with the Belgian Gaming Commission to discuss the (im)practicalities of enforcing a ban, in drafting and revising the stage 2 registered report, he wrote with the perspective that a 'ban' approach to loot box regulation is unlikely to be worth pursuing economically. As he subsequently wrote in a guest post on GamesIndustry.biz on 20 September 2022: 'As to exactly how loot boxes should be regulated more broadly, I personally advocate for a more middle-ground approach to loot box regulation. Doing nothing fails to adequately recognise and address the potential harms, but banning the mechanic is likely going too far and removing the economic benefits of loot boxes (for both companies and players)' (Xiao, 2022h). In terms of the author's personal engagement with loot boxes, he plays video games containing loot boxes but he has never purchased any loot boxes with real-world money.

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Competing Interests

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Appendices

Appendix 1: A priori Power Analysis

See Figure S1.

Appendix 3: Discussion of the Removal of Game 36

The commencement of the present study's data collection may have caused Game 36's removal from the Belgian Apple App Store. For full disclosure and context, the stage 1 registered report for the present study setting out the methodology was published on 7 April 2022, and the author did publish various online content about this then upcoming study, including publishing one Twitter post on 30 June 2022 implying that data collection has begun (Xiao, 2022e). Game 36 appears to have been removed from the Belgian Apple App Store between 31 May 2022 and 1 June 2022 as the game appeared on the highest-grossing list on 31 May 2022 but did not do so on 1 June 2022. It is also curious that the game has been removed *only* from the Belgian store and remained available (and high-grossing) in all other countries checked, specifically, Denmark, France, the Netherlands, the UK, and the US, according to data.ai, as shown in Figure S2.
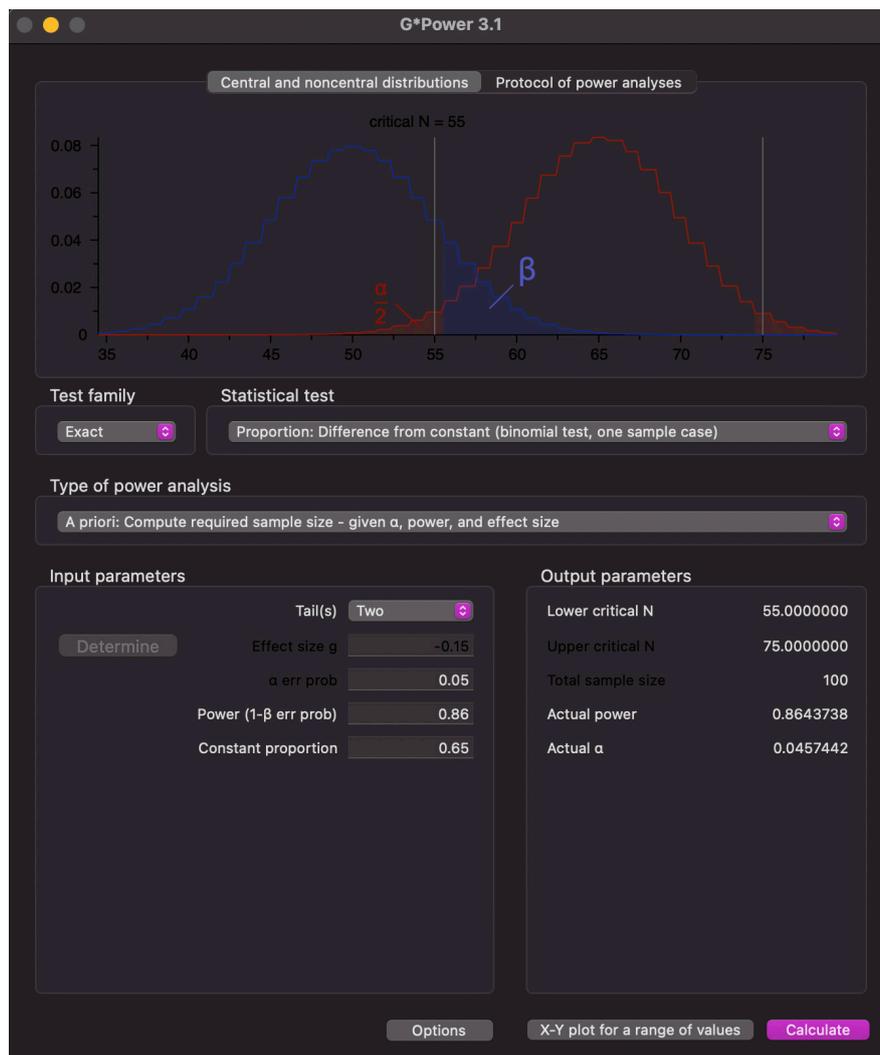
Figure S1. A priori power analysis for Hypothesis 3 using G*Power, given an α value of .05 and assuming an effect size of Hedges' *g* = −.15.

A sample size of 100 games achieves .86 power.

Supplementary Materials

Figure S2. A series of screenshots of the grossing rank of Game 36 (*The Lord of the Rings: War*) in various countries demonstrating the removal date of said game from the Belgian Apple App Store (between 31 May and 1 June 2022) and how said game was curiously not removed from the Apple App Stores of Denmark, France, the Netherlands, the UK, and the US.

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Appendix 2

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Paper 4: Non-enforcement of UK and Nordic gambling laws against loot boxes

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Xiao, L.Y., & Henderson, L.L. (2024). Illegal video game loot boxes with transferable content on Steam: a longitudinal study on their presence and non-compliance with and non-enforcement of gambling law. *International Gambling Studies*, _(_), _–_. https://doi.org/10.1080/14459795.2024.2390827 [Open access].

Data deposit link: https://doi.org/10.17605/OSF.IO/349Y7.

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Illegal video game loot boxes with transferable content on steam: a longitudinal study on their presence and non-compliance with and non-enforcement of gambling law

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ABSTRACT

Loot boxes are gambling-like mechanics in video games that can be bought with real-world money to obtain random rewards. Regulators in many countries have considered whether different loot box implementations fall within the existing legal definition of 'gambling.' Most countries' regulators say that only loot boxes (i) players spent real-world money to purchase and (ii) provide randomized content (iii) that possesses real-world monetary value (*e.g.* be transferable between players) legally constitute 'gambling.' A comprehensive review of Valve's Steam platform for PC games identified 35 games, including some of the most popular games with hundreds of thousands of concurrent players, that implement paid loot boxes with transferable content worth real-world money. These would likely fall afoul of current gambling laws in many countries. Contrary to previous statements published by gambling regulators promising enforcement, consumers, policymakers, and other stakeholders should be aware of the existence and popularity of these presumably illegal loot boxes and how gambling law has not actually been enforced against them. The situation remained unchanged one year later. This longitudinal perspective demonstrates a continued state of noncompliance by game companies and non-enforcement by gambling regulators that leaves consumers unprotected and at risk of encountering illegal content and experiencing harm.

1. Introduction

Loot boxes are video game mechanics that players engage with to obtain random rewards (Xiao, 2022c; Xiao, Henderson, Nielsen, et al., 2021). Many loot boxes are 'paid' because they can be purchased with real-world money; hereinafter, references to 'loot boxes' mean 'paid loot boxes,' unless otherwise specified. The player does not know exactly what they will receive before they purchase a loot box. Most of the time, the loot box is opened only to reveal that it contains common and undesirable rewards. However, rarely, the loot box will contain highly desirable rewards. Players

are therefore incentivized to purchase many loot boxes and spend substantial sums of money to try to obtain the rarer rewards. Many have argued that loot boxes are structurally and psychologically similar to traditional gambling and are risky for consumers to engage with because they might overspend money and experience harm (Drummond & Sauer, 2018; Drummond et al., 2020; Nielsen & Grabarczyk, 2019; Spicer et al., 2022; Xiao, 2022d; Zendle et al., 2018). This is because, like traditional gambling, players are risking their money in a randomized process that is designed to disappoint them most of the time by providing an undesirable 'losing' result but also, rarely, pleasantly surprise them with a highly desirable 'winning' result. Importantly, players are at risk of expending (or losing) significant amounts of money on loot boxes, just like when they participate in traditional gambling when attempting to win money.

Due to a current lack of regulation, vulnerable consumers (*e.g.*, young people and people experiencing problem gambling issues and psychological distress) might be at particular risk (Close et al., 2021; Wardle & Zendle, 2021). Traditional gambling, for example, is available only to adults even in countries where gambling participation has been liberalized. In contrast, loot boxes are widely available in video games played by young children: 56.7% of games deemed suitable for those aged 4+ by Apple contained loot boxes, as did 68.8% rated 9+ and 76.3% rated 12+ (Xiao et al., 2023, p. 8). Indeed, the most recent and reliable data suggest that 21.4% of 11–16-year-olds in Northern Ireland spent money on loot boxes (Department for Communities (Northern Ireland), 2023) (the participation rates of other Western countries are likely to be similar). Adults may also be harmed by loot boxes: a person experiencing gambling harms may have self-excluded themself from being able to participate further in traditional gambling with all licensed gambling operators (*e.g.*, casinos and online betting services). However, they may then encounter loot boxes whilst playing video games, which are not covered by the self-exclusion schemes of traditional gambling operators.

Many countries are considering regulating loot boxes (Xiao, 2022b), and some have already sought to do so (Derrington et al., 2021; Leahy, 2022; Moshirnia, 2018; Xiao, 2021b, 2022d; Xiao et al., 2022). Various regions in Asia, namely, Mainland China, Taiwan, and South Korea (Xiao, 2024b), do not view loot boxes as a type of gambling and instead treat them as a novel product that requires dedicated regulations: specifically, probability disclosures intended to provide transparency by informing players of their likelihood of obtaining potential items (Xiao, Henderson, Yang, et al., 2021). Previous research has found that, although the rate of compliance in China was high in terms of making disclosures, many companies made the information difficult to access or use (Xiao, Henderson, Yang, et al., 2021). This pattern of poor compliance was also observed in the UK when companies attempted to make probability disclosures as required by platform rules, such as on the Apple App Store (Xiao et al., 2023). In contrast, Australia and Germany have instead adopted rules requiring that the presence of loot boxes must be considered when making age rating decisions (Xiao, 2024b): in Australia, starting from September 2024, the minimum age rating for a loot box-containing game is 'not recommended' for those under 15 (Rowland, 2023), whilst in Germany, such games are deemed suitable only for those aged 12+ (USK Unterhaltungssoftware Selbstkontrolle, 2023). Less restrictively, games have also been required to disclose the simple fact that they contain loot boxes in many jurisdictions, but many fail to do even that (Xiao, 2023a, 2024a).

Instead of making new laws to deal with loot boxes, it is also possible to rely on existing law: for example, the EU Unfair Commercial Practices Directive [2005] OJ L149/22, which requires that important information about the product must be provided by businesses to consumers (Leahy, 2022). The UK advertising regulator has opined that whether a game contains loot boxes is material information that a consumer needs to make an informed purchasing decision and therefore games must disclose the presence of loot boxes in any advertising material (Advertising Standards Authority, 2023a, 2023b; Committee of Advertising Practice & Broadcast Committee of Advertising Practice, 2021). Similarly, the Dutch and the Italian consumer protection regulators and the European Commission have held that probability disclosures also must be provided (Autorità Garante della Concorrenza e del Mercato (AGCM) [Italian Competition Authority], 2020; Autoriteit Consument & Markt [Authority for Consumers & Markets] (The Netherlands), 2023; European Commission, 2021). However, there has been a general lack of enforcement against non-compliant games and companies, so widespread compliance across the industry has not yet been achieved (Xiao, 2023a, 2023c, 2024a; Xiao et al., 2023). This means that the players of many games do not yet have access to the relevant information even though its provision is technically already required by law. These requirements also focus only on providing people with more information and may be viewed by some as not being sufficiently interventionist: players, particularly children and young people, are arguably not adequately protected because they may not understand the information provided or be dissuaded from making excessive purchases.

Finally, another category of preexisting law (and likely the most obvious one) that could be used to address loot boxes is gambling law. Since 2018 when the loot box issue first properly entered into the Western public debate, many countries' gambling regulators or relevant authorities have made public announcements as to what implementations of loot boxes would fall afoul of their national gambling laws, *inter alia*, in Belgium (Belgische Kansspelcommissie [Belgian Gaming Commission], 2018), Denmark (Spillemyndigheden [Danish Gambling Authority], 2017), Sweden (Konsumentverket [Swedish Consumer Agency], 2019, p. 7, para 5.3.1.2.), France (Autorité de regulation des jeux en ligne (ARJEL) [Regulatory Authority for Online Games France], 2018, p 7 para 6), the UK (UK Gambling Commission, 2017b, pp. 7-8, paras 3.17-3.18., Ireland (Department of Justice (Ireland), 2018), and the Netherlands (Kansspelautoriteit [The Netherlands Gambling Authority], 2018). Belgium's position was uniquely broad due to the drafting language of the law: the regulator attempted to ban *all* loot boxes purchased with real-world money (Belgische Kansspelcommissie [Belgian Gaming Commission], 2018). However, this restrictive approach has proven impossible to enforce in practice, meaning that 82 of the 100 highest-grossing iPhone games were still illegally selling loot boxes in 2022, four years after the supposed 'ban' was pronounced (Xiao, 2023b). The Belgian regulator has since suggested that law reform should consider whether loot boxes should perhaps be permitted but regulated, rather than entirely banned (Belgische Kansspelcommissie [Belgian Gaming Commission], 2022, 7, para 2.4.2.).

All other countries' positions can be summarized as: only loot boxes that are (i) purchased with real-world money and (ii) whose random content is worth real-world monetary value (*i.e.*, can be transferred between players or 'cashed out' (Leahy, 2022, p. 567; Zendle et al., 2019)) legally constitute gambling and are illegal if offered without

a license (Xiao et al., 2022). Loot boxes are assumed to always involve (iii) an element of randomization and chance inherently, as otherwise the product would not be a 'loot box' *per se*. No license is known to have been granted to video game companies to offer loot boxes as gambling anywhere in the world.

The Netherlands was the only country known to have attempted to enforce gambling law against illegal loot box implementations satisfying the above definition. In 2018, the Dutch gambling regulator threatened criminal prosecution of Valve for offering allegedly illegal loot boxes in *Counter-Strike: Global Offensive* (*CS:GO*; Valve, 2012) and *Dota 2* (*Defense of the Ancients 2*; Valve, 2013). Valve complied with the demands by first disabling Dutch players' ability to transfer loot box content between each other (McWhertor, 2018) and then disabling their ability to engage with loot boxes (Handrahan, 2018). However, in 2022, on final appeal by another video game company, the Dutch court has since overturned the country's gambling regulator's decision to regulate loot boxes using gambling legislation (Afdeling Bestuursrechtspraak Raad van State [Administrative Jurisdiction Division of the Council of State] (The Netherlands), 2022; Xiao & Declerck, 2023). It is not known whether Dutch players are now no longer disabled from engaging with loot boxes since that judgment. The separate point of law that was used to strike down the Dutch enforcement action is unlikely to be decided in the same way by other countries' courts (Xiao & Declerck, 2023). Regardless, in all other countries, the gambling regulators' interpretation remains the law until successfully challenged in the courts (Department for Digital, Culture, Media & Sport (UK), 2022, para. 245). Any paid loot boxes whose random content possesses real-world monetary value and can be cashed out are illegal, unless offered with a gambling license (which cannot be obtained by a video game company for loot boxes in most countries).

Drummond et al. have previously established that the loot box contents of *CS:GO*, *Dota 2*, and *Player Unknown's Battlegrounds* (*PUBG* and, presently, *PUBG: BATTLEGROUNDS*; Krafton, 2017) can be cashed out and possess real-world monetary value (Drummond et al., 2020). This cashing out can be done through the Steam Community Market where Valve facilitates the buying and selling of virtual items in exchange for real-world money between players (https://steamcommunity.com/market/). Drummond et al.'s dataset revealed that the in-game items of these select games on Steam have been bought and sold over 1.45 billion times with a combined value of over US$1 billion (Drummond et al., 2020), p. 987). The average sale price of an individual item was about US$5, but the most expensive item was sold for over US$740 (Drummond et al.., 2020, p. 987. Importantly, approximately 93% of the sales involved an item obtained from a loot box being sold for less than the initial purchase price of the loot box (*i.e.*, to open one and obtain a random item) (Drummond et al., 2020, p. 987), meaning that the player who originally paid for the loot box has lost money as a result of their participation in the activity.

The fact that the money in players' Steam accounts can only be used to make further transactions in the Steam Community Market or to purchase games on Steam is unlikely to preclude Steam from regulation (Steam, 2023b), as placing restrictions on, for example, how physical poker chips might be used in a real-world casino would not preclude the gambling operator from regulation. In addition, players are able to make an uneven trade inside the Steam ecosystem (*e.g.*, for one player to give US$100 worth of in-game items to the other player and receive virtually nothing in return) that is then duly compensated for with an external real-world money transaction (*e.g.*, through the

other player transferring US$100 in real-life to the first player), thus allowing for cashing out. Finally, and perhaps most obviously, it is possible to purchase Valve's VR headset, the Valve Index, and the company's gaming handheld hardware, the Steam Deck, which are consumer electronic products that will be physically delivered to the buyer, using funds in one's Steam account. Players have indeed reported on Reddit that they (partially) funded the purchase of their VR headset and gaming handheld device by generating money from selling in-game items which were obtained from loot boxes (u/crimsoncalamitas, 2022; u/Gortosan, 2023; u/RidgeMinecraft, 2023). The player is then naturally at liberty to resell that physical product to another party in exchange for cash, *e.g.*, on eBay.

The loot boxes in these three games identified by Drummond et al. infringe current gambling laws in many countries according to the respective national gambling regulator's interpretation. However, no enforcement action has reportedly been brought. The UK Government has recently claimed that the UK Gambling Commission has taken 'robust' enforcement action (Department for Digital, Culture, Media & Sport (UK), 2022, paras 35, 245, 251), citing the *FutGalaxy.com Case* (Xiao, 2022d, pp. 449–450; UK Gambling Commission, 2017a). However, that case actually concerned the successful criminal prosecution of a third-party website that facilitated illegal online gambling with in-game currency and had no direct relations to loot boxes (Cornerstone Barristers, 2018), contrary to what the UK Government suggested (Department for Digital, Culture, Media & Sport (UK), 2022, para. 131). That case did not strike at the crux of the issue: that some existing loot box implementations have content that can be cashed out and are unlicensed and therefore illegal under current gambling law, but remain available for purchase by consumers. Indeed, the legal reasoning behind the *FutGalaxy.com Case* would support direct gambling law enforcement against certain loot boxes (Xiao, 2024b). However, no enforcement actions have ever been taken against such 'first-party' contraventions (besides the Dutch attempt that failed on a different legal point (Afdeling Bestuursrechtspraak Raad van State [Administrative Jurisdiction Division of the Council of State] (The Netherlands), 2022; Xiao & Declerck, 2023).

It is trite to state that the law should be enforced as written and that unenforced laws should be repealed, unless their preservation can somehow otherwise be justified. Gambling law has not been properly enforced in relation to video game loot boxes in many jurisdictions, despite statements published by gambling regulators indicating, or at least implying, an intention to enforce the law. Consumers and policymakers may therefore presently be under the incorrect assumption that gambling law has been duly enforced (when it has not been) and thus the loot boxes in all popular games available to them are lawful (when they are not). This point must be clarified and corrected. One potential explanation for this general lack of enforcement action across nearly all jurisdictions is that the gambling regulators do not possess the requisite specialist video game knowledge and tangible evidence to prosecute and lack the resources to obtain them, similarly to why the Belgian gambling regulator did not effectively enforce their loot box 'ban' (Xiao, 2023b). The present study was conducted to detail illegal loot boxes (according to various gambling regulators' previously published interpretations) on the Steam video game digital distribution platform operated by Valve, with the aim of providing a list of game titles and accompanying screenshot evidence for the regulators' perusal and response and thereby supporting potential enforcement.

In addition, age rating organizations have introduced a warning label ('In-Game Purchases (Includes Random Items)') to denote games containing loot boxes and began assigning this to games from April 2020 (Entertainment Software Rating Board (ESRB), 2020; Pan European Game Information (PEGI), 2020; Xiao, 2021a, 2023a; Garrett et al., 2022). This industry self-regulation has technically not been formally introduced to the Steam platform as it is not a participating storefront of the International Age Rating Coalition (IARC), which is responsible for assigning the label to digitally released games (International Age Rating Coalition (IARC), 2022). This measure has been poorly implemented on the mobile Google Play Store platform (Xiao, 2023a) and participating storefronts for PC and console games (Xiao, 2023c). However, at least for *FIFA 23* (Electronic Arts, 2022), the game's Steam product page displayed the label as of 19 February 2023. In contrast, no label was displayed for another game, *NARAKA: BLADEPOINT* (NetEase, 2021), which was deemed by the European age rating organization to contain loot boxes and duly labeled (Xiao, 2023a, 2023c). The present study sought also to assess whether this measure has been effectively implemented for loot box-containing games on the Steam platform.

To summarize, the present exploratory study sought to (i) comprehensively identify loot boxes with transferable content on Steam that would contravene gambling law as interpreted by the relevant regulator of many countries and (ii) check whether games with loot boxes on Steam have been labeled with a loot box presence warning, as is required in some countries.

2. Method

Reviewing the Steam Community Market webpage (https://steamcommunity.com/market/) revealed that the platform supported the buying and selling of the in-game items of 165 games as of 19 February 2023. Specifically, this was done by counting all the game titles listed under the 'Browse by Game' tab on the right hand-side of the interface after fully expanding that list by clicking the 'Show more' button. The webpage as it appeared on 29 January 2024 before and after the 'Show more' button was clicked is respectively shown at: https://osf.io/dvhqg and https://osf.io/y763x.

The following three variables were measured on 19–20 February 2023 in relation to those 165 games through content analysis of the descriptions of the in-game items that were available for purchase and sale for each respective game on the Steam Community Market and the game's Steam product page. This was also supplemented with browsing online resources (*e.g.*, watching YouTube videos recording loot box openings and reading forums posts) where needed and available.

Transferable loot box availability: Whether said game contained loot boxes that could be bought and sold on the Steam Community Market (or 'transferable' loot boxes). Due to constraints on research resources and the need to present the present results promptly to assist in ongoing regulatory efforts, games were not assessed as to whether they contained loot boxes through gameplay. This meant that any nontransferable paid loot boxes could not have been detected. Besides games that only contained transferable loot boxes, games that contained both transferable and nontransferable loot boxes would also have been accurately coded as containing the former. However, any games containing only paid loot boxes that themselves could not be bought and sold between players would

therefore have been coded as not containing 'transferable' loot boxes. Importantly, whether a game contains 'transferable' loot boxes is not necessarily indicative of whether it contain paid loot boxes generally. This is, firstly, because games that do not contain transferable loot boxes may contain other loot boxes that are only sold by the game operator directly in exchange for real-world money and cannot be transferred between players (but whose loot box content could potentially still be transferable). Secondly, some transferable loot boxes may only be obtainable from the game (and, by extension, the game company) without payment and cannot be bought directly with real-world money (so-called non-paid or free loot boxes); however, these loot boxes are then purchasable in exchange for real-world money through the secondary market due to the transferable nature of these loot boxes. It is then debatable whether said game contains paid loot boxes per se, which may be defined either as purchasable directly from the game company or purchasable at all. This aspect is discussed further below.

Loot box content transferability: Whether said game's loot box content could be bought and sold on the Steam Community Market.

Loot box presence labeling status: Whether said game was attached with and displaying the 'In-Game Purchases (Includes Random Items)' label on the Steam storefront product page.

PDF printouts and Safari.webarchive files preserving the webpages visited were recorded. These are publicly available at the data deposit link in the Open Science Framework: https://doi.org/10.17605/OSF.IO/349Y7.

This study was exploratory because, in attempting to establish whether the research methodology was viable, the first author had already observed a significant portion of the data before any preregistration could take place.

2.1. Dual coding

Quasi-dual coding of the data was conducted on 30 January 2024 or approximately one year after the initial data collection because this was suggested by a reviewer during revisions to check the reliability of the content analysis. Given the passage of time, true dual coding of the original data was no longer possible. Firstly, the games and the Steam Community Market, including its content and what results would be shown using the search tool, have undoubtedly changed during the intervening year, which may affect the coding results. Secondly, basing the dual coding on only the materials collected by the first coder at the original data collection time archived on the Open Science Framework (OSF) would mean that the second coder would not actually be performing the original content analysis exercise and thus would not be testing its reliability: specifically, they would be unable to find loot boxes that the first coder has not also found because the first coder did not archive the mass amount of materials that would be required to evidence the *absence* of a certain matter (*e.g.*, a snapshot of the Steam platform as it then was); only the preservation of the evidence of any *presence* was reasonably practicable.

Therefore, when the second coder followed the content analysis method set out above to assess the situation on 30 January 2024 of 17 randomly selected games (which is 10% of the total sample of 165 rounded up), the subject matter studied was technically different (the webpages on different dates were analyzed) and also potentially substantively different (because the companies might have changed the

Table 1. Inter-rater reliability (*n* = 17).

Variable	Percentage agreement (Cohen's κ)
Transferable loot box availability	100% (1.00)
Loot box content transferability	100% (1.00)
Loot box presence labeling status	100% (1.00)

underlying content during the intervening year). Nonetheless, there was perfect agreement for all three variables, as shown in Table 1, despite the passage of time. Notably, the game *CS: GO*, which was in the random dual coding sample, was replaced with *Counter-Strike 2* (Valve, 2023). All *CS:GO* items (including loot boxes and loot box content) were transferred over to its sequel, *Counter-Strike 2*, as stated on the official website (Valve, 2023). Coder 2 therefore coded *Counter-Strike 2* instead of *CS:GO*, given that the former is the complete successor of the latter. References in this article to *CS:GO* apply also to *Counter-Strike 2* as appropriate.

2.2. Longitudinal evidence on non-compliance and non-enforcement

The dual coding procedure above inspired a further exploratory analysis during the revision process, which is to check whether games deemed to contain transferable loot boxes with transferable content (*i.e.*, the type of loot box that would be deemed illegal under the gambling laws of many countries) continue to offer these on the Steam Community Market about a year after the original data collection was conducted in February 2023 and after a number of national gambling regulators were informed of the present results as detailed in the Postscript section. Therefore, all such games were reexamined by a second coder in February 2024.

In accordance with the *Danish Code of Conduct for Research Integrity* (Ministry of Higher Education and Science (Denmark), 2014), as adopted by the IT University of Copenhagen, the present study did not require research ethics assessment and approval because no human participants or personal data were involved and only publicly available information was examined and recorded.

3. Results

Amongst the 165 game entries found through the Steam Community Market webpage and listed in Table 2, 119 (72.1%) were deemed as not containing 'transferable' loot boxes (even though they may still have contained paid but nontransferable loot boxes), 10 (6.1%) were identified as containing 'transferable' loot boxes but their content could not be confirmed as being transferable due to a lack of information; and 36 (21.8%) were identified as containing 'transferable' loot boxes whose content is also transferable.

Notably, amongst those 36 entries, one entry was not a game *per se* but was the Steam platform's 'meta' trading card feature: users were able to purchase, using real-world money, random assortments of digital 'cards' that can then be transferred between users and therefore possess real-world monetary value.

None of the 36 entries were marked with the loot box presence warning label of 'In-Game Purchases (Includes Random Items),' although arguably the Steam platform's trading card feature was incapable of being so labeled.

Table 2. Full list of all games studied and the coding of the variables ($N = 165$).

#	Title	Transferable loot box availability	Loot box content transferability	Loot box presence labeling status
1	*Counter-Strike: Global Offensive [Counter-Strike 2]*	yes	yes	no
3	*Dota 2*	yes	yes	no
5	*Killing Floor 2*	yes	yes	no
6	*PUBG: BATTLEGROUNDS*	yes	yes	no
7	*Rust*	yes	yes	no
8	*Steam platform's 'meta' trading card feature*	yes	yes	cannot be
9	*Team Fortress 2*	yes	yes	no
10	*Unturned*	yes	yes	no
11	*!Anyway!*	yes	yes	no
12	*#monstercakes*	yes	yes	no
20	*Armello*	yes	yes	no
25	*Ball 3D: Soccer Online*	yes	yes	no
41	*Business Tour - Online Multiplayer Board Game*	yes	yes	no
43	*Call to Arms*	yes	yes	no
51	*DeDrive*	yes	yes	no
70	*Forgotten Lore*	yes	yes	no
76	*Gremlins, Inc.*	yes	yes	no
82	*Hero Siege*	yes	yes	no
86	*Immune*	yes	yes	no
90	*Islands of Nyne: Battle Royale*	yes	yes	no
92	*KurtzPel*	yes	yes	no
110	*PAYDAY 2*	yes	yes	no
114	*Primal Carnage: Extinction*	yes	yes	no
116	*Project Winter*	yes	yes	no
122	*Reflex Arena*	yes	yes	no
124	*Rival Rampage*	yes	yes	no
125	*Robot Roller-Derby Disco Dodgeball*	yes	yes	no
128	*Savage Resurrection*	yes	yes	no
129	*Screeps: World*	yes	yes	no
132	*Shoppe Keep 2*	yes	yes	no
139	*Stardrift Nomads*	yes	yes	no
143	*Supraball*	yes	yes	no
151	*WARMODE*	yes	yes	no
160	*XERA: Survival*	yes	yes	no
162	*Zup! Arena*	yes	yes	no
165	*武侠乂*	yes	yes	no
13	*- Arcane Raise -*	yes	cannot confirm	no
22	*Avalom: Ancestral Heroes*	yes	cannot confirm	no
48	*CounterAttack*	yes	cannot confirm	no
69	*Flying Pengy*	yes	cannot confirm	no
73	*Gem Forge*	yes	cannot confirm	no
77	*HALF DEAD 2*	yes	cannot confirm	no
78	*HALF DEAD 3*	yes	cannot confirm	no
85	*I was rebuilt*	yes	cannot confirm	no
99	*Mech Anarchy*	yes	cannot confirm	no
133	*Slymes*	yes	cannot confirm	no
2	*Don't Starve Together*	no	N/A	N/A
4	*Golf It!*	no	N/A	N/A
14	*100% Orange Juice*	no	N/A	N/A
15	*A Hat in Time*	no	N/A	N/A
16	*Alien Hostage*	no	N/A	N/A
17	*American Truck Simulator*	no	N/A	N/A
18	*Andarilho*	no	N/A	N/A
19	*Argo*	no	N/A	N/A
21	*Artifact Classic*	no	N/A	N/A
23	*Awesome Metal Detecting*	no	N/A	N/A
24	*BATTALION: Legacy*	no	N/A	N/A

(*Continued*)

Table 2. (Continued).

#	Title	Transferable loot box availability	Loot box content transferability	Loot box presence labeling status
26	*Ballads of Hongye*	no	N/A	N/A
27	*Ballistic Overkill*	no	N/A	N/A
28	*Barro*	no	N/A	N/A
29	*BattleBlock Theater*	no	N/A	N/A
30	*Be Quiet!*	no	N/A	N/A
31	*Black Squad*	no	N/A	N/A
32	*Blade Symphony*	no	N/A	N/A
33	*Blood Feed*	no	N/A	N/A
34	*Bloody Glimpse*	no	N/A	N/A
35	*Bloody Walls*	no	N/A	N/A
36	*Boreal Blade*	no	N/A	N/A
37	*Brawl of Ages*	no	N/A	N/A
38	*Bunny Hop League*	no	N/A	N/A
39	*Burst Into*	no	N/A	N/A
40	*Burst The Game*	no	N/A	N/A
42	*CASE 2: Animatronics Survival*	no	N/A	N/A
44	*Capsa*	no	N/A	N/A
45	*Children of Orc*	no	N/A	N/A
46	*Clatter*	no	N/A	N/A
47	*Comedy Night*	no	N/A	N/A
49	*Darts and Friends*	no	N/A	N/A
50	*Day of Infamy*	no	N/A	N/A
52	*Deadhold*	no	N/A	N/A
53	*Death Runner*	no	N/A	N/A
54	*Defense Clicker*	no	N/A	N/A
55	*Depth*	no	N/A	N/A
56	*Desert Strait: Operation Online*	no	N/A	N/A
57	*Died Of Fear*	no	N/A	N/A
58	*DiggerOnline*	no	N/A	N/A
59	*Dinosaur Forest*	no	N/A	N/A
60	*Dinosaur Hunt*	no	N/A	N/A
61	*Drunken Wrestlers 2*	no	N/A	N/A
62	*Ember Strike*	no	N/A	N/A
63	*Emily is Away*	no	N/A	N/A
64	*Empires Apart*	no	N/A	N/A
65	*Epic Royal*	no	N/A	N/A
66	*Euro Truck Simulator 2*	no	N/A	N/A
67	*Exit From*	no	N/A	N/A
68	*FLYVALNY 20!8*	no	N/A	N/A
71	*FreeCell Quest*	no	N/A	N/A
72	*Fruit Ninja VR*	no	N/A	N/A
74	*Golf Around!*	no	N/A	N/A
75	*Golf With Your Friends*	no	N/A	N/A
79	*HUNGER*	no	N/A	N/A
80	*Half-Life: C.A.G.E.D.*	no	N/A	N/A
81	*Heliborne Collection*	no	N/A	N/A
83	*Hired Ops*	no	N/A	N/A
84	*Holopoint*	no	N/A	N/A
87	*Interstellar Rift*	no	N/A	N/A
88	*Intralism*	no	N/A	N/A
89	*Intruder*	no	N/A	N/A
91	*Knights Hunt*	no	N/A	N/A
93	*L.S.S*	no	N/A	N/A
94	*LET IT DIE*	no	N/A	N/A
95	*Legend of Himari*	no	N/A	N/A
96	*Longvinter*	no	N/A	N/A
97	*Machine Hunt*	no	N/A	N/A
98	*Marble Combat*	no	N/A	N/A
100	*MegaRats*	no	N/A	N/A
101	*MineSweeper VR*	no	N/A	N/A

(*Continued*)

Table 2. (Continued).

#	Title	Transferable loot box availability	Loot box content transferability	Loot box presence labeling status
102	*Miscreated*	no	N/A	N/A
103	*Moon Bullet*	no	N/A	N/A
104	*Move or Die*	no	N/A	N/A
105	*Natural Selection 2*	no	N/A	N/A
106	*NeoBoom*	no	N/A	N/A
107	*Nine Parchments*	no	N/A	N/A
108	*Nova-Life: Amboise*	no	N/A	N/A
109	*OLDTV*	no	N/A	N/A
111	*Paintball War*	no	N/A	N/A
112	*Path of Exile*	no	N/A	N/A
113	*Perfect Heist 2*	no	N/A	N/A
115	*Project Lounge*	no	N/A	N/A
117	*Ratz Instagib 2.0*	no	N/A	N/A
118	*Realm Revolutions*	no	N/A	N/A
119	*Red Wake Carnage*	no	N/A	N/A
120	*Redmatch 2*	no	N/A	N/A
121	*Redout: Enhanced Edition*	no	N/A	N/A
123	*Remnants*	no	N/A	N/A
126	*Rogue Agent*	no	N/A	N/A
127	*Russian Life Simulator*	no	N/A	N/A
130	*Sense of The Devil*	no	N/A	N/A
131	*Shoot Mania VR: Fun Zombies*	no	N/A	N/A
134	*SosSurvival*	no	N/A	N/A
135	*Soul at Stake − 1v4*	no	N/A	N/A
136	*Space Engineers*	no	N/A	N/A
137	*SpeedRunners*	no	N/A	N/A
138	*Spider Wars*	no	N/A	N/A
140	*SteamVR*	no	N/A	N/A
141	*Subnautica*	no	N/A	N/A
142	*Subsistence*	no	N/A	N/A
144	*Survival Zombies The Inverted Evolution*	no	N/A	N/A
145	*The Culling*	no	N/A	N/A
146	*ULTIMATE ARENA: SHOWDOWN*	no	N/A	N/A
147	*USA 2020*	no	N/A	N/A
148	*Undarkened*	no	N/A	N/A
149	*Unearthing Process*	no	N/A	N/A
150	*UpGun*	no	N/A	N/A
152	*WAVESHAPER*	no	N/A	N/A
153	*Wallpaper Engine*	no	N/A	N/A
154	*Warframe*	no	N/A	N/A
155	*West of Red*	no	N/A	N/A
156	*Wing Breakers*	no	N/A	N/A
157	*Wolcen: Lords of Mayhem*	no	N/A	N/A
158	*Wolflord - Werewolf Online*	no	N/A	N/A
159	*World of Warships*	no	N/A	N/A
161	*Zombie Grinder*	no	N/A	N/A
163	*n-body VR*	no	N/A	N/A
164	*中国象棋*	no	N/A	N/A

Note. The game's numbering is based on its position on the list as shown in the Steam Community Market interface on 19 February 2023. Games identified as containing transferable loot boxes are listed before other entries, and those with transferable content are bolded and listed before the ones without.

3.1. Longitudinal results: February 2023 compared to February 2024

A year after the original data collection was conducted in February 2023, the longitudinal reanalysis confirmed that all 36 previously identified entries continued to offer transferable loot boxes with transferable content in February 2024.

One game (*Killing Floor 2* (Tripwire Interactive, 2016)) out of 35 relevant games (2.8%) was now newly attached with a loot box presence warning label next to the game's age rating. All other games remained unlabeled.

4. Discussion

In total, 36 entries (35 individual games and the Steam platform's trading card system) were identified as infringing the current gambling law of many countries per the pronounced interpretations of national gambling regulators (*e.g.*, Spillemyndigheden [Danish Gambling Authority], 2017; UK Gambling Commission, 2017). Games containing paid loot boxes whose content is transferable were very rarely identified in mobile contexts: very few examples (*e.g.*, *Auto Chess* (Dragonest, 2019)) were discovered by previous loot box prevalence and regulatory compliance studies on mobile platforms (Xiao, Henderson, Yang, et al., 2021; Xiao, 2023a, 2023b; Xiao et al., 2023; Zendle et al., 2020). The present study comprehensively studied the Steam platform and is therefore able to report a substantial number of loot box implementations that are suspected to be illegal in many countries.

Zendle et al. previously studied whether games containing loot boxes could be cashed out on the Steam platform amongst a more limited sample, but did not report specific games due to not being able to reliably assess whether cashing out was possible (Zendle et al., 2020, p. 1769). Zendle et al.'s data collection was conducted approximately three and a half years prior to the present study. Due to this passage of time, some games have changed, *e.g.*, *Rocket League* (Psyonix, 2015) removed loot boxes (Gach, 2019; Psyonix Team, 2019; Valentine, 2019), which limits how much the data are comparable across the two studies. In addition, Zendle et al.'s methodology was different and would have been able to detect paid loot boxes that are nontransferable and contain transferable rewards, which the present study could not have: this would have affected the coding results unless that game also contained paid loot boxes that are transferable, thus affecting any cross-study comparisons. Reviewing Zendle et al.'s data revealed that 12 games were coded by both that study and the present study as to whether they contain loot boxes that can be cashed out: there was substantial agreement (Cohen's $\kappa = 0.66$) amongst the three 'coders' (two from Zendle et al. and one from the present study). For the seven games that the present study submitted as offering illegal gambling, both Zendle et al. coders agreed that five of those games contained loot boxes with content that could be cashed out, and one Zendle et al. coder agreed that the remaining two games contained transferable loot box content.

Amongst the 36 entries confirmed to contain transferable loot box rewards, three games were delisted at the publisher's request (namely, *Forgotten Lore* (Getzelman, 2018); *Immune – True Survival* (vidiludi, 2016); and *Savage Resurrection* (S2 Games, 2016)), and one game was 'no longer available on the Steam store' (specifically, *Zup! Arena* (Quiet River, 2018)). Gambling regulators could quite reasonably come to the conclusion that

the prosecution of these four games is not worth pursuing and that the other contraventions that continue today in relation to the further 32 entries are more concerning.

Amongst those 32 entries are highly popular games, such as *CS:GO*, *Dota 2*, *PUBG*, and *Team Fortress 2* (Valve, 2007). These four games in particular have hundreds of thousands of users playing each game at any given time (Clement, 2022b, 2022c, 2022d), with *CS:GO* regularly having more than 1 million concurrent players (Clement, 2022a). These are therefore not obscure examples of games operated by companies that may be unaware of relevant regulations due to a lack of resources. Instead, leading international video game companies oversee their operation (including legal compliance). Many companies are failing to comply with gambling law in many countries, despite the relevant regulators having published opinions on what types of loot boxes would be deemed as illegal gambling. Indeed, in 2018, the Dutch gambling regulator had even previously enforced the law against *CS:GO* and *Dota 2* in the Netherlands (although that enforcement action would now likely be deemed illegal due to a separate legal point (Afdeling Bestuursrechtspraak Raad van State [Administrative Jurisdiction Division of the Council of State] (The Netherlands), 2022; Xiao & Declerck, 2023), but it is not known whether Valve has reverted its 'compliance' action that it was incorrectly forced to perform) (Handrahan, 2018; McWhertor, 2018). It is not known why other gambling regulators have not enforced the law, in contrast to what the Dutch regulator has tried but ultimately failed to do. Again, the courts of other countries are unlikely to agree with the separate point of law that was used to strike down the Dutch enforcement action.

The responsibility to better comply with the law lies not only with the companies operating each individual game but also with Valve's Steam platform, as it facilitates the trading of in-game items in exchange for real-world money. Valve, through the Steam platform, also directly profits from each player-to-player transaction because it charges a 'Steam Transaction Fee,' which is 5% and at least US$0.01 (Steam, 2023a). Furthermore, popular games published by Valve itself (*e.g.*, *Team Fortress 2*, *Dota 2*, and *CS:GO*) also charge an additional 10% 'game specific fee' (Steam, 2023a). This means Valve profits 15% of the sale price from player-to-player transactions of the loot box content in the most popular games. Valve should have ensured that any loot box content is not transferable using the Steam Community Market in countries where the provision of such facilities would render the relevant loot boxes into illegal gambling (which we know Valve is technically capable of doing from the previous experience in the Netherlands).

Interestingly, a few games technically did not offer loot boxes with transferable content directly for purchase using real-world money (so-called 'Embedded-Embedded' loot boxes; see Nielsen & Grabarczyk, 2019) and took efforts to emphasize that point (likely for compliance reasons). For example, *Armello* (League of Geeks, 2015) stated in relation to a loot box that 'This Chest can be earned through in-game systems' and implied that it could *not* also be bought directly from the game company. This means that this loot box was initially designed and intended to be a non-paid, 'Isolated-Embedded' loot box (see Nielsen & Grabarczyk, 2019) (which is *not* obtained through direct purchase using real-world money but offers transferable content) that many countries may not regulate under existing law (Xiao et al., 2022). However, some countries, such as the UK, would still be capable of regulating such loot boxes as gambling even though they are non-paid (see, *e.g.*, Section 6(4)(b) of the UK Gambling Act 2005 stating that a player gambles 'whether or not he risks losing anything at the

game'). Regardless, this loot box or 'Chest' in *Armello* can itself be bought and sold on the Steam Community Market for real-world money between players, meaning that to any user it is *de facto* an 'Embedded-Embedded' loot box (see Nielsen & Grabarczyk, 2019) (because the player has the option of obtaining it by buying it with real-world money, albeit not from the game company) that infringes gambling law in many countries (Xiao et al., 2022), despite what the game company might have intended.

Similarly, *Gremlins, Inc.* (Charlie Oscar, 2016) stated that:

> Gremlins, Inc. features in-game items and fully supports Steam Community Market. While playing the game, certain actions will trigger random chest drops with items of varying rarity: it could be a new emoticon, a new profile background, a new music track, or one of the dozens of other cosmetic items. These items are FREE, yours to use or trade on Steam Community Market. *We, the developer, do not engage in the direct sales of any drop items*; only players can trade them. (emphasis added) (Charlie Oscar, 2023)

The companies are preempting regulation and enforcement by arguing that they do not sell the loot boxes directly for real-world money and are not offering (potentially) illegal gambling themselves. Indeed, the odd regulator (*e.g.*, in Sweden (Konsumentverket [Swedish Consumer Agency], 2019, p 43) and France (Autorité de regulation des jeux en ligne (ARJEL) [Regulatory Authority for Online Games France], 2018, p. 7, para 6)) has suggested that if loot box content only gains real-world monetary value through third-party websites (and cannot do so directly through the game company), then the companies do not infringe gambling law when offering loot boxes. However, given that these loot boxes with transferable content that is worth real-world monetary value can be bought with real-world money, these companies are still facilitating illegal gambling (arguably offered by one player to another) by providing the means for players to obtain and purchase loot boxes. Some form of culpability must reasonably attach, even if perhaps not under gambling law for the direct provision of illegal gambling. Furthermore, importantly, a distinction should be drawn between 'third-party' websites like FutGalaxy.com (which the UK gambling regulator successfully prosecuted (Xiao, 2022d, pp. 449–450; UK Gambling Commission, 2017a) and skins betting websites (which the Australian online gambling regulator has successfully prosecuted (Australian Communications and Media Authority, 2023; Xiao, 2024b) on one hand and the Steam Community Market on the other, which is arguably not truly 'third-party,' given the close connections between the game and Steam. For example, the underlying video game is bought through Steam and the in-game items (including transferable loot boxes and transferable loot box rewards) are managed through the Steam platform. Indeed, in relation to games where Valve, the operator of Steam, also acts as the developer and/or publisher for the relevant game (*e.g.*, *Team Fortress 2*, *Dota 2*, and *CS:GO*) specifically, the third-party immunity argument is unsustainable because Valve cannot claim another one of its own services was provided by a 'third-party.'

Notably, probability disclosures informing the player of how likely they are to obtain specific rewards, which are required by law in some jurisdictions (Xiao, Henderson, Yang, et al., 2021) and generally required by industry self-regulation in all other countries (Xiao et al., 2023), have not been made in relation to many of these 'Isolated-Embedded' loot boxes that are actually 'Embedded-Embedded' loot boxes in practice. For example, *Armello* merely detailed how the loot boxes might contain

rewards of varying rarity (Armello, 2023). Players who purchase such a loot box from the Steam Community Market with real-world money have not been informed of the relevant probabilities for obtaining various random content. The prices of these loot boxes can also fluctuate as they change according to market demands. These aspects make purchasing loot boxes on the user-to-user Steam Community Market even riskier than buying them more transparently from game companies directly at a predetermined set price with known probabilities. A number of other games that directly sold Embedded-Embedded loot boxes also did not make probability disclosures. Similarly to how all games found to contain transferable loot boxes did not attach the loot box presence warning label of 'In-Game Purchases (Includes Random Items),' it appears that self-regulatory measures that were adopted by other platforms (*e.g.*, the Google Play Store and the Apple App Store) but not by Steam were indeed not voluntarily complied with. One of the most popular digital storefronts (and likely the most popular for PC games) should adopt the IARC system. Steam and IARC should work toward ensuring that the self-regulation is applied to the platform and that companies comply satisfactorily with it (Xiao, 2023c).

Finally, particular attention is directed to the 'meta' trading card system offered on the Steam platform generally. These cards feature the intellectual property from games of various companies that do not sell any type of loot boxes, *e.g.*, *Elden Ring* (FromSoftware & Bandai Namco, 2022). It is not known how the revenue is shared by Valve's Steam platform and the IP-owning companies, but those other companies are also implicated in the sense that they have allowed their IP to be used in relation to a product that constitutes illegal gambling in many countries. These cards can be obtained through purchasing packs containing random cards with real-world money. These cards are also transferable between players and therefore possess real-world monetary value. It is doubtless that this mechanic constitutes illegal gambling (as it is not known to have been duly licensed) under the various gambling regulators' interpretations. There is no practical difference between this mechanic and physical packs containing random cards in real-life that operate identically. Those physical card packs also infringe gambling law but have not been enforced against (Xiao, 2022a). The digital trading card packs of the Steam platform have again highlighted how gambling regulators have drawn an artificial distinction between video game loot boxes and physical card packs that cannot be justified on the face of the law as drafted. In 2018, a representative of the Belgian gambling regulator attempted to justify this distinction based on the exception provided by Article 3(3) of the Belgian Gambling Act of 7 May 1999 which permits the playing of card games outside gambling venues (Taylor, 2018); however, that exception only applies to the *playing* of trading card games and not the *purchasing* of packs to obtain random trading cards, which is an entirely separate activity that cannot escape being caught by regulation. The Belgian gambling regulator has since, in 2022 following Xiao's study (2023b), agreed that trading card packs are equivalent to video game loot boxes and should be regulated identically (Belgische Kansspelcommissie [Belgian Gaming Commission], 2022, p 7, fn 11).

As mentioned in the Method section, the present study focused on identifying loot boxes that can be bought and sold on the Steam Community Market, as this could be done without expending the significant resources that would be required to find loot boxes through gameplay. This methodological choice meant that loot boxes that are sold

for real-world money by game companies but are not transferable on the Steam Community Market could not and were not identified. Such loot boxes could also contain rewards that are transferable and possess real-world monetary value, and thereby infringe gambling law. Therefore, more games may contain loot boxes on Steam that are illegal in many countries than the present study has identified. In addition, the number of in-game items and amount of money being transacted in relation to these games and their loot boxes have not been calculated. These may be knowable by using the Steam Marketplace API (Application Program Interface), as was done by Drummond et al. (2020, pp. 986–987) in relation to *CS:GO*, *Dota 2*, and *PUBG* only, as discussed in the Introduction. Future research should consider expanding on that line of inquiry using the game titles that the present study has additionally identified.

The present study is further limited in only considering the situation on the Steam platform. Other platforms, such as G2G.com, take a commission fee for helping players to sell in-game items and accounts to each other (Yin, 2023). Such services are facilitating players in breaching the rules of many video games, which generally forbid transactions that would allow loot box content to gain real-world monetary value (whilst the transactions on Steam are all fully permitted), and should be investigated further. Other games, such as *Magic: The Gathering Online* (Wizards of the Coast, 2002), existing outside the Steam ecosystem, also contain paid loot boxes with content that is transferable and possesses real-world monetary value. Indeed, *Magic: The Gathering Online* provides a first-party service that allows players to cash out their loot box rewards: upon collecting a complete set of certain loot box content, the player can pay a fee and ask for the digital content to be removed from their account in exchange for a complete set of the same content to be delivered to them physically (Wizards of the Coast, 2023). The physical content can of course be bought and sold on the secondary market without any restrictions following delivery and possesses substantial real-world monetary value. The video game company actually declares to customs that the physical package is worth US$50 (Wizards of the Coast, 2023), which is far below its actual secondary market value but nonetheless represents a recognition by the company that the package's value is not nil. Another example is *Gods Unchained* (Immutable, 2021), which is a trading card game that sells loot boxes containing NFTs (non-fungible tokens) and claims to have had US$178 million worth of cards (many of which were likely obtained through loot boxes) traded between players as of 3 August 2023 (Immutable, 2023). Beyond the video game loot box context, other physical and digital products that are bought with real-world money and provide random transferable content with real-world monetary value, such as digital containers with random NFTs that exist without an accompanying game (*e.g.*, NBA Top Shot (Xiao, 2022a)) and virtual mystery boxes that potentially delivers physical prizes (*e.g.*, Hybe.com), also exist. If the gambling regulators' logic as to what types of loot boxes constitute illegal gambling is applied, then these products would also constitute illegal gambling unless licensed (Xiao, 2022a). However, generally, gambling law has also not been enforced against these other products.

5. Conclusion

The gambling regulators of many jurisdictions (*e.g.*, Denmark (Spillemyndigheden [Danish Gambling Authority], 2017) and the UK (UK Gambling Commission,

2017b, pp. 7-8, paras 3.17-3.18) have opined that loot boxes that players (i) spend real-world money to purchase and (ii) whose random content possesses real-world monetary value (*e.g.*, is transferable between players) constitute illegal gambling under existing law. No enforcement actions have been brought in any jurisdiction, despite known contraventions existing in the market (besides an attempt in the Netherlands that failed on another point of law). Following the present study, an Austrian court ruled that certain loot boxes whose randomised content is transferable between players are indeed illegal gambling in a civil case (and the game company decided not to appeal the judgment) (Gameswirtschaft, 2023), so although the law has been correctly applied, it is not a criminal prosecution by the gambling regulator. The present study set out to comprehensively identify contraventions on Valve's Steam platform that digitally distributes games for PCs. In total, 35 games were identified as offering loot boxes that would be illegal according to the gambling regulators' interpretation of their country's current gambling law. The Steam platform was also identified as offering a trading card mechanic that similarly infringes gambling law. Gambling regulators have not proactively enforced the law against these contraventions, despite some of them being the most popular and well-known games at present. Consumers, policy-makers, and other stakeholders are hereby alerted to the fact that loot boxes offering transferable content with real-world monetary value do exist; are implemented in several widely popular games on the PC platform; and have not been properly regulated against.

6. Postscript: responses from regulators

The first draft of this study: https://doi.org/10.31219/osf.io/taes2 (Version 1 dated 26 February 2023) was sent to the UK Gambling Commission, the Danish Gambling Authority [Spillemyndigheden], the Finnish Gambling Administration at the National Police Board [Poliisihallituksen arpajaishallinto/Polisstyrelsens lotteriförvaltning], the Swedish Gambling Authority [Spelinspektionen], the Norwegian Gambling and Foundation Authority [Lotteri- og stiftelsestilsynet], and the Icelandic Ministry of Justice [Dómsmálaráðuneytið]. The various responses (where it was received) are summarized below alongside the first author's comments. These paragraphs are clearly denoted as to whether it is the relevant regulator's official response or the first author's commentary.

6.1. UK Gambling Commission

The UK Gambling Commission reiterated its previously published position and thanked the first author for bringing the aforementioned physical and digital products that might constitute illegal gambling to its attention. However, the Commission was unable to comment on any action it might potentially take, except to assure the first author that 'these products are being looked at by specialists throughout the Commission.'

6.2. Danish Gambling Authority

6.2.1. The regulator's position on loot boxes

The Danish Gambling Authority was unable to respond in detail in writing because it 'cannot comment on specific cases, because of [its] obligation of confidentiality.' The Authority reiterated its previously published position and highlighted that, when determining whether loot boxes may infringe Danish gambling law, '[the] relevant factor will often be, whether the prize in the [loot box] has an economic value.' The Authority invited the first author to discuss the issues in a remote meeting on 17 April 2023. The Authority is of the view that loot boxes do not necessarily fit the existing definitions under Danish gambling legislation because the law was drafted only with traditional gambling in mind. A criminal prosecution in relation to loot boxes is likely to be difficult and costly. Other less strict ways to enforce the law may be more strategically viable.

6.2.2. The first author's commentary on loot boxes

A cautious approach to enforcing the law appears advisable when the legal position is not clear-cut. Indeed, the Dutch gambling regulator's attempt to enforce gambling law against loot boxes that could be cashed-out was, after prolonged litigation, struck down by the court (whose judgment suggests that loot boxes are generally not regulable under the Dutch gambling law regime). A failed enforcement attempt (especially a costly one involving litigation and multiple appeals) may be viewed as an inefficient use of public resources. As to other less strict enforcement options that are available to regulators, one obvious method (as the first author suggested during the meeting) is to send pre-action correspondence clarifying the legal position and ask companies to stop implementing loot boxes that might infringe the law. Regulators may also wish to consider education campaigns that directly engage with foreign companies, particularly smaller ones without internal legal teams or the resources to hire external legal advisors for multiple jurisdictions.

6.2.3. The regulator's position on card packs

In relation to card packs and similar gambling-like products, the Authority stated that products offering random content whose value is always above the cost of purchase would not fall within the gambling definition. Further, the Authority identified that those products (whose content's value might be lower than the cost of purchase) were not explicitly mentioned by Danish gambling law when the relevant Act was passed. Therefore, it is difficult to determine the legislative intent: it could be that these products (such as card packs) which existed prior to the passage of the law, unlike loot boxes, were not intended to be covered by the Act and so are not regulable even if they fall within the definition. However, it could also be that the legislators did not consider whether these products should or should not fall within the definition.

6.2.4. The first author's commentary on card packs

Regardless, these products do seem to fall within the existing definition of gambling if plainly interpreted without considering any further materials. It would be a valid policy decision not to regulate such products. However, the law should be amended to carve out such products (rather than to seemingly include them but then not enforce the law) and

a specific policy justification (detailing how that justification might be properly invalidated when better scientific evidence becomes available) should also be published.

6.3. Finnish Gambling Administration

6.3.1. The regulator's position

The Finnish Gambling Administration at the National Police Board was unable to respond to the first author's request for confirmation as to whether specific products are in violation of the law or comment on potential enforcement action as doing so is not within its scope of work. The Administration invited the first author to discuss the issues in a remote meeting on 16 March 2023 with the intention of facilitating the first author to ask further questions that the Administration would be able to answer.

During the meeting, the Administration noted that a previously published document, POL-2018-22730 on 'the relationship between loot boxes and the Lotteries Act' dated 22 August 2018, already set out its interpretation of the law (Gambling Administration of the National Police Board Finland, 2018). This document was requested by a Finnish police department to 'assist in [its] assessment [of the loot boxes in *CS:GO*] in the criminal process.' (That document is made available at the data deposit link for wider scrutiny as it has not been publicly accessible through the Police Board website recently.) The Administration opined in that document that *CS:GO* loot boxes constitute a 'lottery' and violates the Finnish Lotteries Act because the three relevant elements of (i) the participation was paid for with real-world money; (ii) chance; and (iii) monetary gain are satisfied by the product. Further, (iv) the company behind the game, Valve Corporation, does not have a license to offer such lotteries. Indeed, a commercial company cannot obtain such a license even if it desires to do so because such lotteries can only be organized for 'a public benefit purpose' as set out in Sections 5 and 7 of the Finnish Lotteries Act. This is a licensing requirement that a commercial company intending to generate revenue through loot boxes (*i.e.*, organizing lotteries for a commercial purpose) obviously cannot meet. It is notable that the Administration opined that Valve Corporation remains liable for violating the law even though the company's rules prohibit players from trading in-game items on third-party marketplaces because, ultimately, it has 'technically enabled it.' In response to the first author's further question as to whether any enforcement actions were taken against Valve Corporation in relation to *CS:GO* loot boxes following the publication of POL-2018-22730, the Administration clarified that 'the prosecutor decided to not pursue a criminal investigation.'

The Administration explained, in response to the first author's question regarding what enforcement options are available to it, that Finnish lotteries law distinguishes between (a) lotteries whose prize is literally 'money' or 'money lotteries' (Section 3(1) of the Finnish Lotteries Act) and (b) lotteries whose prize is 'of monetary value' or 'goods lotteries' (Section 3a(1) of the Finnish Lotteries Act). Age and advertising restrictions only apply to money lotteries (Sections 14a and 14b of the Finnish Lotteries Act), meaning that the Administration's supervisory powers in relation to those two matters apply only to money lotteries and are significantly curtailed in relation to goods lotteries whose prize is 'of monetary value' but *not* of money *per se*. Loot boxes would generally be 'goods lotteries' because players cannot directly win cash through them. Therefore, the two enforcement options available to the Administration in relation to loot boxes are

limited to (i) informing the relevant video game company of the law and (ii) referring the matter to the Police for potential criminal prosecution. The Administration then reiterated that it will not comment on 'possible future interventions.'

6.3.2. The first author's commentary

Finnish lotteries law is rather unique in differentiating between (a) games of chance whose prizes are literally of money and (b) games of chance whose prizes are of 'monetary value' (*i.e.*, 'money's worth'). Only the first category of money lotteries legally constitute 'gambling' (Section 3 of the Finnish Lotteries Act), whilst the second category of goods lotteries are another type of non-'gambling' lotteries that are nevertheless regulated as games of chance albeit differently. The gambling laws of other countries, such as the UK, do not make such a distinction and would treat both categories in the same way. It may be sensible to provide different licensing regimes for the two categories of lotteries, *e.g.*, to allow charitable goods lotteries to be more expediently approved. The second category might potentially be less harmful than the first category in most cases. However, in the interest of providing maximum consumer protection, the legislative decision to not provide the gambling regulator with robust enforcement powers in relation to the second category of lotteries (particularly, those that fall under that category but are, in fact, non-licensed and illegal) should be revisited. This is also relevant considering that games of chance through which it is possible to win forms of what may well be virtual property (*e.g.*, cryptocurrencies and NFTs), but which are not necessarily 'money' *per se*, are becoming increasingly popularized. The Finnish Lotteries Act should be amended to give additional powers to the Administration to supervise and enforce against illegal goods lotteries, such as loot boxes with transferable content worth real-world money and physical card packs.

Following from the Administration's clarification that it was the prosecutoriate that decided against pursuing further criminal investigation, the first author sought and obtained a copy of the relevant decision, which is made available at the data deposit link (Länsi-Suomen Syyttäjänvirasto [Prosecutor's Office of Western Finland], 2019). In short, the prosecutor lacks jurisdiction under criminal law because the relevant video game company under investigation is not based in Finland. Further extensive discussion of the law can be read elsewhere (Xiao, 2024b). The main takeaway is that, although some loot boxes might constitute illegal gambling under Finnish law, it is not a punishable crime for companies not based in Finland to offer them to Finnish consumers at present. Finland's criminal and gambling laws are highly unsatisfactory and should be promptly updated to address digital or online harms, such as those associated with loot boxes.

6.4. Swedish Gambling Authority

6.4.1. The regulator's position

The Authority did not respond in detail in writing and instead invited the first author to discuss the issue in a remote meeting on 30 June 2023. The Authority did not have an update to its previously stated position (that it is possible some gambling-like products would fall afoul of gambling law depending on the factual circumstances). The loot box

issue has not been a priority as the focus of the Authority has been on regulating traditional gambling. However, the Authority recognizes the importance of paying more attention to this area and is conducting ongoing work.

6.5. *Norwegian Gambling and Foundation Authority*

No response as of 29 April 2024, although the Deputy Director General responded to the first author's e-mail stating that '[he] will follow up and get back to [the first author]' on 17 April 2023, despite an e-mail reminder sent by the first author on 13 June 2023.

6.6. *Icelandic Ministry of Justice*

No response as of 29 April 2024.

7. Post-postscript: longitudinal results

The opportunity to reexamine the noncompliance and non-enforcement situation one year following the original data collection during revisions of this study revealed that the non-compliant games remained available on the Steam platform, and that only 2.8% of games (one game) had subsequently attached a loot box presence label. This is presumably because the relevant video game companies and national gambling regulators have not taken any actions. Stakeholders such as policymakers, players, and parents should be under no illusion about whether the regulators proactively pursue enforcement actions against illegal loot boxes: they do not. Given the regulators' unwillingness (and in some cases inability, *e.g.*, in Finland due to lacking relevant legal powers) to enforce gambling law, stakeholders should not and cannot rely on the status quo to address the concerns surrounding loot boxes. More radical solutions need to be proposed and pursued, so that the problem may be properly dealt with. This could be (i) better funding national gambling regulators so that they have both the financial resources and video game expertise to take appropriate actions or (ii) seeking to regulate loot boxes with consumer protection law (Cartwright & Hyde, 2022; Leahy, 2022) or new, dedicated legislation as multiple countries have already done as discussed above (Xiao, 2024b).

Disclosure statement

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Notes on contributors

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Data availability statement

The underlying data (in particular, PDF printouts and Safari.webarchive files preserving the Steam webpages observed), analysis code and output, and the peer review and editorial history are publicly available in the Open Science Framework at: https://doi.org/10.17605/OSF.IO/349Y7.

Open scholarship

This article has earned the Center for Open Science badges for Open Data and Open Materials through Open Practices Disclosure. The data and materials are openly accessible at DOI: https://doi.org/10.17605/OSF.IO/349Y7

Positionality statement

In terms of L.Y.X.'s personal engagement with loot boxes, he has played and continues to play video games containing loot boxes (*e.g.*, *Hearthstone* (Blizzard Entertainment, 2014) until 2018 and *Genshin Impact* (miHoYo, 2020) from 2020), but he has never purchased any loot boxes with real-world money.

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Paper 5: The UK Apple App Store loot box probability disclosure requirement

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RESEARCH ARTICLE

What are the odds? Poor compliance with UK loot box probability disclosure industry self-regulation

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Abstract

Loot boxes are purchased in video games to obtain randomised rewards of varying value and are thus psychologically akin to gambling. Disclosing the probabilities of obtaining loot box rewards may reduce overspending, in a similar vein to related disclosure approaches in gambling. Presently, this consumer protection measure has been adopted as law only in the People's Republic of China (PRC). In other countries, the videogaming industry has generally adopted this measure as self-regulation. However, self-regulation conflicts with commercial interests and might not maximally promote public welfare. The loot box prevalence rate amongst the 100 highest-grossing UK iPhone games was 77% in mid-2021. The compliance rate with probability disclosure industry self-regulation was only 64.0%, significantly lower than that of PRC legal regulation (95.6%). In addition, UK games generally made insufficiently prominent and difficult-to-access disclosures both in-game and on the game's official website. Significantly fewer UK games disclosed probabilities on their official websites (21.3%) when compared to 72.5% of PRC games. Only one of 75 UK games (1.3%) adopted the most prominent disclosure format of automatically displaying the probabilities on the in-game purchase page. Policymakers should demand more accountable forms of industry self-regulation or impose direct legal regulation to ensure consumer protection.

1. Introduction

Paid loot boxes are randomised monetisation methods in videogames that are purchased by players to obtain randomised rewards of varying value [1]. Some loot boxes may be obtained through gameplay without paying real-world money. However, the present study focuses on *paid* loot boxes which are, hereinafter, referred to as 'loot boxes.' Loot boxes are prevalent in videogames internationally and across different hardware platforms: approximately 60.0% of the highest-grossing mobile games in 'Western' countries (specifically, Australia and the UK) contain loot boxes [2, 3], as do approximately 90.0% in the People's Republic of China (PRC) [4]. (In this paper, the PRC refers to Mainland China and excludes the Special Administrative Regions of Hong Kong and Macau, and Taiwan, as the applicable laws in these areas are

different.) Loot boxes represent an important revenue stream for the videogame industry [5]. Certain rare rewards have a probability of as low as '0.0008%' (or 1 in 125,000) chance of being won from a loot box costing £2.50 (*e.g.*, in Game S14: *Art of Conquest*): the low entry cost and the low chance of winning, present in most loot boxes, are characteristics shared by traditional prize raffles and lotteries. Players often purchase multiple loot boxes in order to attempt to obtain the valuable rare rewards [6]. Loot boxes have been considered conceptually and structurally akin to gambling [7–9].

Vulnerable players, such as problem gamblers and children, may be at particular risk of experiencing harm when engaging with loot boxes [10–14]. In the UK, 58.9% of games deemed suitable for children aged 12+ contained loot boxes in 2019 [3], as did 90.5% in the PRC in 2020 [4]. Indeed, in 2019, 22.9% of 11–16-year olds in the UK reported paying real-world money to buy loot boxes [15], although this figure has since decreased to 10.3% in 2022 [16]. Many countries across the world are considering whether to regulate loot boxes because of their potentially harmful link to problem gambling, and because of general consumer protection concerns (*e.g.*, lack of transparency as to how the randomisation process determines loot box results) [17–19].

Not regulating loot boxes leaves consumers continually exposed to potential harms; however, banning loot boxes may be overly restrictive and unjustifiable given that only a small minority of players may be harmed [20]. Indeed, attempting to ban loot boxes may also be impractical, as demonstrated by Belgium's ineffective attempt to do so [21]. A less restrictive approach that better balances consumer freedom with consumer protection is requiring videogame companies to disclose the probabilities of obtaining randomised rewards from loot boxes, which is easy to implement and therefore incurs minimal compliance costs [4]. Such a measure seeks to provide consumers with information to help them to make more informed purchasing decisions, but does not limit consumers' ability to purchase loot boxes. Researchers have recommended adopting this measure to provide transparency and reduce the potential financial harms of overspending on loot boxes [19, 22, 23].

This probability disclosure measure has been adopted as law in the PRC, which is presently the only country to do so [4]. (Since data collection was conducted for the present study, Taiwan has also separately required this by law since July 2022 [24].) In all other countries [e.g., 25–27], the videogame industry has generally adopted this measure as a form of voluntary self-regulation or corporate social responsibility [28]: for example, all videogames published on Apple's App Store in all countries 'offering "loot boxes" or other mechanisms that provide randomized virtual items for purchase must disclose the odds of receiving each type of item to customers prior to purchase' [29].

In the PRC, amongst the 100 highest-grossing iPhone games, probability disclosures were found for 95.6% of 91 games containing loot boxes [4]. However, because the PRC law requiring probability disclosures and Apple's self-regulation were in force simultaneously, it could not be determined whether the PRC legal requirement was necessary *in addition* to Apple's self-regulation to ensure the identified high level of compliance. A replication in another country (where the relevant legal requirement does not apply, such as the UK) would shed light on the effectiveness of self-regulation acting alone.

Further, the PRC study identified a variety of different methods of probability disclosures of varying prominence and accessibility, because the relevant PRC law did not require specific methods of disclosure: only 5.5% of games disclosed probabilities in the most prominent and accessible disclosure format of automatically displaying the probabilities on the in-game loot box purchase page [4]. Probability disclosure self-regulation in Western countries is similarly worded in general terms and do not require specific, uniform and prominent methods of disclosure [30], *e.g.*, Apple's self-regulatory requirement quoted above. Corporate actions that

seek to inhibit consumers from making more informed choices and potentially encourage them to make worse choices are termed 'sludge' in the behavioural science literature [31–34]. This contrasts with using 'nudge' to help consumers make better choices [35], which probability disclosure should do. Most disclosures observed in the PRC were arguably sludge rather than nudge because they were not uniform, not prominent, and not easily accessible, such that consumers could not derive the maximum potential benefits from them: only 21.2% of in-game disclosures and 10.6% of website disclosures in the PRC could be considered 'reasonably prominent' [4]. How games disclose probabilities in other jurisdictions governed by industry self-regulation has not been investigated. Recently, the behavioural science literature has debated whether a preoccupation with 'i-frame' interventions seeking to influence individual behaviour might have overshadowed, and made regulators less likely to consider, more systematic policy change or so-called 's-frame' interventions [36]. Information-based disclaimers are 'i-frame' interventions because they require the players, as individuals, to digest and utilise complex sets of information presented in idiosyncratic ways across games. If loot box probability disclosures as a 'i-frame' intervention is of poor efficacy globally (beyond the PRC), then countries around the world should consider more interventionist 's-frame' loot box regulation (*e.g.*, placing limits on product availability).

Finally, the only previous survey of UK loot box prevalence (which did not assess probability disclosure compliance) used a highest-grossing iPhone game list captured on 28 February 2019 [3]. It has been suggested that, since then, videogame companies have begun to stop implementing loot boxes and instead adopt other (non-randomised) monetisation methods, such as battle passes [37, 38], either to avoid bad press or to act more ethically towards their customers [39], as demonstrated by commercial decisions taken by companies such as Epic Games [40–42]. A further survey in the UK would shed light on whether loot box prevalence has indeed decreased two years after the previous UK survey.

Therefore, a survey replicating Xiao et al. (2021b) was conducted in the UK to assess: (i) the effectiveness of self-regulation alone in the absence of legal intervention; (ii) the methods of compliance (*i.e.*, prominence and accessibility of probability disclosures) in Western countries; and (iii) any industry changes in the prevalence of loot box implementation.

The following hypotheses were preregistered at <https://doi.org/10.17605/OSF.IO/FJNMY>.

Hypothesis 1: The percentage of the 100 highest-grossing iPhone games containing loot boxes in the UK that discloses loot box probabilities will be significantly lower than the 95.6% found in the highest-grossing iPhone games in the PRC by Xiao et al. (2021b).

Hypothesis 2: The percentage of the 100 highest-grossing iPhone games containing loot boxes in the UK that will be found by the present study will be significantly lower than the 59.0% found in the highest-grossing iPhone games in the UK in February 2019 by Zendle et al. (2020a).

Further, the present study was preregistered to describe:

1. the percentages of the 100 highest-grossing UK iPhone games containing loot boxes disclosing probabilities at the following three locations: (i) in-game only; (ii) on the official website only; and (iii) at both locations;

2. the percentages of the 100 highest-grossing UK iPhone games containing loot boxes using various methods of disclosure subcategories developed by Xiao et al. (2021b), and using various then yet unidentified methods of disclosure subcategories that were subsequently defined by the present study;

3. the percentage of games containing loot boxes, which were both included in Xiao et al. (2021b)'s sample and available on the UK Apple App Store with an English version when data is being collected by the present study, that disclosed loot box probabilities.

Finally, the percentage of the 100 highest-grossing UK iPhone games containing loot boxes that disclosed the implementation of pity-timer submechanics (which *change* the probabilities of obtaining randomised rewards as the player purchases more loot boxes; see [4]) is described and their prevalence rates in the UK and the PRC are compared through exploratory analysis.

2. Method

Replicating Xiao *et al.* (2021b) and as preregistered, the 100 highest-grossing iPhone games on the UK Apple App Store on 21 June 2021 as reported by App Annie, an authoritative independent analytics company, were selected to form the sample. In addition, as preregistered, 31 games that were both included in Xiao et al. (2021b)'s sample and available on the UK Apple App Store with an English version (but were not within the UK 100 highest-grossing list on 21 June 2021) when data was being collected by the present study were added to the sample. The aforementioned 31 games, in addition to eight games that were within both the 100 highest-grossing PRC list in Xiao *et al.* (2021b) and the UK list used by this present study, constitutes the 'Overlap Sample' of 39 games. Thus, a total of 131 games were coded. These games' titles and their numbering for the purposes of this study are shown in Table 1.

The following variables were measured:

2.1. Apple age rating

This variable was coded using the relevant age rating information displayed on the game's UK Apple App Store page.

2.2. Presence of paid loot boxes

A 'paid loot box' was defined as being either an Embedded-Isolated random reward mechanism or an Embedded-Embedded random reward mechanism, as defined by Nielsen & Grabarczyk (2019). This variable was coded based firstly on 40 minutes of gameplay. If no such mechanic was found within that time, this variable was coded based on up to 2 hours of internet browsing of video streams and screenshots. In total, 125 games (95.4%) were coded through gameplay and 6 games (4.6%) were coded through internet browsing. In contrast to Zendle et al. (2020a), but replicating Xiao et al. (2021b), games were assessed based on gameplay first, which was only then followed by internet browsing if required, because this more accurately reflected a player's experience of encountering loot boxes when they start to play a new game [4]. Additionally, this also allowed for free exploration of the game's various menus and therefore more accurate assessment of the other variables relating to probability disclosures as virtually no videos of players interacting with probability disclosures are available: videos generally only show (relatively experienced) players purchasing and opening loot boxes, without consulting the relevant probability disclosure.

2.3. Presence of probability disclosure

Games were coded as having disclosed probabilities if the likelihood of obtaining potential rewards from loot boxes was found either in-game or on the official website. Considerable efforts were expended when attempting to find disclosures but the risk of false negatives could not be entirely removed: however, any disclosures that were not found by the present study

Table 1. Full list of 131 games studied and their numbering.

#	Title	#	Title	#	Title
1	Roblox	45	Mobile Legends: Bang Bang	89	Solitaire Cruise Tripeaks Card
2	Coin Master	46	DRAGON BALL LEGENDS	90	Jurassic World Alive
3	Candy Crush Saga	47	WWE SuperCard—Battle Cards	91	Clawee
4	Clash of Clans	48	Matchington Mansion	92	Football Rivals
5	PUBG MOBILE—Traverse	49	FIFA Soccer	93	Mortal Kombat
6	Clash Royale	50	Kiss of War	94	Backgammon—Lord of the Board
7	Pokémon GO	51	Star Trek Fleet Command	95	Football Manager 2021 Mobile
8	State of Survival Walking Dead	52	Fire Emblem Heroes	96	Yu-Gi-Oh! Duel Links
9	Gardenscapes	53	Mafia City: War of Underworld	97	June's Journey: Hidden Objects
10	Homescapes	54	Age of Z Origins	98	Dragon City Mobile
11	Rise of Kingdoms	55	Choices: Stories You Play	99	Golf Rival
12	Royal Match	56	CSR 2 Multiplayer Racing Game	100	Hero Wars—Fantasy World
13	Project Makeover	57	Empires & Puzzles Epic Match 3	S1	Arena of Valor
14	8 Ball Pool	58	Farm Heroes Saga	S2	LifeAfter: Night falls
15	Brawl Stars	59	War and Order	S3	Princess Connect! Re: Dive
16	Golf Clash	60	Merge Dragons!	S4	Arknights
17	Call of Duty: Mobile	61	Hay Day	S5	Onmyoji
18	Fishdom	62	Family Island–Farming game	S6	Honkai Impact 3rd
19	Bingo Blitz—BINGO games	63	Klondike Adventures	S7	Shining Nikki
20	Top War: Battle Game	64	Lotsa Slots—Vegas Casino	S8	Saint Seiya Awakening
21	Candy Crush Soda Saga	65	Manor Matters	S9	Royal Chaos
22	Pet Master	66	Match Masters—PvP Match 3	S10	Identity V
23	Evony	67	Love Island The Romance Game	S11	Last Shelter: Survival
24	Rise of Empires: Fire and War	68	EverMerge—Merge and Match!	S12	SLAM DUNK
25	Toon Blast	69	Monster Legends: Collect all	S13	eFootball PES 2021
26	Minecraft	70	Slotomania Vegas Casino Slots	S14	Art of Conquest
27	Genshin Impact	71	BitLife	S15	Langrisser
28	Zynga Poker—Texas Holdem	72	Harry Potter: Puzzles & Spells	S16	Ode To Heroes
29	Solitaire Grand Harvest	73	MARVEL Strike Force: Squad RPG	S17	Azur Lane
30	Episode—Choose Your Story	74	Merge Mansion	S18	Love Nikki-Dress UP Queen
31	RAID: Shadow Legends	75	Township	S19	LINE: Disney Tsum Tsum
32	Lords Mobile: Tower Defence	76	Score! Hero 2	S20	BanG Dream! Girls Band Party
33	DRAGON BALL Z DOKKAN BATTLE	77	The Sims FreePlay	S21	Ragnarok M: Eternal Love EU
34	Chapters: Interactive Stories	78	Mighty Party: Battle Heroes	S22	Mr Love: Queen's Choice
35	Cash Frenzy—Slots Casino	79	The Grand Mafia	S23	Ulala: Idle Adventure
36	Warpath	80	Adorable Home	S24	Dragon Raja
37	Star Wars: Galaxy of Heroes	81	Garena Free Fire- World Series	S25	PES CARD COLLECTION
38	Guns of Glory: Conquer Empires	82	Harry Potter: Hogwarts Mystery	S26	Summoners War
39	Game of Thrones: Conquest	83	Redecor—Home Design Makeover	S27	Sky: Children of the Light
40	Puzzles & Survival	84	Mario Kart Tours	S28	Golden HoYeah Slots Casino
41	Marvel Contest of Champions	85	F1 Clash	S29	Brutal Age: Horde Invasion
42	King of Avalon: Dragon Warfare	86	The Simpsons: Springfield	S30	AFK Arena
43	Top Eleven Be a Soccer Manager	87	Last Day on Earth: Survival	S31	Contra Returns
44	Toy Blast	88	MHA: The Strongest Hero		

were also unlikely to have been observed by and helpful to the average, or indeed even the determined, consumer.

2.4. Location of observed disclosure

Games were coded as having disclosed probabilities (i) in-game only, (ii) on the official website only, or (iii) at both locations. If multiple loot boxes were found for a game, this variable was coded based on all loot boxes found: *e.g.*, if a game contains loot box A and loot box B, and loot box A's probability disclosure was made in-game only and loot box B's probability disclosure was made on the official website only, this game would be coded as having made disclosures at both locations, so as to be as fair as possible to companies by giving them maximum recognition for their compliance efforts. This approach was also adopted because such potential within-game variation between multiple loot box types could not be exhaustively recorded as some games contained at least 75 different loot boxes [43].

2.5. Method of in-game disclosure

This variable was coded in accordance with the six subcategories of in-game disclosures developed in Xiao et al. (2021b), which included, for example, an in-game probability disclosure that is 'Automatically displayed on the loot box purchase page without requiring any additional input from the player.' When an in-game probability disclosure was found that did not fall within any of the six subcategories developed in Xiao et al. (2021b), a new subcategory was defined and created. If multiple loot boxes were found for a game, this variable was coded based on the loot box that made the most prominent in-game disclosure, so as to be fair to companies by allowing them to gain maximum credit for their compliance efforts and highlighting their most consumer-friendly examples.

2.6. Method of official website disclosure

This variable was coded in accordance with the five subcategories of official website disclosures developed in Xiao et al. (2021b), which included, for example, an official website probability disclosure that is 'Linked directly from the homepage.' When an official website probability disclosure was found that did not fall within any of the five subcategories developed in Xiao et al. (2021b), a new subcategory was defined and created. If multiple loot boxes were found for a game, this variable was coded based on the loot box that made the most prominent official website disclosure.

2.7. Was a pity-timer disclosed?

A 'pity-timer' was defined as a submechanic that changes (either increases or decreases) the probabilities of obtaining randomised rewards from loot boxes as the player purchases more loot boxes, as defined by Xiao et al. (2021b).

2.8. Inter-rater reliability analysis

As preregistered, 20 games (15% of the sample of 131 games, rounded up) were dual-coded to test the inter-rater reliability of the coding, which is summarised in Table 2. Two coders first coded the *Apple age rating*, *Presence of loot boxes*, *Presence of probability disclosure* and *Location of observed disclosure*. The two coders were in perfect agreement, except that there were two disagreements for the *Location of observed disclosure* (90.0% agreement, Cohen's kappa = 0.85). Discussions revealed that these related to particularly inaccessible disclosures made by Games 14: *8 Ball Pool* and S20: *BanG Dream*! *Girls Band Party*. For Game 14: *8 Ball*

Table 2. Inter-rater reliability (n = 20).

Variable	Percentage agreement (Cohen's kappa)
Apple age rating	100% (1.00)
Presence of paid loot boxes	100% (1.00)
Presence of probability disclosure	100% (1.00)
Location of observed disclosure	90.0% (0.85)
Method of in-game disclosure	100% (1.00)
Method of official website disclosure	95.0% (0.93)
Disclosure of a pity-timer	100% (1.00)

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Pool, which made particularly hidden disclosures at *both* locations, the first coder failed to find the in-game disclosure which could only be accessed through a button not on the loot box's purchase page (specifically, a button hidden in the settings menu that was not sign-posted from elsewhere, such as the loot box purchase screen) and the second coder failed to find the official website disclosure which was inaccessible from the official website's homepage. In addition, the first coder failed to find the official website disclosure for Game S20: *BanG Dream*! *Girls Band Party* because it could only be found on the FAQ (Frequently Asked Questions) page of the website, which, although it was linked from the homepage, did not state or imply that it would show the disclosure: the 85th question in a long list of 117 different questions on various topics on the FAQ page reveals how the probabilities can be accessed in-game by 'tapping the "i" on the Gacha [loot box] screen' [see 44]. Disclosing at one location how to access the disclosure at the other location was deemed to be a disclosure at both locations (if the disclosure at the other location could in fact be found as described), so as to give companies credit for at least providing these instructions to the player. The two coders then exchanged screenshots of found loot boxes, disclosures and pity-timers to ensure that both were coding based on the same loot box that made the most prominent disclosure following the methodology of Xiao et al. (2021b). There was one disagreement as to *Method of official website disclosure* (95.0% agreement, Cohen's kappa = 0.93), which was caused by the second coder creating a new subcategory to define a relatively inaccessible method of official website disclosure that was made by Game 100: *Hero Wars—Fantasy World* on the customer support website as a 'drop rates' post but which could not otherwise be accessed except through a direct link [45], unlike other customer support website disclosures which could all be found using the website's embedded search function. Following discussions, it was agreed that this proposed subcategory was redundant, and the situation was already covered by the pre-existing subcategory that the website disclosure was inaccessible from the homepage (which corresponded to the first coder's coding). The coding was adjusted after the inter-rater reliability discussions.

3. Results

3.1. Descriptive statistics: Presence of loot boxes and apple age ratings

Of the 100 highest-grossing UK iPhone games on 21 June 2021, 77.0% (77 games) contained loot boxes. Their Apple App Store age ratings are summarised in Table 3. Notably, Games 1: *Roblox* and 26: *Minecraft* were duly coded as containing loot boxes. This was because, although loot boxes were not officially implemented by the developer and publisher of these two games (*i.e.*, no 'first-party' implementation), these 'sandbox' games allow for user-generated content (UGC [46]) to be implemented and sold by third parties (which could be designed to cost real-world money and provide randomised rewards, *i.e.*, loot boxes). This is officially recognised

Table 3. Apple App Store age rating of games containing loot boxes (cumulative; N = 100).

Apple App Store Age Rating	Total number of games (cumulative)	Number of games that contain loot boxes (cumulative)	Percentage containing loot boxes
4+	30	17	56.7%
9+	48	33	68.8%
12+	80	61	76.3%
17+	100	77	77.0%

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and permitted by Roblox Corporation [47], the developer and publisher of Game 1: *Roblox*, which explicitly requires probability disclosures for such UGC loot boxes. These two games were included in the sample when reporting *Presence of paid loot boxes* and *Apple age rating* because their existence needs to be highlighted as they present a unique compliance risk (specifically, that the subject of self-regulation may itself need to impose and enforce subsidiary self-regulation on others to ensure that it is compliant with its own self-regulation obligations, as Game 1: *Roblox* did); however, these two games were excluded from the sample when reporting presence, location and accessibility of probability disclosures and disclosure of pity-timers because the present study sought to report whether, and if so how, the game *officially* (or first-party) implemented loot box probability disclosures. The array of UGC loot boxes is too diverse and too frequently changed for these latter aspects to be assessed with confidence in these two games: doubtlessly, some UGC loot boxes do not disclose probabilities despite being required to do so, and how UGC loot boxes disclose probabilities will vary significantly between various third-party implementations.

3.2. Descriptive statistics: Locations of found UK disclosures

Of the 75 games containing first-party implemented loot boxes, 64.0% (48 games) disclosed probabilities as required by Apple's self-regulation, whilst 36.0% (27 games) did not. Locations at which disclosures were observed are displayed in Table 4. An exploratory binomial test revealed that the UK website disclosure availability rate of 21.3% was significantly lower ($p <$ .001) than the 72.5% PRC rate [4].

3.3. Confirmatory analyses: Comparing disclosure and prevalence rates

The two preregistered hypotheses were tested.

Hypothesis 1 was supported using a binomial test (one-tailed test, $p =$ .05) which revealed that the UK disclosure rate of 64.0% was significantly lower ($p <$ .001) than the 95.6% PRC disclosure rate [4].

Hypothesis 2 was rejected using a binomial test (one-tailed test, $p =$ .05) which revealed that the UK loot box prevalence rate in mid-2021 of 77.0% was not significantly lower ($p >$ .999) than the 59.0% early 2019 UK prevalence rate [3]. On the contrary, it was significantly higher ($p <$ .001).

Table 4. Locations of observed disclosures (n = 75).

Location of Disclosure	Number of games
In-game only	32 (42.7%)
On the official website only	0 (0.0%)
Both locations	16 (21.3%)
No disclosure found	27 (36.0%)

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3.4. Descriptive statistics: Accessibility of UK in-game and website disclosures

Eight subcategories of in-game disclosures were identified, as summarised in Table 5. The UK situation was similar to the PRC's [4]: more than half of games' probability disclosures in both jurisdictions were accessed through tapping a small generic button. Three new subcategories, not identified in the PRC [4], were defined: although they were each only subtly different from pre-existing subcategories, certain aspects of their implementation nonetheless render them distinct and noteworthy. For example, two games disclosed probabilities when symbols that conceptually implied randomness and chance (*e.g.*, a dice symbol used in Game 87: *Last Day on Earth*: *Survival*) were interacted with: this subcategory therefore should be recognised as being different from the subcategory that showed probabilities after a small generic symbol, such as an '*i*' or '(?)' button (which do not in any way allude to probabilities, as used in Game S14: *Art of Conquest*) was tapped (26 games). Both aforementioned subcategories should be deemed less prominent than the subcategory that displayed probabilities after a button explicitly stating 'probabilities' or a conceptually similar word (*e.g.*, 'rates' used in Game 33: *DRAGON BALL Z DOKKAN BATTLE*) was tapped (3 games). One egregiously hidden ingame disclosure subcategory (that was initially missed by a coder as described in the Method section) was used by one game (Game 14: *8 Ball Pool*): players were required to enter the settings menu, scroll down to the bottom and then interact with a button to 'View' 'Mini Games Information' in order to be redirected to the website disclosure This arguably actively concealed implementation draws some allusions to the one PRC game that required players to

Table 5. Subcategories of observed in-game disclosures (n = 48).

Number of games	Adoption rate	Summary of disclosure format	Further implementation details
26 (54.2%)	34.7%	Immediately after tapping a small generic symbol	*e.g.*, a question mark sign '(?)' (Game S14: *Art of Conquest*); an '*i*' or '*i*' sign, which stands for 'information' (Game 31: *RAID: Shadow Legends*); an exclamation mark sign ['!'] (Game S23: *Ulala: Idle Adventure*); or a 'details' button (Game 27: *Genshin Impact*)
13 (27.1%)	17.3%	After tapping a small generic symbol and following additional steps	Same types of generic symbol as above. Additional steps include, *e.g.*, tapping on another button (Game 77: *The Sims FreePlay*); or tapping on another button and following a hyperlink to the game's official website's disclosures (Game 6: *Clash Royale*)
3 (6.3%)	4.0%	Immediately after tapping a small button explicitly referencing 'probabilities' or a conceptually similar term	*e.g.*, a button stating 'Character Summoning Rates' (Game 33: *DRAGON BALL Z DOKKAN BATTLE*); 'Appearance Rates' (Game 52: *Fire Emblem Heroes*); or 'Drop Rate' (Game S22: *Mr Love*: *Queen's Choice*)
2 (4.2%)	2.7%	Interacting with a graphic symbol that conceptually referenced 'probabilities' and 'chance'	*e.g.*, a dice symbol (Game 87: *Last Day on Earth*: *Survival*)
1 (2.1%)	1.3%	Automatically displayed on the loot box purchase page without requiring any additional input from the player	Specifically, as implemented in Game 98: *Dragon City Mobile*
1 (2.1%)	1.3%	After tapping a small button explicitly referencing 'probabilities' and following additional steps	Specifically, tapping a 'Pack Probabilities' hyperlink button and then tapping a 'Continue' button that takes the player to the official website disclosure (Game 37: *Star Wars*: *Galaxy of Heroes*)
1 (2.1%)	1.3%	By tapping a graphic element on the loot box purchase page that was not seemingly interactable and then following additional steps	Specifically, tapping the picture depicting the loot box above the payment/ price button (colloquially known to players as the loot box 'banner') and then tapping an [*i*] button and an 'OK' button to confirm being redirected to the official website disclosure (Game 69: *Monster Legends*)
1 (2.1%)	1.3%	By interacting with certain buttons not on the loot box purchase page	*e.g.*, a button hidden within the game's settings menu (Game 14: *8 Ball Pool*)

Note. Adoption rate refers to the percentage of the 75 games implementing first-party loot boxes that adopted each subcategory. Example games used to illustrate each subcategory were not necessarily included in the subsample.

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chat, in a foreign language, with the in-game customer support bot found in the settings menu in order to access the disclosure [4]. In contrast, only one game (Game 98: *Dragon City Mobile*) adopted the most prominent disclosure method of automatically showing the probabilities on the loot box purchase page without requiring any additional input from the player.

Four subcategories of website disclosures were identified, as summarised in Table 6. The much smaller subsample size of 16 games, when compared to the PRC's of 66 games [4], caused by companies not disclosing probabilities on official websites in the UK must be noted. The results therefore need to be interpreted with some caution. Unlike with in-game disclosures, the UK website disclosure situation is very different from the PRC situation [4]: the vast majority of PRC website disclosures (78.8% in the PRC) were published as 'news' or 'notice' posts and then chronologically listed alongside other posts; in contrast, only two UK games (12.5%) disclosed probabilities on their websites in this manner. Two new subcategories, not previously identified in the PRC [4], were defined. Firstly, two games' website disclosures were technically linked from their respective homepages; however, the interactable link on the homepages did not explicitly reference 'probabilities' or in any way allude to the disclosure being available on the other page that will be opened [see 44]. Secondly, nearly half of UK website disclosures (7 games) were published as 'probabilities' or 'drop rates' posts on the customer support website and could be found using the website's embedded search function but required players to perform this additional step. Finally, nearly a third of UK website disclosures (5 games) were not accessible from the website's homepage and could only be accessed either through typing in and visiting the correct URL, or through being redirected from in-game: these were technically official website disclosures, but were effectively inaccessible by people who are unfamiliar with, or do not play, the game (*e.g.*, parents of child players).

3.5. Descriptive statistics: Overlap sample

Of the Overlap Sample of 39 games whose disclosure status were assessed in both the PRC by Xiao et al. (2021b) and the UK by the present study, 13 games (33.3%) had different Apple age ratings, of which four games (30.8%) had higher age ratings in the UK and nine games (69.2%) had higher ratings in the PRC.

Table 6. Subcategories of observed website disclosures (n = 16).

Number of games	Adoption rate	Summary of disclosure format, including link to example implementation
7 (43.8%)	9.3%	Published as a 'probabilities' or 'drop rates' post on the customer support website and could be found using the website's search function, *e.g.*, Game 15: *Brawl Stars* [57]
5 (31.3%)	6.7%	Inaccessible from the homepage (*i.e.*, a web address exists for the disclosure, but the link can only be found through a search engine or is only linked to from in-game, such that the disclosure on the official website is not hyperlinked from anywhere else on the website), *e.g.*, Game 37: *Star Wars*: *Galaxy of Heroes* [43]
2 (12.5%)	2.7%	Published under the 'news' or 'notice' tab and which were then chronologically listed alongside other posts, *e.g.*, Game 6: *Clash Royale* [62]
2 (12.5%)	2.7%	Published on a page that is linked directly from the homepage; however, the link does not reference 'probabilities' or 'drop rates' and therefore it is unclear that the link leads to the disclosure, *e.g.*, for Game S20: *BanG Dream*! *Girls Band Party*, on the FAQ page of the website as described in the Method section [44]

Note. Adoption rate refers to the percentage of the 75 games implementing first-party loot boxes that adopted each subcategory. Example games used to illustrate each subcategory were not necessarily included in the subsample.

Loot boxes were found in the same 35 games (89.7%) in both jurisdictions. The disclosure rate was identical in both jurisdictions at 94.3% (33 of 35 games). However, there were four inconsistencies (11.4%) as to whether a game disclosed probabilities: two games' disclosures were found only in the PRC [4], whilst two other games' disclosure were found only in the UK by the present study. These inconsistencies were not further investigated because they may have been caused simply by the passage of time.

A binomial test revealed that the disclosure rate of 94.3% in the Overlap Sample is significantly higher ($p < .001$) than the 64.3% found in the overall sample when overlapping games were excluded ($n = 70$).

3.6. Exploratory analyses

3.6.1. Comparisons with PRC loot box prevalence rates. A binomial test revealed that the UK loot box prevalence rate in mid-2021 of 77.0% found by the present study remained significantly lower ($p < .001$) than the 91.0% mid-2020 PRC prevalence rate [4]. Of games deemed suitable for children aged 12+, binomial tests revealed that the loot box prevalence rate of 76.3% found by the present study was significantly higher ($p < .001$) than the 58.9% early 2019 UK prevalence rate [3], and significantly lower ($p < .001$) than the 90.5% mid-2020 PRC prevalence rate [4].

3.6.2. Disclosures are less likely to be found for UK-only games. Of the 100 highest-grossing UK iPhone games on 21 June 2021, 73% (73 games) were not available in the PRC Apple App Store when a search was conducted on 11 September 2021. (This search was conducted using best endeavours; however, it may potentially have incorrectly categorised certain games as being available in the UK only because, for example, certain games might have initially been made available on the PRC store but were removed from the PRC store by 11 September 2021. The results under this subheading should therefore be interpreted with due caution; however, note that such one direction errors could only render the probability disclosure compliance rate in the UK only subsample to be higher than the true value, meaning that the interpretations made by the present study hold even if errors along these lines were made.) Of these 73 games, 76.7% (56 games) contained loot boxes, of which, 60.7% (34 games) disclosed probabilities. Amongst the 105 games containing first-party implemented loot boxes in all 131 games sampled, a two-sample z-test revealed that probability disclosures were significantly less likely to have been found for games available in the UK only (of which 60.7% made disclosures) when compared to games available in both jurisdictions (of which 89.8% made disclosures), $z = 3.40$, $p < .001$.

3.6.3. Pity-timers. Of 75 games containing first-party implemented loot boxes within the UK 100 highest-grossing list, 34.7% (26 games) disclosed the implementation of a pity-timer mechanic. A binomial test revealed that this disclosed UK pity-timer prevalence rate was significantly lower ($p < .001$) than the 65.9% mid-2020 PRC pity-timer prevalence rate [4].

4. Discussion

4.1. Loot box prevalence and accessibility to children

In-game purchases involving randomisation were prevalently implemented in 77.0% of the highest-grossing iPhones games available on the UK Apple App Store. Hypothesis 2 that loot box prevalence in the UK has decreased in the two years following the previous UK study due to industry developments (*e.g.*, abandonment of loot box implementation for ethical reasons) was rejected. It would appear that corporate actions by particular companies like Epic were special cases that have been overemphasised and do not reflect a broader trend within the industry, at least on the mobile market. Most high-grossing companies did not stop

implementing loot boxes in order to provide better consumer protection. A significantly higher UK loot box prevalence rate than Zendle et al.'s 2019 results (59.0%) (2020a) was found. Discussions between the research teams revealed that this is partially due to: (i) more games implementing loot boxes; (ii) Zendle et al. failing to find the more minor and hidden loot boxes in a few games (similar to those found in Game 53: *Mafia City*: *War of Underworld*); and (iii) Zendle et al. not recognising social casino games (wherein the player is able to spend real-world money to participate in randomised gambling activities but cannot withdraw any winnings into cash) as containing 'loot boxes,' contrary to the present study's methodology [48, cf. 49]. Notably, the true prevalence rate of loot boxes could actually be higher than the reported 77.0% because it is possible for loot box implementations to have been missed by both coders, but it is *not* possible for any game to have been mistakenly identified as containing loot boxes when it did not (because screenshots of all identified loot boxes are available for public scrutiny at the data deposit link: <https://doi.org/10.17605/OSF.IO/CX5RV>). In addition, loot boxes were more prevalent within each age rating category than Zendle et al. (2020a) had suggested: for example, 76.3% of games deemed suitable for children aged 12+ contained loot boxes in 2021, compared to the 58.9% in 2019. Loot boxes are more widely available and easily accessible to children and young people in the UK than was previously apparent.

A number of differences were identified between the PRC and UK samples: the 77.0% loot box prevalence rate remained significantly lower than that found in the PRC in 2020 (91.0%); pity-timers were disclosed significantly less prevalently in the UK (34.7%) as compared to the PRC (65.9%) (although the actual prevalence of pity-timers was not measured); and 33.3% of games in the Overlap Sample had different age ratings. The product availability in various countries can be vastly different: surveys should be conducted in other countries to assess national loot box prevalence before any regulations are imposed. However, the present results are highly likely to be translatable internationally to other Western countries in North America, Europe, and Australasia, where the highest-grossing game lists are similar.

4.2. Ineffectiveness of industry self-regulation

Probability disclosures, as required by Apple's self-regulation, were found for only 64.0% of the 75 games within the UK 100 highest-grossing list containing first-party implemented loot boxes. Considerable efforts (above and beyond what a regular consumer might have used) were expended to try to find the disclosures: any that were not found were also unlikely to have been found by the average, or even the determined, player. Indeed, games whose disclosures could not be found highly likely *failed* to disclose probabilities as required [4]. The following discussion proceeds on that assumption.

Players of 36.0% of games containing first-party implemented loot boxes presumably had no access to probability disclosures, despite this consumer protection measure having been promised to them by both Apple and the relevant game companies. Apple is the owner and operator of the software marketplace, and therefore it financially benefits from every loot box sale because it always deducts a commission of up to 30% and at least 15%. Apple is also the self-regulator that sets out the relevant loot box probability disclosure requirement. However, Apple has not sought to actively enforce its self-regulation and police compliance; on the contrary, Apple is arguably financially benefiting from the lack of probability disclosures in more than a third of games containing loot boxes when players potentially overspend: there is a conflict of interest in that the rule-making self-regulator benefits from non-compliance. The games analysed by the present study were the most popular and highest-grossing UK iPhone games (the compliance rate amongst worse-performing games is likely even lower), and therefore Apple's inaction with this particular sample could not be excused for practical reasons,

such as being unable to assess every single one of more than one million games, reportedly presently available for download from the Apple App Store [50]. Indeed, Apple is arguably obliged to audit compliance amongst all available games, in accordance with the promise it made to consumers when it instituted the self-regulation. Regardless, Apple can afford to, and is obliged to, monitor compliance and rectify non-compliance amongst *at least* the highest-grossing games, but Apple has *failed* to do so.

The relevant game companies that did not make loot box probability disclosures are failing to be transparent and honest not only with players but also with Apple, because companies intending to market games on the App Store must purport to have complied with the App Store Review Guidelines, which includes the loot box probability disclosure self-regulation [29], during the submission review process [51]. Players of a substantial proportion of games are not being given the consumer protection that was promised to them. Crucially, such non-compliance with self-regulation that deceptively purported to have been compliant has given consumers, and also policymakers and regulators, the *false* impression that industry-wide compliance (and a certain degree of consumer protection) has been achieved in Western countries, despite loot box probability disclosures not being required by law when this is evidently untrue. Failing to provide disclosures after promising to provide them is arguably worse than not promising and not providing disclosures in the first place because, in the latter case, consumers would know that they are not being provided with any consumer protection and therefore may act in a more risk-averse manner, whilst in the former case, consumers were misled into believing that consumer protection is being provided to them (when it is not) and therefore they may have been induced to act in a more risk-tolerant manner by this misrepresentation.

European consumer protection law certainly recognises that the former is *worse* and more culpable than the latter: for example, 'claiming to be the signatory to a code of conduct [*i.e.*, self-regulation] when the trader is not,' or 'claiming that a trader (including his commercial practices [*i.e.*, whether or not to disclose loot box probabilities]) or a product has been approved, endorsed or authorised by . . . a private body [*i.e.*, an industry self-regulator such as Apple] when the trader, the commercial practices or the product have not or making such a claim without complying with the terms of the approval, endorsement or authorisation' are both viewed as 'commercial practices which are in all circumstances considered unfair' that are liable for criminal prosecution (EU Unfair Commercial Practices Directive [2005] OJ L149/22, Annex 1, paras 1 and 4). An example to illustrate this may be that parents would be more willing to allow their children to play games containing loot boxes if the parents know that the game makes probability disclosures: thus, a game which purports to, but does not, disclose probabilities is potentially more harmful because it creates a false impression of being 'safer' and enforcement action against it is more imminently necessary.

Companies were statistically significantly more likely to disclose probabilities in the PRC where legal requirements applied than they were to disclose in the UK where only advisory-level industry self-regulation applied. This proposition is further supported by the finding that games available in the UK only were statistically significantly less likely to have made disclosures (only 60.7% did so) than games available in both the UK and the PRC (89.8% did so), and the particularly high disclosure rate in the Overlap Sample (which consisted of well-performing and highly scrutinised PRC games that were also available in the UK) of 94.3%. A spillover effect may have been observed: companies intending to release games in both the UK and the PRC markets simply made a PRC-law compliant version of the game and released said version in all markets (regardless of the absence of local legal requirements and/or industry self-regulation). The PRC legal regulation may have improved the degree of consumer protection in other countries beyond its formal jurisdiction.

Policymakers and regulators in countries such as the UK, where practically voluntary and non-enforced industry self-regulation similar to Apple's is already in force, should demand more accountable forms of industry self-regulation and consider requiring loot box probability disclosure by law to increase the rate of compliance and better protect consumers from potential loot box harms, *e.g.*, overspending.

4.3. Locations and methods of disclosure

Similarly to the pattern identified in the PRC [4], companies preferred to make disclosures at only one location (66.7%), rather than at both locations (33.3%). This means that, in relation to most games, players do not have two alternative channels of accessing probability disclosures, thereby reducing the number of players seeing the disclosures and therefore providing a lower degree of consumer protection. Notably, unlike in the PRC where companies preferred making website disclosures, companies in the UK preferred making in-game disclosures. No game in the UK disclosed on the official website *only* (0.0%), whilst 40.2% did so in the PRC. Indeed, in total, 75.9% of games containing loot boxes (66 of 87) made disclosures on the official website in the PRC, but only 33.3% did in the UK (16 of 48 games). This is a statistically significant difference between the UK and the PRC. Survey results have shown that in-game disclosures are more likely to be seen by players than website disclosures, even in the PRC where website disclosures are implemented more frequently than in-game disclosures [52]. A preference for in-game disclosures may be beneficial for consumer protection; however, making disclosures at both locations is evidently superior: on one hand, making disclosures internally within the game ensures that the disclosures are more proximate to the loot box purchase decision itself, which likely maximises their effect at providing a 'cooling off' period and potentially halting purchase [53, 54]; on the other hand, making disclosures externally on the official website ensures that non-players who have an interest in learning about the disclosures (*e.g.*, parents of child players) can also easily access them without needing to expend time to play the game themselves [30]. However, two-thirds of UK games *failed* to make disclosures at both locations.

Xiao et al. (2020b) defined a disclosure as being 'reasonably prominent' if the player can access it by interacting with an element either on the loot box purchase page or the website's homepage that referenced 'probabilities' or a conceptually similar term (*e.g.*, 'rates'). Of all UK in-game disclosures, only five games' disclosures (10.4% of in-game disclosures) could be deemed reasonably prominent because they were either shown automatically (one game), or were accessed through initially interacting with a button on the loot box purchase page that explicitly referenced 'probabilities' or 'rates' so as to clearly indicate that the button led to the disclosure (three games showed the disclosure immediately upon the button being tapped, whilst one other game required performing additional steps after tapping said button). Importantly, when compared, UK games made fewer reasonably prominent in-game disclosures (10.4%) than in the PRC (21.2%).

None of the UK website disclosures (0.0%) could be deemed 'reasonably prominent' because the player could not access any of them by simply interacting with an automatically displayed element on the website's home page that referenced 'probabilities' or a conceptually similar term. One UK website disclosure subcategory representing 43.8% of website disclosures was comparatively more accessible than the other subcategories because players could access the disclosures by using the customer support website's homepage's embedded search function to look up terms such as 'probability' (Game 2: *Coin Master* [55]), 'chances' (Game 56: *CSR 2 Multiplayer Racing Game* [56]), or 'drop rates' (Game 15: *Brawl Stars* [57]). Notably, the terms generally were not interchangeable, meaning that, for example, if a player searched

for 'probability' on the official website of Game 15: *Brawl Stars*, there would have been no result and the player would not have been able to access the disclosure. Companies could have inputted all these synonyms as keywords on the probability disclosure page to ensure that it would be found when any one of the synonyms was searched for by the player. This subcategory could not be deemed reasonably prominent because it required the player to perform multiple additional steps (opening up the embedded search function; typing in the correct keyword search phrase; and then following the hyperlink that is shown amongst the search results), and because there was a chance that the player might enter an incorrect synonym and believe that there was no disclosure available. When compared, fewer official website disclosures were reasonably prominent in the UK (0.0%) than in the PRC (10.6%). Substantially more UK website disclosures were also entirely inaccessible from the homepage (31.3%) than in the PRC (7.6%).

Overall, of all 75 highest-grossing UK iPhone games containing first-party implemented loot boxes, only one game (1.3%) adopted the most prominent disclosure format of automatically displaying the probabilities on the in-game loot box purchase page (compared to 4 of 91 PRC games (4.4%)); only five UK games (6.7%) made reasonably prominent in-game disclosures (compared to 11 of 91 PRC games (12.1%)); and no UK games (0.0%) made reasonably prominent official website disclosures (compared to 7 of 91 PRC games (7.7%)). Overall, only 5 UK games (6.7%) made reasonably prominent disclosures at either location (compared to 17 of 91 PRC games (18.7%)) and no game (0.0%) made reasonably prominent disclosures at both locations (compared to 1 of 91 PRC games (1.1%)). When compared to PRC games, UK games generally made less prominent and less accessible disclosures both in-game and on the official website, and significantly fewer UK games disclosed probabilities on their official websites at all. In terms of the method of disclosure, the UK and the PRC loot box probability disclosure compliance situation appears similarly suboptimal: nearly *all* companies in both countries failed to adopt the most prominent disclosure format of automatically displaying probabilities in-game and failed to make reasonably prominent disclosures at both locations.

4.4. A preponderance of sludge

Sludge (*i.e.*, ways that information is obscured or complicated by companies to inhibit informed consumer choice) was widely deployed by videogame companies in the UK loot box probability disclosure context. The present study was unable to verify the accuracies of disclosures made due to lack of access to previous opening results held by game companies. However, examples of evidently unclear, inaccurate, or incomplete probability disclosures were identified: for example, Game 77: *The Sims FreePlay* disclosed percentages that did not sum to 100%. Game S31: *Contra Returns* disclosed the probability of obtaining many specific loot box rewards not as a percentage but instead as a range, *e.g.*, '0.5%–2%' and '45%–70%,' without any further explanation.

Sludge can also be seen in the differing methods of disclosure: for example, with in-game disclosures, there was great variability in what button on the purchase page the player must first engage with to access the disclosure or at least to begin the process of eventually accessing the disclosure (compare the '(?)' button used in Game S14: *Art of Conquest*, the dice symbol used in Game 87: *Last Day on Earth: Survival*, the 'Character Summon Rates' button used in Game 33: *DRAGON BALL Z DOKKAN BATTLE*, and the '(i)' button used in Game 77: *The Sims FreePlay*). Confusingly, certain games chose to use such symbols, which would have led to disclosures in other games, for other purposes unrelated to probability disclosures: for example, in Game 8: *State of Survival Walking Dead*, the '(i)' button on the loot box purchase screen, when tapped, displayed a reward preview screen, which easily could have, but

importantly did *not*, display probability disclosures. In most cases, players would not automatically know which button they should interact with to access the disclosure and would have to try multiple options, because there is no uniform industry standard requiring a specific format, unlike standardised food nutrition labels, for example [58]. A button explicitly stating 'probability disclosures' would be the most easily recognisable in all circumstances, but only 6.6% of games making in-game disclosures adopted this or automatically displayed probabilities.

4.5. How can companies do better?

The methods of disclosure, both in-game and on the official websites, and the examples of sludge presented by this study echo the suboptimal compliance situation identified in relation to loot box probability disclosure law in the PRC [4]. Companies chose to comply with loot box probability disclosure self-regulation imposed by Apple in 64.0% of games containing loot boxes; however, most companies that have disclosed probabilities used methods of disclosure that are difficult for players to access, and many companies have adopted corporate actions that obfuscate and complicate the decision-making environment and further discourage players from seeing the disclosure and benefiting from their consumer protection effects.

Companies should make disclosures both in-game on the loot box purchase page and on the game's official website to maximise players' and non-players' opportunities to access and benefit from the probabilities. Companies can easily improve the prominence and ease of access of their disclosures by automatically showing them on the in-game loot box purchase page or, if that is not possible, by adopting the other reasonably prominent disclosure methods recognised above under Section 4.3.. Companies should also consider whether their disclosures should list each individual reward separately, or disclose probabilities per rarity category and have a separate list of rewards in each category [see 30].

4.6. From individual-based intervention to systematic change?

Indeed, to place this case study on video game loot box probability disclosures into the wider behavioural science literature, probability disclosures represent an 'i-frame' intervention that seeks to influence the individual's behaviour for the better (but ultimately places the burden on the individual to change, with some assistance) [36]. The industry obviously supports this measure because it maintains the status quo and its positive effects are likely *de minimis*. Other 's-frame' interventions that seek to change the underlying system are needed in the loot box context to achieve better consumer protection on a wider scale, *e.g.*, how loot boxes are designed and how video games are monetised. Companies should, of course, refrain from using sludge to weaken the effectiveness of probability disclosures (thus improving the effectiveness of the i-frame intervention). However, more importantly, systematic changes (*i.e.*, s-frame interventions) should encourage, if not require, companies to design more 'ethical' and safer video game monetisation methods: for example, by forcing companies to implement fewer different loot box types in each game and fewer potential rewards in each loot box. Doing so would reduce the length and enhance the readability of the probability disclosure and possibly even eliminate the need of such an in-frame intervention entirely [59]. The mere existence of probability disclosures as an i-frame intervention should not dissuade policy-makers from seeking more systematic changes (*i.e.*, s-frame interventions), such as banning loot boxes for under-18s, if better consumer protection on a wider scale is deemed desirable.

4.7. Limitations

The present study focused on the highest-grossing games that were the most scrutinised by the public: this likely means that the compliance rate would have been lower amongst financially

worse-performing games that received less public oversight. The compliance situations on Android, the other major mobile platform, and other hardware platforms (*i.e.*, amongst console and PC games) remain to be specifically assessed by future research. In particular, a future study should consider the compliance situation on the Google Play Store for Android [see 60]: this is because Apple iOS devices are generally more expensive than Android devices meaning that the two platforms might be used by different players and companies, such that the present iOS-based results may have been affected by socioeconomic status bias and therefore not replicate to the Android platform. Cultural differences between the UK and the PRC might have partly contributed to the observed marked differences in compliance: specifically, if the UK does adopt loot box probability disclosure regulation as law, the compliance rate might increase but still remain lower than that previously observed in the PRC.

The present study did not assess whether more established companies or member companies of specific trade associations, *e.g.*, the ESA or Ukie, have complied with the self-regulation more widely and more effectively than other companies. Note, however, that in light of the present results, even if all members of a trade syndicate have complied with the industry self-regulation, that syndicate should be cautious when communicating to the public about the transparency and safety of the product. This is because that syndicate has no control over, and cannot regulate, the compliance (or lack thereof) of non-syndicate member companies. Widespread industry compliance is not present; therefore, such a false sense of security should not be impressed upon consumers.

The relevant features of only one loot box were recorded per game. Most games contained multiple loot box types: for example, Game 37: *Star Wars*: *Galaxy of Heroes*'s website disclosure revealed that it contained at least 75 different loot box types [43]. Exhaustively recording the relevant features of each loot box type in each game was not practicable. Indeed, variations in loot box implementation within the same game could not be recorded: each game was coded according to the loot box that used the most prominent disclosure method, even though in some games other loot box types disclosed probabilities using worse methods, for example, in Game 33: *DRAGON BALL Z DOKKAN BATTLE*, one loot box's in-game disclosure was accessed by tapping a button stating 'Character Summon Rates,' whilst another loot box's in-game disclosure was accessed by tapping an identical button stating 'Character Summon Rates' but then tapping another button on a new screen that opens up: this within-game variation demonstrates that individual players may experience loot box probability disclosures differently even within the same game.

Whether probability disclosures are effective at reducing loot box spending or preventing overspending remains to be assessed through further research. Survey results from PRC players indicate that only 16.4% of players self-reported spending less money on loot boxes after seeing probability disclosures [52]. Individual players' loot box spending data from before and after probability disclosures were implemented would reveal the measure's effectiveness: videogame companies are in possession of such data and should share them publicly to ensure that players are provided with adequate consumer protection measures, rather than an ineffective measure that is merely performative. Probability disclosures are not the only form of harm-minimisation technique that might be potentially beneficial and could be adopted: other options such as capping the amount of money that players can spend [53, 61] or reducing the complexity, and other potentially problematic aspects, of loot boxes [22, 39, 59] should also be considered.

5. Conclusion

Loot boxes are now more prevalent in UK videogames and more accessible to UK children than previously suggested. Amongst the highest-grossing UK iPhone games, industry self-

regulation requiring probability disclosures has resulted in only a 64.0% compliance rate, significantly lower than the 95.6% disclosure rate in the PRC where loot box probability disclosures are required by law. Emerging technologies are often initially subject only to industry self-regulation. The public and policymakers should, justifiably, be sceptical of the potential effectiveness of any proposed voluntary self-regulation with little enforceability and no independent oversight, and be wary of the motivations of the industries recommending self-regulation for adoption in lieu of legal regulation. Policymakers around the world should demand more accountable forms of self-regulation and, if that is not forthcoming, require loot box probability disclosure by law to ensure a higher compliance rate and provide better protection to consumers.

When given discretion as to how prominently and accessibly probability disclosures should be implemented, the vast majority of companies chose methods that are suboptimal: for example, by failing to disclose probabilities at multiple alternative locations; by requiring players to perform complex series of actions before showing them the disclosures; and by disclosing probabilities using technical language and mathematical formulae (as was done by Game 100: *Hero Wars–Fantasy World*) that are difficult to understand. The videogame industry, both companies and self-regulators (*e.g.*, software marketplaces and hardware providers), can do much better when it comes to making and requiring uniform, prominent and accessible loot box probability disclosures. Policymakers should not treat requiring probability disclosures as an adequate regulatory solution to the potential harms of loot boxes. More could be done.

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Paper 6: Age-rating organisations' loot box presence disclosure requirement

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Beneath the label: unsatisfactory compliance with ESRB, PEGI and IARC industry self-regulation requiring loot box presence warning labels by video game companies

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Loot boxes in video games are a form of in-game transactions with randomized elements. Concerns have been raised about loot boxes' similarities with gambling and their potential harms (e.g. overspending). Recognizing players' and parents' concerns, in mid-2020, the Entertainment Software Rating Board (ESRB) and PEGI (Pan-European Game Information) announced that games containing loot boxes or any forms of in-game transactions with randomized elements will be marked by a new label stating 'In-Game Purchases (Includes Random Items)'. The same label has also been adopted by the International Age Rating Coalition (IARC) and thereby assigned to games available on digital storefronts, e.g. the Google Play Store. The label is intended to provide more information to consumers and allow them to make more informed purchasing decisions. This measure is not legally binding and has been adopted as industry self-regulation or corporate social responsibility. Previous research has suggested that industry self-regulation might not be effectively complied with due to conflicting commercial interests. Compliance with the ESRB's, PEGI's and IARC's loot box presence warning label was assessed in two studies. The first study found that 60.6% of all games labelled by

either the ESRB or PEGI (or 16.1% using a more equitable methodology) were not labelled by the other. The majority of the inconsistencies were caused by the ESRB refusing to apply the measure retroactively. Five instances where one age rating organization culpably failed to accurately identify loot box presence were identified (although only two cases were admitted by the relevant organization). Generally, with newly released games, consumers can rely on the PEGI and ESRB labels. PEGI has retroactively labelled many older games, meaning that consumers can expect the labelling to be accurate. However, due to the ESRB's policies (which it has refused to improve), North American consumers cannot rely on the label for many older games containing loot boxes, unlike their European counterparts. The data suggest that the loot box issue is far more pressing on mobile platforms than console/PC platforms. The second study found that 71.0% of popular games containing loot boxes on the Google Play Store (whose age rating system is regulated through IARC) did not display the label and were therefore non-compliant. The IARC's current policy on the Google Play Store is that only games submitted for rating after February 2022 are required to be labelled. This policy (which the IARC has refused to improve) means that most popular and high-grossing games can be, and presently are, marketed without the label, thus significantly reducing the measure's scope and potential benefit. The Apple App Store still does not allow loot box presence to be disclosed. At present, consumers and parents cannot rely on this self-regulatory measure to provide accurate information as to loot box presence for mobile games. Due to their immense scale, the mobile markets pose regulatory and enforcement challenges that PEGI admits are not yet resolved. The mere existence of this measure cannot be used to justify the non-regulation of loot boxes by governments, given the poor compliance and doubtful efficacy (even if when complied with satisfactorily). Improvements to the existing age rating systems are proposed. Preregistered Stage 1 protocol: https://doi.org/10.17605/OSF.IO/E6QBM (date of in-principle acceptance: 12 January 2023).

1. Introduction

Paid loot boxes are products within video games that players buy to obtain randomized rewards [1,2]. Some loot boxes are 'non-paid' and can be obtained without spending real-world money; however, the present study focuses on *paid* loot boxes. Hereinafter, 'loot boxes' refers to *all* forms of randomized video game monetization methods, i.e. any 'in-game transactions with randomized elements' [3]. Concerns have been raised about loot boxes' similarities with gambling and the risks that consumers might overspend money and experience harm [4–9]. Children and other vulnerable consumers (e.g. people experiencing problem gambling issues) might be at particular risk of harm [10,11]. Many countries are considering imposing legal regulation, and a few countries have already taken regulatory actions [12–16]. However, in most countries at present, paid loot boxes are specifically regulated only through industry self-regulation [17]. There are two prominent loot box self-regulatory measures: probability disclosures and text-based warning labels attached to age ratings.

The Apple App Store, similar to many other hardware and software platforms [18], imposes the self-regulatory requirement that all games available on that platform 'offering "loot boxes" or other mechanisms that provide randomized virtual items for purchase' [19] must disclose the probabilities of obtaining those items to customers prior to purchase. Xiao *et al.* assessed companies' compliance with Apple's self-regulatory measure among the 100 highest-grossing iPhone games in the UK and found that only 64% of games containing loot boxes disclosed probabilities. This compliance rate was significantly lower than the 95.6% observed in Mainland China where probability disclosures were (and continue to be) required by law [20].

The second self-regulatory measure is to prewarn players about the presence of loot boxes. The Entertainment Software Rating Board (ESRB), established by the Entertainment Software Association (ESA), reviews the content of video games and provides age ratings depending on the inclusion of certain material, e.g. the amount and degree of violence and sexual content [21]. The ESRB is adopted in North America. PEGI (Pan-European Game Information) performs a similar function in Europe generally [22]. Recognizing the concerns that have been raised about loot boxes, on 13 April 2020, the ESRB and PEGI announced that they will attach an additional text-based warning to the age ratings of video games containing loot boxes [23]. The ESRB uses the 'In-Game Purchases (Includes Random Items)' 'interactive element' [3] (figure 1), while PEGI originally proposed to use the 'In-game Purchases (Includes Paid Random Items)' 'content descriptor' (figure 2) [24]. PEGI secretly changed
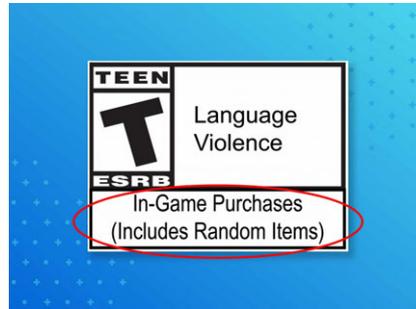
Figure 1. The ESRB 'In-Game Purchases (Includes Random Items)' interactive element. © 2020 Entertainment Software Rating Board (ESRB).

Figure 2. The originally announced, but since replaced, PEGI 'In-game Purchases (Includes Paid Random Items)' content descriptor. © 2020 Pan-European Game Information (PEGI).

Figure 3. The current PEGI 'In-game Purchases (Includes Random Items)' content descriptor. © 2020 (Pan-European Game Information (PEGI).

its label to instead read 'In-game Purchases (Includes Random Items)' (figure 3), which is identical to the ESRB's (except for the capitalization of the 'G'), soon after the initial announcement (without a further announcement) by retroactively partially changing the initial announcement (see §4.3.3 for further detail). As of 16 January 2023, the PEGI announcement's text still referred to the older label, but the image accompanying has been changed to reflect the current (i.e. the ESRB's) label. These two largely identical labels are intended to cover, according to the ESRB, 'all transactions with randomized elements' [3]. The ESRB and PEGI both consciously chose to specifically *not* use the term 'loot boxes' to 'avoid confusing consumers' [3], particularly parents who might not have sufficient knowledge about video games or 'ludoliteracy'.

According to the ESRB, its label accounts for:

'… loot boxes and all similar mechanics that offer random items in exchange for real-world currency or in-game currency that can be purchased with real money' [3].

According to PEGI, its label covers:

'… all in-game offers to purchase digital goods or premiums where players don't know exactly what they are getting prior to the purchase (e.g. loot boxes, card packs, prize wheels)' [24].

These definitions accord with the wide definition for 'loot boxes' adopted by the present study. These labels were intended to 'provide the additional information if the game features paid random items' [24],

such that '…consumers can make more informed decisions when purchasing or downloading a game, instead of finding out after the fact' [3]. Notably, the presence of these labels, or rather the presence of loot boxes, does not affect a game's age rating, because neither the ESRB nor PEGI recognizes loot boxes as actual 'gambling' or 'simulated gambling' [25,26]. These labels can therefore attach to games containing loot boxes but are rated suitable for young children (i.e. ESRB's 'E' or 'Everyone' rating and PEGI's 'PEGI 3' rating) [24]. This is unlike how other content, such as depiction of 'realistic violence', 'illegal drugs, alcohol or tobacco' or 'simulated gambling', would (in certain situations, automatically [27]) cause the game to attract higher age ratings [28,29]. I have previously criticized the labels for not providing sufficient information to truly help players and parents make more informed purchase decisions [23]. The labels fail to identify and explain where and how the loot boxes in a specific game can be purchased, and so players and children cannot easily actively avoid engaging with the mechanics. The labels also do *not* signify whether or not the relevant mechanic provides rewards that can then be transferred to other players and 'cashed-out' [30] (i.e. have real-world monetary value), which is a relevant consideration for many gambling regulators [9,16,17]. The labels might be of some assistance by providing information at the initial point of purchasing or downloading the game; however, once the player has begun playing the game, the labels are no longer helpful. An improvement might be to specifically describe the loot box mechanics to help players actively avoid them and to provide a choice in the options menu to turn the ability to purchase loot boxes on or off (potentially even with the default option set to 'off'). Through experimental studies, Garrett *et al.* have concluded that these labels fail to adequately warn consumers about the potential risks involved with loot boxes and therefore 'fail to adequately inform consumer spending decisions' [31].

The ESRB's and PEGI's wide definitions for 'in-game transactions with randomized elements' [3] and what the present study refers to as 'loot boxes' are effectively identical, despite trivial variations in the wording of the definitions and of the labels. Therefore, the reasonable expectation is that a game containing loot boxes should be labelled with the 'In-Game Purchases (Includes Random Items)' interactive element after being rated by the ESRB in North America and with the 'In-game Purchases (Includes Paid Random Items)' content descriptor or its newer variation after being rated by PEGI in Europe. The ESRB and PEGI should be *consistent* when deciding whether a game contains loot boxes. If one of them fails to label a game with the loot box warning when the other has done so, then the former has highly likely inaccurately rated said game's loot box presence by failing to identify it. The only highly unlikely exception being that a game potentially has separate North American and European versions and only one of which contained loot boxes: such a situation has never been popularly reported.

Research Question 1: Are video games being consistently given the loot box self-regulatory warning label by the ESRB and PEGI?

Hypothesis 1: All games that have been labelled with the 'In-Game Purchases (Includes Random Items)' interactive element by the ESRB should also have been labelled with the 'In-game Purchases (Includes Paid Random Items)' content descriptor or its newer variation by PEGI and vice versa.

The ESRB and PEGI only play a direct role when rating physically published games and are only *indirectly* involved in the rating of each individual digitally released game. Both the ESRB and PEGI are 'participating rating authorities' of the IARC (International Age Rating Coalition), which is a simplified system that allows game companies to simultaneously obtain multiple age ratings for use in different territories for digitally delivered games [32]. After companies fill in a single questionnaire about their games' content, the IARC will produce age ratings that 'also include content descriptors and interactive elements, identifying games and apps that [*inter alia*] offer in-app/game purchases (*as well as those that are randomized*)' (emphasis added) [32]. Specifically, the IARC uses the 'In-Game Purchases (Includes Random Items)' interactive element, which is the ESRB's label and whose wording differs slightly from that of the PEGI label. The IARC is not implemented on the Apple App Store (which uses its own age rating system [33]) but is adopted by the Google Play Store and other major platforms [32]. Depending on which national version of the Google Play Store is visited, the appropriate age rating for that territory is shown. For example, for the game *Guns of Glory* (FunPlus, 2017), the US Google Play Store displays the ESRB rating of Everyone 10+ (https://play.google.com/store/apps/details?id=com.diandian.gog&hl=en&gl=us), while the Danish Google Play Store displays the PEGI rating of 7 (https://play.google.com/store/apps/details?id=com.diandian.gog&hl=en&gl=dk). *Guns of Glory* has previously been identified as containing loot boxes in multiple studies [18,34,35]. Indeed, the IARC has attached the 'In-Game Purchases (Includes Random Items)' label to the game on both the US and Danish Google Play Stores alongside the respective ESRB and PEGI age ratings.

Notably, the IARC explains that 'Interactive Elements are assigned *universally*, providing notice about the ability to make in-game purchases (including randomized ones)…' (emphasis added) [36]. This contrasts with the IARC's assignment of 'Age Rating and Content Descriptors', which will differ by region [36]. In other words, a game containing loot boxes can receive different age ratings in different regions under the IARC system, but the loot box warning label, which is an interactive element, should be attached to that game regardless of region. Universal or global assignment of the label means that the IARC has effectively extended the 'jurisdictional' scope of the loot box self-regulatory warning label requirement to countries beyond those covered by the ESRB and PEGI. For example, Germany, despite being in Europe, does not use PEGI and instead adopts the alternative USK (Unterhaltungssoftware Selbstkontrolle (USK) to provide age ratings. Up until 31 December 2022 (inclusive), the USK did not assess the presence of loot boxes and did not require the use of a label to signify their presence in relation to physical games marketed in Germany [37]. (On 14 December 2022, the USK announced that it will begin to assess the presence of loot boxes and attach the 'In-Game-Käufe + zufällige Objekte [In-game purchases + random items]' label accordingly to new game submissions from 1 January 2023 [38]). Notably, as of 16 December 2022, the official USK web page explaining the integration of the USK age ratings within the IARC system has *not* been updated to explain that the IARC will now additionally attach 'In-Game-Käufe (zufällige Objekte möglich) [In-Game Purchases (Includes Random Items)]' to games containing loot boxes and, instead, the web page still only states that games allowing for additional in-game purchases will be attached with the generic 'In-Game-Einkäufe [In-Game Purchases]' [39]. However, the USK is a 'participating rating authority' of the IARC [32], and so, even before the USK introduced its own loot box warning label, games containing loot boxes were being attached with 'In-Game-Käufe (zufällige Objekte möglich)' on the German Google Play Store: for example, *Guns of Glory* (https://play.google.com/store/apps/details?id=com.diandian.gog&hl=de&gl=de) as of 18 September 2022.

Draft laws in the US that have failed to pass [40] tried to require games containing loot boxes to 'prominently disclose to the consumer at the time of … purchase a bright red label that is easily legible and which reads: "Warning: contains in-game purchases and gambling-like mechanisms which may be harmful or addictive"' [41,42]. Another (since died) Bill intended to require the following (arguably not entirely scientifically inaccurate) loot box warning label within the US state of Illinois:

> 'Attention Parents: A Loot Box System exists in this game that permits an unlimited amount of REAL MONEY to be spent without any age restriction. REAL MONEY is exchanged for random digital items. This process has been linked to REAL LIFE GAMBLING ADDICTIONS in both children and adults. Please regulate your own spending as well as your children's spending' [43].

Other countries might be considering imposing similar information-based warning labels to address the potential harms of loot boxes. Previous research has found that other industries, such as alcohol [44], tobacco [45] and gambling [46], have all taken various corporate actions that probably reduced the effectiveness of product warnings. Loot box probability disclosures are known to have been implemented suboptimally by video game companies: specifically, lacking prominence and being difficult to access [18,20]. Compliance with Belgium's 'ban' on loot boxes through applying pre-existing gambling law has also been poor [35].

When filling in the content rating questionnaire, Google warns that: 'Misrepresentation of your app's content may result in removal or suspension, so it is important to provide accurate responses to the content rating questionnaire'. The IARC also recognizes that ratings can be changed through 'post-release modification' [47] and states that: 'IARC rating authorities [*inter alia*, the ESRB and PEGI] monitor ratings assigned to games and apps to ensure accuracy. Corrections, if needed, are implemented promptly by storefronts'. However, considering prior research, reasonable doubt must be cast on the compliance rate with the self-regulatory requirement of attaching loot box warning labels.

Rather than to assess the 100 presently highest-grossing Google Play Store games as to whether they contain loot boxes (as previous studies have done [18,20,34,35]) and then to check whether they are displaying the label, it is more economical and efficient to instead examine games previously known to contain loot boxes. If a game that was known to contain loot boxes is displaying the label, then it is no longer necessary to assess whether said game still contains loot boxes through gameplay, as this can be reasonably assumed. Only those games previously known to contain loot boxes but are not displaying the label need to be reassessed through gameplay. This expediency is desirable because it is hoped that the present study's results could be published promptly and thereby contribute to the efforts of the UK Government's Department for Digital, Culture, Media & Sport's technical working group that is developing industry self-regulation for loot boxes with the aim of reducing harm [48].

The sample selection (as detailed below) was based on previously highest-grossing games (many of which probably still remained high grossing and popular presently) [18,20,34,35]. This, therefore, represents a sample of particular interest for players, parents, policymakers and the age-rating organizations. However, some limitations should be noted. Firstly, the compliance rate among this sample of historically (and potentially presently) high-grossing games is not necessarily representative of that of financially worse performing games (which might be less scrutinized by players and other companies and therefore less likely to comply or, contrastingly, might be performing worse financially because they have accurately displayed the label) or the overall situation on the Google Play Store. Secondly, these games were previously highlighted in published academic work as having contained loot boxes [18,20,34,35], and, therefore, their operating companies might have since become more likely to comply (when compared with a newly published game that has not yet gained any notoriety), as companies have reportedly complied with the Belgian 'ban' on loot boxes only following the publication of Xiao and media reporting thereof [35,49] and 4 years after they were originally supposed to have done so.

Research Question 2: Are video games previously known to be high grossing and contain loot boxes and presently containing loot boxes on the Google Play Store accurately displaying the IARC 'In-Game Purchases (Includes Random Items)' label?

Hypothesis 2: All titles in the present sample of video games previously known to contain loot boxes, and which are presently available on the Google Play Store and continue to contain loot boxes, will accurately display the IARC 'In-Game Purchases (Includes Random Items)' label.

The present series of two studies did not seek to assess the efficacy of the loot box self-regulatory labels on consumer behaviour (see [31]) and instead sought to assess (i) whether the ESRB and PEGI have *consistently* applied the loot box self-regulatory warning label and (ii) whether companies have complied with this self-regulation by *accurately* labelling games containing loot boxes with the relevant notice.

2. Method

2.1. Study 1

The ESRB provides a public search tool for identifying the age ratings, content descriptors and, importantly for Study 1, interactive elements, including the 'In-Game Purchases (Includes Random Items)' label, for specific games [50]. However, it is not possible to use the search tool to specifically identify only games with the 'In-Game Purchases (Includes Random Items)' label. Using the relevant filter for the label unhelpfully brings up all games with 'No Interactive Elements' (the overwhelming majority) and those with the relevant label. The ESRB also publishes a list of all games that it has rated in reverse chronological order [51]. By using the 'Refine Search' function of the search tool and limiting the 'Time Frame' to 'Past Year' (the longest period that could be chosen) and applying no other filters, a list of all games that were rated in the year leading up to 21 September 2022 were extracted through data scraping. This list consisted of 698 individual entries (a few games appeared as multiple entries because different editions and platforms were sometimes rated and listed separately). In total, 21 entries (3.0%) were labelled by the ESRB with the 'In-Game Purchases (Includes Random Items)' interactive element. Two entries were excluded for bearing the exact same name as another entry. A third entry was excluded because although it bears an additional subtitle (*FIFA 22 Legacy Edition*), it is the same game as another entry (*FIFA 22*) and appears to have probably been rated on the same date. A list of 18 individual video game titles that were labelled by the ESRB with the loot box self-regulatory warning in the year leading up to 21 September 2022 was thereby produced. Based on how many games appeared as results when the Time Frame filter was set to 'Past Year', it can be estimated (appreciating that seasonable variability and COVID-19 impacts cannot be accounted for) that the ESRB rated approximately 700 games per year historically. This information can be used to infer that the ESRB rated approximately 992 games in the 17 months between 13 April 2020 (the date on which the labels were announced and began to be assigned) and 21 September 2021 (the date after which the list of games rated in the past year leading up to 21 September 2022 started). The 1415 entries (amending and improving on the preregistered 1000 entries) that immediately preceded the 698 entries that have already been collected on the reverse chronological order list were also collated through data scraping. An additional 26 entries labelled by the ESRB with the 'In-Game Purchases (Includes Random Items)' interactive element were identified, and 10 entries bearing the same or a

substantially similar name were excluded as above. These additional 16 entries were combined with the 18 previously identified entries to form an approximately complete list of 34 games that have been labelled by the ESRB with the loot box self-regulatory warning since 13 April 2020 (hereinafter, the 'ESRB List'). The ESRB List was generated thusly because it was deemed impractical to analyse all 31 636 individual historical entries (existing on 21 September 2022) and the ESRB provided no information as to the exact date that a rating was given, besides allowing an inference to be drawn through the Time Frame filter. Certain games are also published months after a rating has been granted, so the release date of games also cannot be used to determine the relevant rating date. It was deemed unwise and potentially leading to a conflict of interest (and a change in compliance behaviour) to contact the ESRB and ask for a complete list of games that it has labelled with the warning, although this might be done following the publication of the present study.

PEGI similarly provides a search tool for identifying the age ratings and content descriptors (including the 'In-game Purchases (Includes Random Items)' label) for specific games [52]. Unlike the ESRB search tool, the PEGI search tool *can* be used to produce a list of all games ever rated by PEGI that were given the 'In-game Purchases' content descriptor, if the 'DESCRIPTOR' of 'In-Game Purchases' is selected in the 'EXTENDED SEARCH' options [53]. The 'In-game Purchases (Includes Random Items)' is treated as a subtype of the overarching 'In-game Purchases' content descriptor, and therefore all games that have been given the loot box self-regulatory warning are included in said list. On 21 September 2022, a list of 523 individual results of games that have ever been labelled by PEGI with the 'In-game Purchases' content descriptor was produced. Again, a number of games appeared as multiple entries, as different editions and platforms were sometimes rated and listed separately. In total, 125 results (23.9%) were ever labelled by PEGI with the 'In-game Purchases (Includes Random Items)' content descriptor or its older variation. Entries were excluded for bearing the same name as another entry (55 entries) and being the same game as another entry despite minor changes to the title (e.g. '*World of Tanks on PlayStation 4*' as compared with '*World of Tanks*', six entries). A list of all 64 individual video game titles that have ever been labelled by PEGI with the loot box self-regulatory warning was thereby produced (hereinafter, the 'PEGI List').

The following variable was measured:

2.1.1. Presence of the loot box self-regulatory warning label on the other system

The games on the ESRB List were entered into the PEGI search tool [52] and vice versa with the PEGI List and the ESRB search tool [50]. Screenshots were taken of the relevant ratings, content descriptors, and/or interactive elements. If the corresponding loot box self-regulatory label could be found for the game on the other age rating system, then this game was marked as 'consistent', but if not, then 'inconsistent'. If a game appeared on both the ESRB List and the PEGI List, then it was deemed 'consistent', but screenshots were taken on both systems to corroborate this. Some reasonable flexibility was allowed when searching for a corresponding game if a game with the exact same title could not be found. Any deviation was recorded. If a game could not be found on the other system even after allowing for a reasonable amount of flexibility with the search term, then it would have been excluded from analysis.

The 'consistency rate' between the ESRB's and PEGI's usage of the loot box warning self-regulation was calculated as follows:

$$\frac{\text{games that have been labelled with the loot box warning by both the ESRB and PEGI}}{\text{(all games on the ESRB and PEGI Lists} - \text{any duplicate or excluded games)}}.$$

Hypothesis 1 would have been accepted had the consistency rate been greater than or equal to 95%. Otherwise, Hypothesis 1 would have been rejected. In terms of the interpretation of results, a consistency rate of greater than or equal to 95% would have been viewed as the ESRB and PEGI having been sufficiently consistent. A consistency rate of greater than or equal to 80% but less than 95% would have been deemed as the self-regulatory measure not having been applied sufficiently consistently by the ESRB and PEGI, and thus the rating processes require improvements to enhance cohesion. A consistency rate of less than 80% would have been seen as the measure having been applied inconsistently, and thus the rating processes being in need of significant improvements. These cut-offs and corresponding potential interpretations were based on the author's own opinion on what is a 'satisfactory' self-regulatory measure and what he deemed most policymakers would agree with.

Study 1 achieved level 3 of bias control as recognized by *Peer Community In Registered Reports* (*PCI RR*), as it was necessary to attempt to collate the ESRB and PEGI Lists to affirm the study's practical

feasibility. I certified in the registered protocol that: at the time, I have 'not yet observed ANY part of the data/evidence' [54], specifically, I have not searched for games on either List using the other rating system's search tool.

2.2. Study 2

The sample of 100 (or potentially fewer) games were selected using the following steps:

1. The sample was derived from the samples of four previous studies assessing loot box prevalence among mobile games in different countries, which examined 531 separate instances of video games and identified whether they contained loot boxes [18,20,34,35].

2. Among those 531 games, 100 were originally studied in Chinese and not in English [20]. Those 100 Chinese games were reviewed in 2021 to identify a subset of 31 games that were also then available in English, which were reassessed in a UK study [18]. The present study is less interested with the compliance situation of games available only in Chinese and more concerned with the compliance situation in North America and Europe (i.e. 'Western' countries) where the ESRB and PEGI self-regulate; therefore, those 100 Chinese games were not reviewed again as the previously distilled list of 31 games that were available in both languages were taken into account.

3. A list of 431 games combining the results of three previous studies was collated [18,20,34]. Any duplicates and any games assessed to have *not* previously contained loot boxes were removed. Some reasonable flexibility as to the game's title was allowed when searching for and removing duplicate games (e.g. changes to the subtitle to reflect a content update). Any deviation was recorded. The remaining games therefore formed a list of non-duplicate games that were known to contain loot boxes.

4. It was known that two so-called 'sand box' games (specifically, *Roblox* (Roblox Corporation, 2006) and *Minecraft* (Mojang Studios, 2011)) would be included on that list. These two games contain a significant amount of third-party user-generated content, including loot boxes [18,35]. This represents a particular compliance difficulty as these 'platform' games' developers and publishers would need to ensure not only compliance by themselves but also compliance by many third parties creating content for these games [49,55]. To ensure that both of these games would be assessed, they were removed from the list and did not form part of the sample. Their compliance situation was separately reported. If either game would have become unavailable for download and incapable of being assessed, then this would have been noted in lieu.

5. Therefore, the present study's sample was a total of 100 random games from the list of non-duplicate games that were known to contain loot boxes.

6. Alternatively, had that list contained fewer than 100 games, the entire list would have formed the sample.

7. Had any game in the sample been no longer available for download from the Google Play Store by the data collection period then it would have been excluded from the sample and replaced with another random game from the list. Had that list contained fewer than 100 games or had no games been left on that list to replace the excluded game, then the study would have proceeded with the available games even if the sample was formed of fewer than 100 games.

8. The same exclusion and replacement (if possible) procedure would have applied had *Guns of Glory* been included. This game is specifically being excluded as it has been used as an example to test and illustrate the present study's methodology for the stage 1 registered report submission and its 'results' have already been observed.

The following variables were measured:

2.2.1. Presence of the interactive element of 'In-Game Purchases (Includes Random Items)'

The Google Play Store page of the relevant game was reviewed to check whether the IARC interactive element of 'In-Game Purchases (Includes Random Items)' has been noted alongside the game's age rating. The US and Danish Google Play Stores for each game were checked to see whether the label has been attached to both the ESRB and the PEGI ratings, respectively. A simple change of the parameter 'gl = [country code]' in the game's Google Play Store URL allowed for the switching of regions. The country code for the US is 'us', while Denmark uses 'dk'. To illustrate using the example of *Guns of Glory,* the US store could be visited through the following URL: https://play.

google.com/store/apps/details?id=com.diandian.gog&hl=en&gl=us, while the Danish store could be visited through: https://play.google.com/store/apps/details?id=com.diandian.gog&hl=en&gl=dk. PDF printouts of the relevant web pages (showing the URL visited) were made.

2.2.2. Presence of paid loot boxes (newly assessed)

If the Google Play Store page of a game known to previously contain paid loot boxes did not show the IARC interactive element of 'In-Game Purchases (Includes Random Items)' alongside the game's age rating, then that game was played for up to an hour to identify whether paid loot boxes were still being implemented and sold in that game. Any identified paid loot boxes had a screenshot taken. If a paid loot box could not be identified within that timeframe, then the game would have been coded as not containing paid loot boxes.

To align with the methodology of prior studies [18,20,35], a 'paid loot box' was defined as being either an Embedded-Isolated random reward mechanism (which are video game mechanics that players must pay real-world money to activate and which provide randomized rewards that do *not* possess direct real-world monetary value) or an Embedded-Embedded random reward mechanism (whose activation also must be paid for by players with real-world money but which *do* provide randomized rewards that possess direct real-world monetary value), as defined by Nielsen & Grabarczyk [4].

In particular, it is emphasized that so-called 'social casino games' or 'simulated casino games', in which the player is able to spend real-world money to participate in simulated traditional gambling activities (i.e. 'games of chance' or 'mixed games of chance and skill'; e.g. slot machines, poker and blackjack) and win or lose virtual currency *randomly* [35], were counted as games containing 'loot boxes' for the purposes of Hypothesis 2, despite some debate on that point within the academic literature [56,57]. This is because spending real-world money to participate in a social casino game constitutes an in-game '[transaction] with randomized elements', per the ESRB's definition [3]. The present study's definition of 'paid loot box' encompasses both mechanics that are commonly known as 'loot boxes' and social casino games. This accords with both the ESRB's and PEGI's definitions for mechanics that the loot box warning labels are supposed to cover [3,24]. However, the relevant compliance rates (see below) among 'social casino games' (which were identified using the definition above) and non-'social casino games' were additionally separately reported to provide nuance.

Further, again aligning with the methodology of prior studies [18,35], so-called 'sand box' games, such as *Minecraft* or *Roblox*, that contain a significant amount of third-party user-generated content were assumed to contain paid loot boxes without the need for such a mechanic to be specifically identified and a screenshot taken.

2.2.3. Date and time of data collection

The date and time, based on Greenwich Mean Time, on and at which the interactive element and paid loot boxes was searched for, was recorded.

Inter-rater reliability through dual-coding was not calculated because the methodology has been repeatedly used and refined and is known to be reliable [58]. The raw data and a full library of PDF printouts and screenshots showing, *inter alia*, the relevant Google Play Store web page sections and in-game loot box purchase pages for each game has been made available via https://doi.org/10.17605/OSF.IO/YZKUP for public scrutiny.

The 'compliance rate' with the loot box warning self-regulation was calculated as follows:

$$1 - \frac{\text{games newly assessed as containing loot boxes but not displaying the interactive element}}{(\text{all games previously known to previously contain loot boxes} \\ - \text{games newly assessed as not containing loot boxes})}.$$

Hypothesis 2 would have been accepted had the compliance rate been greater than or equal to 95%. Otherwise, Hypothesis 2 would have been rejected. In terms of the interpretation of results, a compliance rate of greater than or equal to 95% would have been viewed as the self-regulatory measure having been nearly perfectly complied with and worthy of commendation. A compliance rate of greater than or equal to 80% but less than 95% would have been deemed as the self-regulatory measure having been mostly complied with, although improvements are needed. A compliance rate of less than 80% would have been seen as the measure having *not* been adequately complied with and in need of significant improvements to achieve its regulatory aim. Again, these cut-offs and corresponding potential

interpretations were based on the author's own opinion on what is a 'satisfactory' self-regulatory measure and what he deemed most policymakers would agree with.

Study 2 achieved level 6 of bias control as recognized by *PCI RR* as the relevant data did not yet exist at the relevant time [54].

The sample sizes for both studies were justified on the basis of resource constraints: specifically, the researcher had limited time and was seeking to promptly complete the study in time to assist in the government-supported, industry self-regulatory efforts regarding loot boxes contemporaneously under way in the UK [48].

In accordance with the *Danish Code of Conduct for Research Integrity* [59], as adopted by the IT University of Copenhagen, the present series of two studies did not require research ethics assessment and approval because no human participants or personal data were involved and only publicly available information was examined and recorded.

3. Results

3.1. Study 1: ESRB and PEGI consistency

3.1.1. Confirmatory analysis

The ESRB and PEGI Lists combined to form a list of 98 separate entries. Among those, 24 entries were combined into another entry because they appeared on both the ESRB and PEGI Lists; referred to the same underlying game; and so represented cases where both age rating systems attached the label. Of the remaining 74 different games that were attached with the loot box warning label by either the ESRB or PEGI up until 28 September 2022, 24 games (32.4%) were labelled thusly by both, 10 games (13.5%) were labelled only by the ESRB and 40 games (54.1%) were labelled only by PEGI, as shown in table 1.

A closer examination was made of the 50 games regarding which the ESRB and PEGI did not conform and apparently came to different conclusions as to whether or not said game contained loot boxes and therefore should be attached with the label on 21 September 2022. PEGI rated two of those games (4.0%) after 21 September 2022 and correctly labelled them, so these are treated as cases of consistency. A total of eight games (16.0%) were submitted to only one of the two bodies: five games (10.0%) were submitted only to PEGI and three games (6.0%) were submitted only to the ESRB. Given that the other age rating organization did not have an opportunity to examine, and could never have potentially labelled, these eight games, they were excluded from the consistency rate calculation as preregistered.

In summary, among 66 games that both the ESRB and PEGI rated and therefore had an opportunity to attach the loot box presence warning label to, the ESRB and PEGI were genuinely inconsistent in relation to 40 games (60.6%) and consistent with 26 games, which means that the 'consistency rate' was calculated to be only 39.4%. Among the 40 disagreements, 35 (87.5%) were attributed to the ESRB failing to attach the label while five (12.5%) were attributed to PEGI.

Hypothesis 1 is rejected as the consistency rate of 39.4% is less than 95%.

3.1.2. Exploratory analysis

It became apparent during the data collection process that PEGI applied the label to some games that were originally rated prior to the announcement of the label *retroactively*, while the ESRB did not. This is demonstrated by the labelling status of the *FIFA* games (Electronic Arts, 1993–present), which were released through annual editions: PEGI has labelled *FIFA 15* to *FIFA 22* with the label. By contrast, the ESRB failed to label *FIFA 15* to *FIFA 20*, but did label *FIFA 21* and *FIFA 22*. The *FIFA* games are always released in the year before that edition's numbering, meaning that *FIFA 20* was released on 27 September 2019 and *FIFA 21* was released on 9 October 2020 (according to PEGI, as shown in the relevant PEGI Search Tool Printouts at the data deposit link[1]). The label was announced by the ESRB and PEGI on 13 April 2020. It would be reasonable to conclude from these dates that the ESRB applied the label only after the label announcement date, but PEGI has gone back and rerated at least some games to attach the label (as both organizations have since confirmed). As further detailed in §4.1.1 of the Discussion section, either approach was justifiable given the wording of the

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[1]Hereinafter, any references to a game's release date according to PEGI can also be corroborated by relevant printouts at the data deposit link.

Table 1. Synthesis and interpretation of the official explanations for the disagreements/inconsistencies ($n = 40$). Note: underlined text means the author is of the view that the relevant age rating organization is culpable for some failings. The wording of '*et al.*' refers to when a title was submitted as multiple entries and some of those entries may have additional subtitles attached to the original game title.

game title and/or category description	label missing from…	ESRB labelling status or response	PEGI labelling status or response
29 games originally rated prior to the label being introduced	ESRB	not responsible for updating the label	duly labelled
		did not invite publishers to add the label	invited publishers to add the label
		the publisher cannot add labelling in the search tool even if desired	relevant publisher voluntarily added the label upon invitation
		did 'encourage' publishers to 'add [label] to packaging and marketing materials if applicable'	
Mobile Suit Gundam Battle Operation 2	PEGI	duly labelled	rated prior to the label being introduced
			invited publishers to add the label
			relevant publisher did *not* voluntarily add the label upon invitation
			the label has not yet been added as of 12 February 2023.
UFC 4	ESRB	does not contain loot boxes	agrees does not contain loot boxes
			publisher disclosed out of an abundance of caution
PGA Tour 2K21			technically a false positive
			since corrected by removing the label

(*Continued*.)

Table 1. (*Continued.*)

game title and/or category description	label missing from…	ESRB labelling status or response	PEGI labelling status or response
Arcadegeddon / *Riders Republic*	PEGI	labelled based on self-reporting possibly technically a false positive	does not contain loot boxes
Blankos Block Party	PEGI	labelled based on self-reporting	does not contain loot boxes in PEGI territories due to region-specific geo-blocking
Rainbow Six Siege	PEGI	duly labelled	recognizes had opportunity after the label was introduced to re-label the game upon resubmission **admits to failing**
Originally rated prior to the label being introduced but resubmitted after the label was introduced for another rating (might be an updated version, part of a new compilation, or a new hardware platform release)		resubmission for new hardware platform releases (made after the label was introduced) received the label Original submission remains unlabelled	Commits to improving procedure for similar resubmissions in the future
Apex Legends et al.	ESRB	not labelled	duly labelled
Black Desert et al.		no intention to add the label in the future	invited publishers to add the label
Hunt: Showdown et al.		failed to review rating when given opportunity after the label was introduced upon resubmission: 're-releases of games that do not add new pertinent content use the initial submission's rating assignment'. **admits to labelling error**	relevant publisher voluntarily added the label upon invitation
Genshin Impact	ESRB		duly labelled

announcements, although applying the label retroactively should be preferred. This incongruence with retroactivity affects the fair interpretation of their label application's 'consistency rate' (which has been considerably reduced as a result) when calculated as preregistered. A more equitable consistency rate must be determined that accounts for the retroactivity issue because the ESRB has been attributed with a substantially higher number of failings than may be fair.

I have since received official responses from PEGI and the ESRB explaining the 40 disagreements/ inconsistencies: these are synthesized in table 1. Prior to receiving those responses, I conducted exploratory analysis attempting to deduce the explanations for the inconsistencies: that content remains available as §3.1.2 of the first draft of this study: https://doi.org/10.31219/osf.io/asbcg (Version 1 dated 18 January 2023). I do not expect that the PEGI and the ESRB explanations would be intentionally incorrect and misleading as both were aware that their responses would be duly published at the data deposit link. The official explanations are more reliable than, and preferable to, my own deductions, and thus are presented instead.

The official responses allowed for the retroactivity issue to be dealt with fairly and accurately. In total, 30 games (29 games that the ESRB did not label and *Mobile Suit Gundam Battle Operation 2*, which PEGI did not label) fall within this category of games that were rated prior to the introduction of the label and did not have another variation of the same title resubmitted (for whatever reasons) for a separate rating after the label was introduced, which would give the age rating organization another fresh opportunity to reconsider whether to attach the label. Four games were confirmed not to contain loot boxes by at least one age rating organization and were either confirmed or likely false positives at the other. One game took technical measures, specifically, geo-blocking, to prevent loot boxes from being accessible in PEGI territories, thus rendering the version of the game rated by PEGI to not be the same as the one rated by the ESRB. For the justifications given, all 35 aforementioned games must be excluded from the revised consistency rate calculation.

This leaves five games, which in the author's view must be deemed as inconsistent due to genuine, culpable failings on the part of either the ESRB (four games; 80%) or PEGI (one game; 20%). The ESRB admitted fault for only one of those four games, while PEGI admitted fault for the one single game. The one fault that the ESRB admitted to as a rating mistake is not worth further elaboration. PEGI admitted fault with one game even though this game was originally rated before the label was introduced, because this game has since been resubmitted at a date after the label came into force as part of a compilation, thus giving PEGI a genuine opportunity to attach the label after it was introduced, and PEGI failed to add the label at this new opportunity. The three games for which the ESRB would not admit fault fall within the same category that PEGI admitted fault for: the ESRB had a new opportunity after the label came into force to re-examine each of those games for labelling due to a resubmission (although the ESRB disputes whether these should technically be viewed as 'resubmissions' *per se*). However, the ESRB failed to use these opportunities to consider whether labelling was appropriate and simply copied the initial submission's rating (even though that rating was decided using outdated criteria). Notably, the ESRB did properly label *Rainbow Six Siege* (an older game originally rated prior to the label's introduction) upon resubmission for new hardware platform releases after the label was introduced, so there was even 'precedent' of this being done correctly at the ESRB.

Among a total of 31 games that the ESRB and PEGI both had fair opportunities to label after the label was introduced: 26 games were consistent, while five were inconsistent due to one organization culpably failing to label the game. The revised 'consistency rate' is 83.9% among this subsample.

Hypothesis 1 would still be rejected even when the more equitably determined consistency rate of 83.9% is used, as it remains less than 95%.

3.2. Study 2: IARC on the Google Play Store

3.2.1. Confirmatory analysis

From the list of 431 games derived as preregistered, 129 games previously assessed to have *not* contained loot boxes (potentially including duplicate games) were removed, resulting in a list of 302 games. From that list of 302 games, 127 duplicates, *Roblox* and *Minecraft* were removed, thus leaving a list of 173 non-duplicate games previously assessed to have contained loot boxes.

When forming the sample of 100 random games previously known to contain loot boxes, six games that were initially randomly chosen were excluded and replaced. *Guns of Glory* was replaced as preregistered. *Brawl Stars* (Supercell, 2017) and *Mario Kart Tour* (Nintendo, 2019) were replaced because these two games were known to have had their loot boxes removed since 18 September 2022

and therefore no longer contained loot boxes [60,61]. Interestingly, *Brawl Stars* still had the label attached as of 12 January 2023, despite not containing any loot boxes, and thus it would have technically constituted a false positive. By contrast, *Mario Kart Tour* did not have the label attached as of 13 January 2023, and it could not be determined whether a label was duly attached *previously* when the game did still contain loot boxes. *Hokage Ninja Duel* (unknown developer/publisher, unknown year) was not available on the Google Play Store as of 13 January 2023 and was replaced. *Clawee* (Gigantic, 2017) was available on the Google Play Store, but the game would not operate on the phone after being downloaded despite multiple attempts at different times and was replaced. *Sniper 3D Assassin: Gun Games* (unknown developer/publisher, unknown year) could not be found under this exact name on the Google Play Store. A game entitled '*Sniper 3D: Gun Shooting Games* [the Chinese full-width colon is original]' (Fun Games For Free, 2014) was identified as a potential match; however, although said game was available when browsed using the web version of the Google Play Store, it could not be found on the phone version of the Google Play Store. Downloading and installing the relevant apk (Android Package) file from an alternative source was deemed to be potential copyright infringement and ill-advised. Given that the game is not even a confirmed match (as no information on which company was operating this game when Zendle *et al.* [34] originally coded it is available), it was deemed more appropriate to exclude and replace this game.

Among the 100 random games previously known to contain loot boxes which were sampled, 29 games (29.0%) displayed the label and were therefore assumed to continue to contain loot boxes and 71 (71.0%) did not display the label. The Danish and the US storefronts were identical as to whether a game was labelled, thus indicating that the system did indeed generate the PEGI-worded and ESRB-worded ratings from the same source information (i.e. the developer/publisher questionnaire [62,63]). Of the 71 games that did not display the label and were therefore replayed to verify whether they continued to contain loot boxes, 71 games (100.0%) were found to continue to contain loot boxes. The 'compliance rate' among the entire sample was therefore calculated to be 29.0%.

Hypothesis 2 is rejected as the compliance rate of 29.0% is less than 95%.

As preregistered, 13 games were identified to be 'social casino' games and were deemed to 'contain loot boxes', among which two games were labelled with the 'loot box presence' warning meaning that the compliance rate was 15.4%. This shows that some companies (although this appeared to be a minority view) do recognize social casino games as broadly falling within the 'loot box' or the 'in-game transactions with randomized elements' [3] definition. Among 87 non-social casino games, 27 were labelled, therefore giving a 31.0% compliance rate. Notably, many social casino games received PEGI 12 and ESRB Teen ('suitable for ages 13 and up' [28]) ratings. Two such games even received PEGI 3 and ESRB Everyone ('suitable for all ages' [28]) ratings. Whether those age ratings are appropriate is left to the discretion of the relevant stakeholders. However, PEGI has previously decided that, since 2020, all new games that contain simulated or actual gambling are to be rated PEGI 18 [27]: this is demonstrated by how social casino games frequently received the arguably incongruent combination of PEGI 18 and ESRB Teen ratings.

Neither *Roblox* nor *Minecraft* displayed the loot box presence warning label on the Google Play Store when assessed on 12 January 2023.

3.2.2. Exploratory analysis

I have since received official responses from PEGI and the ESRB/the IARC explaining the actions that they have taken in relation to the non-labelled Google Play Store games. Notably, the responses from the ESRB and the IARC were received from one relevant person who acted in her capacity as both President of the ESRB and Chairman of the IARC. For this reason, at times, it was difficult to discern whether a response should be properly attributed to the ESRB, the IARC, or both. Prior to receiving those responses, in addition to the 71 games identified as non-compliant through confirmatory analysis, I conducted exploratory analysis, justified in §3.1.2 of the first draft of this study: https://doi.org/10.31219/osf.io/asbcg (Version 1 dated 18 January 2023), that found a further 13 non-compliant games. I sent this list of 84 games to the age rating organizations asking for their response and, if appropriate, corrections.

The IARC response may be summarized as follows. The label was only introduced to the Google Play Store in February 2022 (i.e. almost 2 years after it was introduced for physical games, but nearly a year before the data collection dates). The IARC opines that any games originally rated prior to February 2022 need not be attached with the label and should not be deemed as non-compliant. The IARC admits fault as to three games 'legitimately missing' the label. The IARC's response suggested that the measure was

well complied with after February 2022. I found this suggestion unconvincing: I address this in §4.2.1, but I also undertook further exploratory analysis to check the IARC suggestion that supposedly the label was well complied with by games rated/released after February 2022. Specifically, with little effort, I found an additional list of 11 games released after February 2022 that most likely contained loot boxes and were not labelled. This list includes *Diablo Immortal* (Blizzard Entertainment & NetEase, 2022) whose loot boxes were highly controversial and publicized due to Blizzard Entertainment deciding not to release the game in The Netherlands and Belgium, citing gambling regulation ([35], p. 13). The other 10 games were recently released so-called 'gacha' games. Further data collection was stopped because the author deemed the point proven that many games released after February 2022 were still not duly labelled. The IARC response in relation to these 11 games was that 'a large portion of them were submitted [for rating] prior to [the label being introduced]'. The rating submission dates of games cannot be independently verified.

I was informed by the IARC on 31 January 2023 that it deemed five of those 84 games to '*not* warrant the [label]' (emphasis original) and that all the other games (regardless of when they were originally assigned a rating) on the list of 84 games were added with the label. The divergent interpretations as to whether a game warrants the label are discussed at §4.2.2. I since checked whether those other 79 games were duly labelled and, as of 5 February 2023, only 77 games were so labelled. Further communications with the IARC revealed that two games were marketed as multiple products in different regions, rather than one product in all regions. The IARC only labelled the North American versions but not the European or 'Rest of the World' versions. The versions of the two games that I originally found and later identified to the IARC have since been labelled; however, one additional 'Rest of the World' version of one of those two games remained unlabelled as of 11 February 2023 because I did not specifically highlight it to the IARC. Ten of the games on the list of 11 games released after February 2022 that were unlabelled when I first checked were also since labelled through rectification as of 7 February 2023, thus reflecting that *at least* all but one (as no explanation has been provided for the unlabelled game) did contain loot boxes despite the author not having personally confirmed that point through gameplay.

The IARC refused to label *Roblox* and *Minecraft* as detailed under §4.2.4.

4. Discussion

At the outset, I note that I have since had communications with PEGI and the ESRB/the IARC following data collection. All such communications (except for a remote meeting with PEGI) were in writing and are published at the data deposit link for transparency and further scrutiny. I endeavour to provide my interpretation of the present findings (informed by PEGI's and the ESRB's/the IARC's responses) below. From my experience, PEGI has been more forthcoming in admitting to problems and willing to consider how to fix those issues in the future. By contrast, I have found the response from the ESRB/the IARC to be defensive and unpersuasive: it did not show a willingness to admit to problems or a desire to improve in the future. My opinion is reflected below. An initial draft and non-peer-reviewed version of the Results, Discussion and Conclusion sections written prior to any communications with the relevant organizations is available at: https://doi.org/10.31219/osf.io/asbcg (Version 1 dated 18 January 2023). I welcome others to come to their own conclusions based on the present findings and the responses from PEGI and the ESRB/the IARC.

4.1. Study 1: physical games: the ESRB and PEGI

4.1.1. Retroactivity

The consistency rate of the ESRB's and PEGI's application of the loot box warning self-regulation was 39.4% in the overall sample. This disappointingly low result is somewhat misleading (and arguably treated the ESRB unfairly) due to the ESRB's and PEGI's inconsistent approach to the measure's retroactivity. The ESRB's announcement of the loot box warning label was not clear as to whether it would be applied retroactively to games that have already been rated [3]; similarly PEGI's announcement of its label was also not clear about retroactivity [24]. One could have fairly assumed from the language used by both (specifically, the future tense) that retroactivity was not originally intended by either. The ESRB stated: 'This new Interactive Element … *will be assigned* … ' [3] (emphasis added), while PEGI stated: ' … publishers *will start to provide* additional information … ' [24] (emphasis added).

The ESRB and PEGI provided official responses as to retroactivity. The ESRB has *not* applied the label to games retroactively and has refused to change this approach when responding to the present study (as detailed below), while PEGI has invited publishers to *voluntarily* apply the label (but did not *require* them to do so) by sending communications twice a year. Study 1 could not determine whether all historical games that contained loot boxes have been accurately retroactively labelled by PEGI, at least one instance (*Mobile Suit Gundam Battle Operation 2*) where this was probably not done was detected. PEGI cannot promise that the label's retroactive application to historical games has been complete and accurate, but it should be recognized for taking proactive action to do this: most, if not all, well-known historical games containing loot boxes have now probably been duly labelled.

The two age rating organizations have taken divergent actions in relation to the same consumer protection measure. Undoubtedly, PEGI's approach of applying the label retroactively should be recognized as being better for consumers because more information has been provided even in relation to older games. (An 'older' or 'historical' game in the ESRB/PEGI context is defined as a game originally rated prior to the announcement date of the loot box warning label of 13 April 2020, which means that some of these games were released less than 3 years ago and *not* many years ago.) One can appreciate that providing this label for older games that few players are likely to play today (e.g. an outdated version of the *FIFA* games), and which might not even be in operation any more (e.g. the servers might have already been shut down, thus rendering loot box purchasing factually impossible), may lead to wasted costs. However, given that very little costs would be expended by doing so, retroactivity appears justified to minimize potential loot box harms. PEGI achieved this with little effort simply by sending communications to all publishers twice a year. Any companies that are continuing to offer loot boxes in older games should know that they are doing so and can be expected to easily report this to the ESRB and PEGI and get the label attached at minimal costs. Notably, the German age rating organization, the USK, announced on 14 December 2022 that it will also begin to attach loot box presence warning labels to 'newly submitted' games from 1 January 2023 [38]. The USK has thereby avowed that it will *not* apply the label retroactively.

Going forward, given the consumer protection benefits and minimal compliance costs of adopting retroactivity, the ESRB and the USK should emulate PEGI's example and apply the labels to previously rated games. This process could also be made more efficient if the age rating organizations work collaboratively: for example, the ESRB and the USK should immediately label any historical games that PEGI has already since labelled (or at least promptly seek a clarification from the relevant game company and make a decision accordingly). All three age rating organizations should also update their policy and *require* relevant companies of all older rated games to provide an update as to loot box presence if this is relevant, rather than merely *recommending* companies to voluntarily do so, which is PEGI's current approach. If no response is received from the relevant companies of the older games after a reasonable period of time (e.g. a month), then a warning message stating that the loot box presence status of said game could not be determined should be appended to the online age rating to inform consumers accordingly and pressure the company into replying. Such a message would help to avoid misleading consumers into thinking that a game does not contain loot boxes (which is what the lack of a label presently incorrectly implies). PEGI responded to this suggestion with the counter-argument that this might mean that many games not containing loot boxes are uselessly attached with this message. Parents and consumers may become desensitized to loot box-related warnings as a result. That makes sense; however, ideally, most companies would reply promptly so this would not occur.

A centralized resource should also be developed: if any one rating system decides to label a historical game or indeed a new game as containing loot boxes, that decision should be communicated with others to ensure consistency across the various rating systems. Such cooperation can act as a safeguard to check each other's mistakes and omissions and enhance the accuracy of the labelling process. This type of cross-checking is sensible in relation to the loot box warning label specifically because whether a game contains loot boxes is not (or at least should not be) subjective, unlike, for example, the amount of violence and sexual content that different cultures would allow for various age groups (which various age rating organizations may, and indeed do, reasonably disagree about).

However, cross-checking also has its limitations, so rating systems should encourage players and other stakeholders (such as parents and other competing companies) to report non-compliance (specifically, missing labels). This can help to address cases where all rating systems have failed to notice the loot box implementation in a certain game (which is not unimaginable, as this would probably be due to the relevant company submitting the same inaccurate information to all rating systems). Such complaint avenues were already open prior to this study. However, the ESRB reported that no complaint has ever been filed in relation to inaccurate labelling. Given that a highly popular

game (*Genshin Impact*) was mistakenly left unlabelled (as detailed below), this suggests that the complaint system should be more widely advertised and that accurate complaints leading to the identification of a genuine error should perhaps be financially incentivized to encourage more active reporting. When a mistake or omission has been identified, rating systems should proactively pursue enforcement action (e.g. immediate rectification and fines of 'up to [US]$1 million' [63] according to the ESRB or 'up to €500 000' [64] according to PEGI, as appropriate).

Unfortunately, the ESRB has refused to adopt the aforementioned suggestion of applying the label retroactively without providing a justification (beyond that this was not originally planned). This is despite PEGI having admirably already largely successfully accomplished this and the fact that doing so would only incur minimal costs. Indeed, even if a company voluntarily wanted to add the label, presently, it would not be allowed to change the rating information in the ESRB database found through the online search tool, although the ESRB has 'encouraged' companies to add the label to physical 'packaging and marketing materials'. A major publisher deciding to act responsibly could probably pressure the ESRB into changing its system and allowing labels to be retroactively attached, but no publisher has yet done this (even though they have voluntarily done this at PEGI). Given the ESRB's refusal to improve its approach, it must be concluded that the ESRB 'In-Game Purchases (Includes Random Items)' label was not complied with and was not enforced to a satisfactory degree. Parents and all stakeholders should place cautious reliance on this measure. Games marked with the label should be treated as containing loot boxes and due caution should be exercised (although a few, probably harmless, instances of false positives were also identified). However, some non-labelled games still contain loot boxes, so all non-labelled games should not be assumed to not contain loot boxes. In particular, consumers (including parents) living in ESRB territories are well advised to additionally refer to the PEGI rating system for more complete and accurate information on loot box presence as many older games containing loot boxes remain unlabelled by the ESRB. This burden to cross-check should *not* be unfairly placed on consumers; however, given the ESRB's refusal to adopt the recommendations above and improve its labelling's accuracy and reliability, ESRB consumers must proceed with due caution and not place over-reliance on this questionably discretionary measure.

By contrast, PEGI's implementation of the 'In-Game Purchases (Includes Random Items)' label is more satisfactory. PEGI should be commended for retroactively applying the label and also for committing to improving its rating procedure in light of the one identified and admitted mistake. The PEGI measure could reasonably be relied upon by parents to provide accurate information (barring one or two mistakes and false positives, which PEGI has demonstrated that it is willing and able to promptly correct).

Indeed, leaving aside the ESRB's unjustifiable refusal to apply the label retroactively and to re-releases, with newly released games (i.e. not re-releases), consumers can rely on the PEGI and ESRB labels, although the rating procedures can still be improved.

4.1.2. Non-compliance

After addressing the retroactivity issue in an equitable manner and duly accounting for PEGI's and the ESRB's official responses, the revised 'consistency rate' becomes 83.9%. Five cases of culpable failings (16.1%) remain, which is quite unsatisfactory. As preregistered, as this consistency rate falls between 80% and 95%, it must be interpreted as the self-regulatory measure not having been applied sufficiently consistently by the ESRB and PEGI, and thus the rating processes require improvements to enhance cohesion. Further regulatory issues are illustrated through a case study on a non-compliant game: *Genshin Impact* (miHoYo, 2020), which was attached with the label by PEGI but *not* by the ESRB. For context, *Genshin Impact* was attached with the label by the IARC on the Google Play Store as of 13 January 2023. The ESRB has admitted fault for failing to attach the label to *Genshin Impact* and, as of 7 February 2023, has corrected the rating and added the label.

The ESRB claims in relation to 'Physical Games' it has rated that: 'After release, testers may also play-test the game to verify that the content disclosure was complete' [63]. It is not known whether *Genshin Impact* was in fact physically released as it has been a predominantly digitally released game. However, miHoYo, the developer and publisher, specifically applied for a rating from the ESRB (rather than merely relying on the IARC, which would have sufficed for digital release) meaning that physical release was at least contemplated. However, the ESRB does not appear to have subsequently asked testers to verify whether *Genshin Impact* contained loot boxes and therefore should have the label attached. If the ESRB did invite scrutiny following the release of *Genshin Impact*, the testers failed to identify loot box presence and made obvious errors in their judgement, as the gambling-like, loot box (gacha) character summoning mechanic of *Genshin Impact* is prominently marketed and central to the player's experience and gameplay progression

([65], p. 1077); has been available since the release of the game (and so the ESRB could not have rated an older version without the loot box mechanic); has been correctly identified in two previous loot box prevalence studies [18,35]; and has been subject to media reporting and criticism in popular channels (e.g. [66]).

The ESRB response as to testing after release is that this process was done, but it was 'largely focused on ensuring that all pertinent content that might impact the assignment of an age rating or content descriptor was disclosed during the rating process'. The ESRB decided that the loot box presence warning should not be a 'content descriptor' (e.g. 'Use of Drugs', which would influence the age rating) and should instead be an 'interactive element' (which would not influence the age rating). However, whether the label is one artificial category of content or the other should not affect whether it is duly checked during post-release testing. It is arbitrary to 'largely focus' post-release testing on 'content descriptors'. Indeed, many parents would probably be more concerned about the 'Users Interact' (which includes user-to-user communications); the 'Shares Location' (which includes features that allow other users to see a child's real-life geographical location); and the 'Unrestricted Internet' (which, as the name suggests, allows access to any website) interactive elements than they are of even the most concerning 'Content Descriptors', as the former are capable of posing much more direct harm to a child, including physical injury. The ESRB's post-release testing process is inadequate and must be improved to always account for 'interactive elements'. This official response also exposes potential issues with wider child protection that the ESRB may not be equipped to address.

The rating error of *Genshin Impact* is due to miHoYo (the developer and publisher) failing to submit relevant information and the ESRB both failing to attach the label initially when reviewing miHoYo's submission and then subsequently failing to rectify its mistake. The ESRB rating system failed to catch this error at multiple stages. It is highly unsatisfactory that such a game did not have the loot box warning label attached for more than 2 years after release. *Genshin Impact* is a prominent example of a free-to-play game that operates using the game-as-a-service business model. Many such games are monetized predominantly based on a gambling-like loot box system and are regularly updated with new content (which is often made available in the form of highly desirable, new loot boxes rewards that may be stronger than those obtained through other means ([30], p. 182), e.g. new playable characters in *Genshin Impact* that are only obtainable through the above-mentioned character summoning system). Since its release, *Genshin Impact* has been, and continues to be, one of the most popular and highest-grossing video games, as demonstrated by its repeated nomination for 'best mobile game' and 'best ongoing game' (in the 2 years subsequent to its initial release) at The Game Awards, arguably the leading video game awards ceremony, in 2020 [67], 2021 [68] and 2022 [69] and for winning the Player's Voice category, which is entirely decided by the general public, in 2022 [70]. In relation to such 'ongoing' games with frequent updates, it is important that compliance with all consumer protection measures is also kept up to date. This represents another important reason why loot box warning labels should be applied retroactively. In particular, non-compliance by older games that are being regularly updated and are still high grossing should not be tolerated.

4.1.3. Rating process lacks accountability

In relation to three games: *Apex Legends* (Respawn, 2019), *Black Desert* (Pearl Abyss, 2015) and *Hunt: Showdown* (Crytek, 2018), which originally rated by the ESRB prior to the label coming into non-retroactive effect, the ESRB had more recent opportunities after the label came into effect to revisit its rating decisions when rating downloadable content (DLCs), newer editions or releases on newer platforms of these games. However, it has failed to update the rating and attach the label to the newer versions of these games and admitted to having simply relied on and copied the older decision. The relevant game companies may also be to blame for having submitted outdated and inaccurate information and failing to disclose or specifically highlight loot box presence to the ESRB in their more recent submissions. As a counter-example, *Tom Clancy's Rainbow Six Siege* (Ubisoft, 2015) was originally not labelled by the ESRB; however, the newest hardware platform releases were duly labelled. This may be due to Ubisoft submitting updated information correctly highlighting loot box presence.

The rating processes at the ESRB [63] and PEGI [62] are very similar. There are basically two steps. Firstly, the publisher completes a questionnaire which asks for the self-disclosure of relevant content. The ESRB states that its questionnaire asks for details on 'other factors such as … reward systems … ' [63] This probably refers to loot box presence. It can be assumed that the PEGI questionnaire also asks about loot box presence. The publisher then submits either the game content (at PEGI [62]) or a video showing all relevant game content (at the ESRB [63]) for review by the relevant age rating organization. The ESRB

promises that 'at least three trained raters' would recommend, *inter alia*, 'Interactive Elements' (which includes the 'In-Game Purchases (Includes Random Items)' label) [63]. Further, the ESRB promises that 'After release, testers may also play-test the game to verify that the content disclosure was complete' [63]. PEGI promises that 'PEGI administrators … thoroughly review the provisional age rating [which is automatically derived from the self-disclosure questionnaire]' [62]. No information is provided on post-release monitoring by PEGI. PEGI has shared that loot boxes are particularly difficult to rate because the version of the game it playtests would not be the official release with servers connected and so loot boxes may not appear in the in-game shop that PEGI observes. Therefore, heavy reliance must be placed on self-disclosure during the first step.

This rating process is advertised as being rigorous; however, scrutiny by the present study revealed that (even accounting for the retroactivity issue in a most generous manner) at least 16.1% of games containing loot boxes were not duly labelled by one of either age rating organization. There may also be games that were labelled by neither organization. It also could not be determined what percentage of games already had the loot box presence warning label attached after the questionnaire was filled in by the publisher (i.e. after self-disclosure) and what percentage did only after review of the submission by the age rating organizations (which would mean that the self-disclosure was inaccurate). Both age rating organizations should review their records to figure this out. Doing so would help to identify whether the first step of the rating process needs improvement: if most games did not self-disclose and only had the label attached in the second step upon review by the organizations, then the organizations should consider conducting education campaigns for the publishers to improve the accuracy of the self-disclosures during the first step. The organizations should also compare their records as this could help to identify whether the PEGI approach of reviewing the actual game content might be a superior approach that helped to identify more loot boxes during the second step than the ESRB approach of reviewing only a video of the game content (e.g. in relation to how the ESRB failed to label *Genshin Impact*, but how PEGI did so).

Both age rating organizations responded promptly to my complaint and investigated the relevant issues, including making corrections (although the ESRB has not admitted fault as willingly as PEGI did). Both organizations already provided a complaint system prior to this study, and I hope both would keep such channels open and also proactively respond to complaints filed by others, including parents, and, if appropriate, revise the ratings and labelling status. This is probably the easiest and most cost-effective way of ensuring that information is kept updated and accurate. Two improvements to the rating process are also recommended. Firstly, whenever a newer release of an older game (e.g. DLCs, new editions or new platform releases) is to be rated, the rating process should start afresh; not rely on older ratings; and ensure that any updated content and updated rating guidelines (e.g. to label loot box presence) are duly accounted for. PEGI has committed to improving its rating procedure to more accurately address older games containing loot boxes that get resubmitted. By contrast, the ESRB has refused to adopt this recommendation, meaning that older games would still not be labelled upon re-release. Secondly, due to how contemporary games are frequently updated either to add or remove loot box content, it appears fair to ask for the questionnaire to be refilled and the rating process reconducted annually or at least upon a major content update. This would lead to additional compliance costs, but these costs would be very minor in the context of other regulatory requirements generally (*inter alia*, annual financial reporting obligations), and is justifiable given the potential harms of loot boxes and the need to ensure that any measure that is promised to consumers is complied with effectively and accurately.

4.1.4. Enforcement?

The ESRB promises that 'we have several mechanisms in place to ensure that publishers fully disclose all the content in their games, so consumers get complete and reliable rating information' [63]. physical games, which are relevant to Study 1, the ESRB states that 'our enforcement system includes sanctions and fines (up to $1 million) that may be imposed on publishers who don't fully disclose content to us during the rating process' [63]. Similarly, violations of the *PEGI Code of Conduct*, including failure to disclose significant content (which undoubtedly includes loot box presence), may be sanctioned with 'fines of up to €500 000' [64]. Legal sanctions may also apply to such violations of industry self-regulation, e.g. criminal breaches of the EU Unfair Commercial Practices Directive [2005] OJ L149/22, annex I, para 4. The suspected non-compliant games were, respectively, referred to the ESRB and PEGI, who were asked to take enforcement actions against the relevant companies. The ESRB has corrected its error with *Genshin Impact*, and PEGI has promised to improve its procedure for re-assessing resubmitted older games. However, it is not known whether the relevant companies involved would be punished with a fine.

4.1.5. Scale of the loot box issue: platform differences

Finally, if we are to trust the ESRB and PEGI that only 74 games, among all physical games ever rated, should have had the label attached and therefore contained loot boxes, this reflects that the scale of the loot box and predatory monetization problem is very different on the console/PC platforms as compared with the mobile platform. Most loot box prevalence studies on the mobile platforms identified as many games (usually more) as to have contained loot boxes simply by examining the 100 highest-grossing games [18,20,34,35]. PEGI told me in a remote meeting that only 2%–3% of all console and PC games it rates contain loot boxes. Therefore, in terms of the real-world implications as to the number of games concerned, only a minority of loot box-containing games would fall within the direct jurisdiction of the ESRB and PEGI. (However, it is important to note that some of the games in this seemingly small proportion of games containing loot boxes, such as the *FIFA* game series, do generate a disproportionately large amount of revenue; are played by many players; and are of more general significance than many other games that do not contain loot boxes.) Therefore, whether the IARC is attaching the label accurately is probably of more practical importance. This is addressed in Study 2.

4.2. Study 2: digital games: IARC on the Google Play Store

4.2.1. Non-compliance

Only 29 of the 100 random games previously known to contain loot boxes attached the loot box presence warning label on the Google Play Store through the IARC system. The other 71 games were replayed to confirm that all of them did indeed continue to contain loot boxes as of mid-January 2023 and therefore genuinely failed to disclose loot box presence. The non-compliance rate was 71.0%.

At present, the IARC 'In-Game Purchases (Includes Random Items)' label cannot be treated as a trustworthy and dependable authentication of whether a game contains loot boxes or not on the Google Play Store. Parents and all stakeholders should proceed on the assumption that a game marked with the label does indeed contain loot boxes (although, again, note that at least one, probably harmless, false positive was observed), but no reliance should be placed on the lack of a label, because a non-labelled game may still contain loot boxes. Indeed, unlabelled games that are high grossing are quite likely to still contain loot boxes, given the results of previous loot box prevalence studies [18,20,34,35]. Advertising this measure as providing consumer protection when it has been poorly complied with in practice gave consumers a false sense of security. Further elaboration on this negative consequence has been made elsewhere in relation to poor compliance with Apple's loot box probability disclosure requirement [18] and Belgium's failed loot box 'ban' [35], and is therefore not repeated.

Given this very poor compliance rate, one must question whether this measure was another disingenuous, perfunctory attempt by the industry to dissuade legal regulation (similar to poorly complied-with industry self-regulation requiring loot box probability disclosures [18]). The IARC's defensive responses that fail to suggest tangible ways of improving this currently unsatisfactory situation (detailed below) support such an interpretation. Unless the measure is significantly improved, and until it is independently tested again and found to be effectively complied with, policymakers should place very little (if any) reliance on this measure when determining loot box regulation in the context of mobile games (which does appear to be the crux of the issue) going forward.

The official IARC response has been that the label only became effective on the Google Play Store in February 2022, and therefore, in its opinion, any games originally rated prior to February 2022 need not be labelled and should not be deemed as non-compliant even if unlabelled. This is an important disclaimer that was not publicly known until the present study was conducted and still has not been prominently published (e.g. alongside the IARC page promising the implementation of this measure and on the Google Play Store page concerning age ratings). I also find this excuse unconvincing. Firstly, I have demonstrated that many games released *after* February 2022 were still unlabelled (although the IARC insisted that many of those games were, in fact, rated before February 2022; however, this cannot be independently verified). This exploratory analysis bolsters the sample used for the confirmatory analysis, which was derived from historical samples of games known to contain loot boxes and were, therefore, invariably older games. (An 'older' or 'historical' game in the Google Play Store IARC context is defined as a game rated prior to February 2022. Many games are released months after their rating date, which means that many of these so-called 'older' games were released just a few months ago and are not 'old' in a practical sense.) The IARC has revealed that, even for newly released games, the measure still has not yet fully come into force many months after its

introduction to the Google Play Store. Put another way, there is no specific deadline for compliance. This must now be required to ensure accountability. Secondly, every single one of the 29 *compliant* games were released/rated before February 2022, and each of those games managed to correctly attach the label to itself despite being an older game. Indeed, because some older games were labelled and compliant, many consumers would be under the false impression, and therefore expect, that all games would be accurately labelled. Thirdly, it is illogical and unjustifiable for a consumer protection measure like this to not apply retroactively to older games that continue to be in operation, particularly considering that every single one of these games received a software update *after* February 2022 (which represented opportunities for the IARC to force them to complete a new questionnaire asking about loot box presence). As the IARC system currently stands, a game originally rated before February 2022 that later adds loot boxes after February 2022 would also not need to attach the label. Older games have a blanket licence to implement loot boxes with impunity. Just because a product was originally released prior to a consumer protection measure coming into force cannot justify newly produced versions of that product to not incorporate a consumer protection measure (particularly considering the ease and minimal costs with which this measure can be implemented and complied with: the publisher only needs to edit their answers to one item in the questionnaire).

To use an analogy to illustrate the IARC's 'justification': a consumer protection measure now requires all hamburgers to disclose whether they contain a certain ingredient, but one restaurant argues that it need not comply with this measure because it has been producing hamburgers before this measure came into force. No one would accept this restaurant's argument. The legal principle of non-retroactivity applies only to acts done entirely before the measure came into force and *cannot* apply to acts that started being done before *but could have since been stopped* but have not been stopped without a proper justification. In theory, only a game that was rated and released prior to February 2022 and is no longer being operated need not attach the label: this would require this game to no longer sell loot boxes and be removed from the Google Play Store, as no party should directly benefit from that game's operation any more. Any games that remain on the Google Play Store that continue to operate, sell loot boxes, and generate revenue past February 2022 must be liable for labelling.

The IARC has attempted to 'shift the goalpost' as to what is 'compliant'. However, whether a game is 'compliant' should be based on the view of the reasonable person, and the IARC cannot redefine that for its own benefit: a parent would naturally expect this measure to be applied consistently across all games regardless of any game's original rating submission date if that game continues to sell loot boxes. The original rating submission date that the IARC relies on is also information that could not be independently verified, and thus including this as a criterion for 'compliance' would also mean that this measure cannot be subjected to independent, external scrutiny. A self-regulatory measure cannot be without accountability.

As detailed in §4.1.3 above, the ESRB and PEGI have a two-step process for rating physical games: the self-disclosure by companies is reviewed by the two organizations with additional material. In the IARC context, there is only one step: self-disclosure by companies. Many companies failed to accurately self-disclose and attach the label. It is not known whether the IARC or Google undertook to inform companies about the newly introduced label and encourage them to attach it by completing an updated version of the questionnaire, although a minority of companies did do so. In Study 1, it could not be ruled out that there were games containing loot boxes that neither the ESRB nor PEGI managed to identify and so a 'compliance rate' with the ESRB/PEGI measure cannot be determined for direct comparison purposes. However, it is likely that the two-step process was more effective at identifying loot boxes, specifically, that the second step of external review helped to identify additional loot boxes (although PEGI has stated that these often could not be directly perceived in playtest versions that it rates). The IARC was established because, as PEGI claims, 'This traditional method [of pre-release, two-step review] is not at all practicable for purely digital storefronts that see thousands of new products enter the market (and even more products updated or changed) on a daily basis' [62]. However, Study 2 has evidently shown that the IARC is not working effectively in relation to self-disclosing loot box presence. The adoption of a pre-release, two-step review process for *all* digital games might not be practicable, but an adapted, post-release form of two-step review (that age rating organizations have direct external oversight on) could potentially be required. For example, the highest-grossing games should be reviewed every three months to ensure sufficient scrutiny of at least those games. The relevant companies profiting from loot boxes could be made to bear the associated increased compliance costs. The IARC has responded stating that post-release monitoring does take place on the Google Play Store; however, this has been limited only to ensuring that the game complied with the rating guidelines that were in force upon its submission. In other words,

older and newer games are monitored with a double standard. Anti-competition authorities might be interested in considering the antitrust implications of regulating older video games (and, by implication, more established companies) with fewer rules, while forcing newer games (many of which would be released by smaller, emerging competitors) to abide by more stringent requirements.

4.2.2. Corrections by the IARC since data collection

I submitted a list of 84 unlabelled games to the IARC asking for rectification as detailed in §3.2.2. The IARC raised a number of counter-arguments against labelling games that were originally rated prior to the label coming into force on the Google Play Store. One argument that I found sensible (although not wholly convincing) was that: only the games I identified would be labelled, while many more other games containing loot boxes that I did not examine would not be labelled, and the fact that this may be perceived as unfair by companies. However, the IARC decided to label all of the games from that list as long as it was re-verified by the IARC to contain loot boxes. After conducting a review, the IARC promised that 79 of those games would be labelled, but, as of 5 February 2023, only 77 of those games were confirmed to have been labelled, and seven games were left unlabelled. Further communications resolved the issue with the two then unlabelled games amongst the 79 games as detailed in §3.2.2. However, the IARC's failure to label other release versions of the same game demonstrates that it lacks broad control over the Google Play Store and can only act on a case-by-case basis. An extreme example of a game, *Castle Clash* (IGG, 2013), that is currently released as 15 separate Google Play Store entries is shown in figure 4. I reported the English version to the IARC, which has since been labelled, but, as of 9 February 2023, none of the other versions were labelled even though they were collectively downloaded over 35 000 000 times.

The IARC determined that five of those 84 games I reported do not contain loot boxes and therefore do not warrant the label. After initially refusing to do so, the IARC was eventually convinced by me to share the titles of the five games that allegedly do not warrant the label. The IARC examined a different game for one of those five games. I concede that one of the other four cases might be debatable: the Pokémon egg and incubator mechanic in *Pokémon Go* (Niantic, 2016) has been inconsistently treated in the academic literature as to whether it constitutes a loot box ([56]; [71], p. 26) or not (cf. [34,57]). However, the other three games contained obvious and uncontroversial loot box mechanics (whose screenshots are available at the data deposit link). *Football Rivals: Online Soccer* (Green Horse Games, 2020) is a social casino game involving a slot machine and an energy system used to activate that slot machine. Energy can be refilled with real-world money. A similar social casino game example, *Board Kings: Board Dice Games* (2017, Playtika), involving dice and an energy system, was duly rectified and since labelled. *Harry Potter: Puzzles & Spells* (Zynga, 2020) contained classic loot boxes that became available for perusal after a considerable (but still less than one hour) length of gameplay. The loot boxes in *Final Fantasy XV: A New Empire* (Machine Zone, 2017) were available as part of larger bundles and therefore more difficult to identify. The IARC playtesters probably were not sufficiently dedicated in finding these loot boxes, even though they had my screenshots to guide them. This shows the many difficulties with identifying and regulating loot boxes even when experienced playtesters with specialist videogaming knowledge are employed. The IARC was not willing to enter correspondence regarding specific games on the Google Play Store, so there was no opportunity to seek clarity and obtain further rectification.

A closer examination of the rectifications that the IARC did make allowances for interesting reflections on what constitutes a 'loot box' or an 'in-game transaction with randomized elements', as this has been debated academically ([56], cf. [57]) and because these mechanics are difficult to define for regulatory purposes ([40], pp. 351–355). The IARC generally applied the label to so-called social or simulated casino games. This means that, although the paid randomized mechanics contained therein are not necessarily strictly 'loot boxes', they have been deemed to be mechanics involving randomization that should be specifically highlighted to consumers and parents. Since 2020, PEGI gave the PEGI 18 rating to all *new* games containing simulated or actual gambling [27]. It is justifiable for the measure to not be retroactively applied to decades-old physical games, such as *Pokémon Fire Red & Leaf Green Version* (Nintendo, 2004), which contains simulated slot machine gambling [72]. However, PEGI should reconsider whether this measure should be applied retroactively on the Google Play Store to popular social casino games that were released before 2020 but continue to be engaged with by many players today. Applying this policy only to newer games but not older games again constitutes unfair and inconsistent treatment of competitors. The ESRB should consider whether to
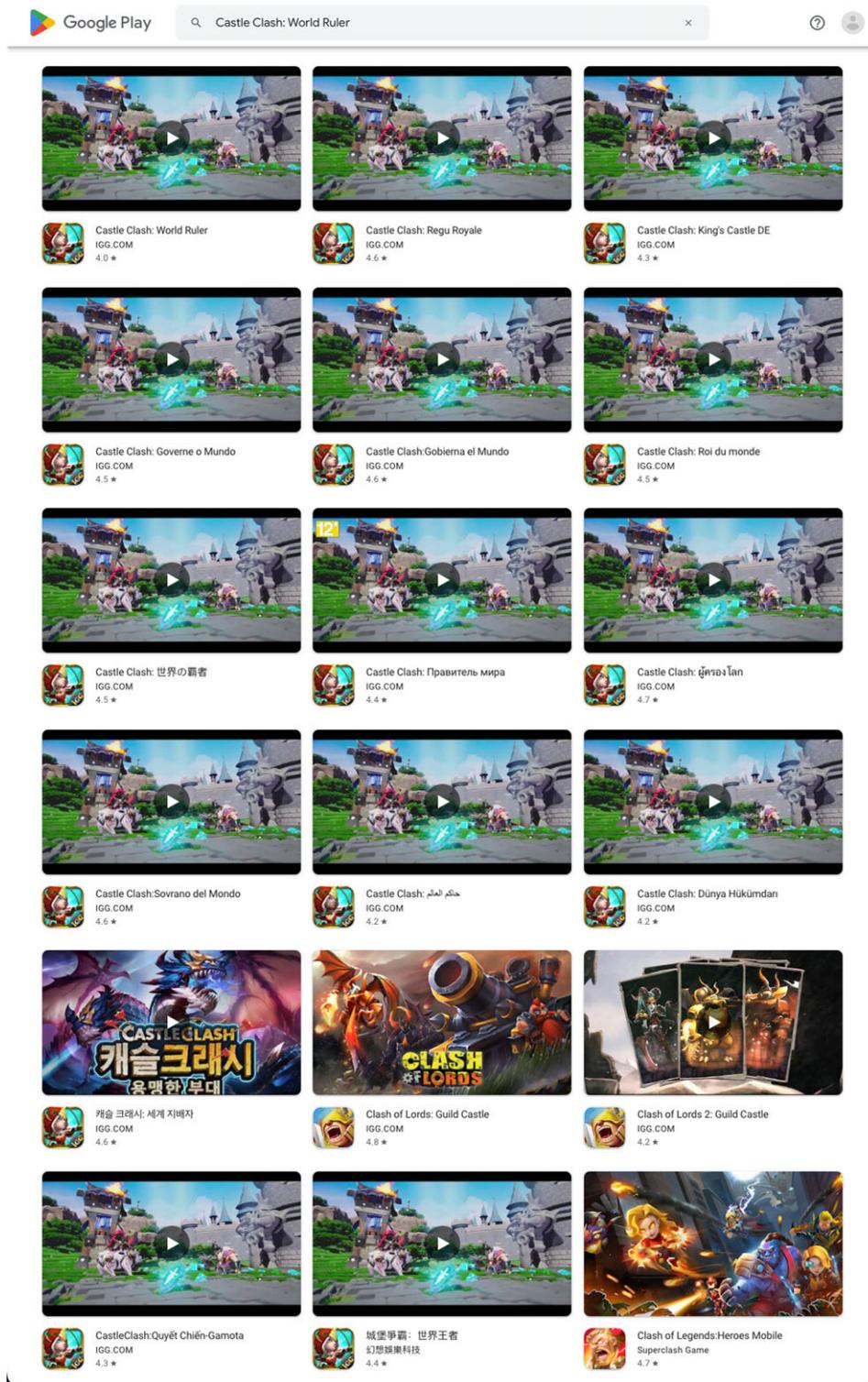
Figure 4. Screenshot of the Google Play Store showing search results for 'Castle Clash: World Ruler', which include 15 different release versions of the same game. © 2023 Google; IGG; Superclash Game.

follow PEGI's lead in also imposing a minimum 17+ Mature rating for games involving simulated gambling.

Further, games that contained an energy system (which can be recharged with real-world money) that can be used to complete tasks with random rewards have also been labelled. This shows that although video game companies might be tempted to obfuscate their loot box mechanic (e.g. how the 'virtual

currency' used to 'purchase' the loot box mechanic is represented), a dedicated self-regulator with specialist video game knowledge is willing to and can identify them when called upon to do so.

Although the IARC has since labelled the vast majority of unlabelled games that the present study identified, it has refused to retroactively apply this to other older games that I did not identify. This means that tens of thousands (if not hundreds of thousands) of other games containing loot boxes remain unlabelled on the Google Play Store. Inconsistent retroactive application (i.e. only labelling some historical games but not others) might mislead consumers into falsely believing that all unmarked historical games do not contain loot boxes. As an individual researcher, I could present further lists of games containing loot boxes for labelling by the IARC to chip away at the number of non-compliant games. However, that is not a sustainable, long-term solution, even if more people take up the task. This duty should be the responsibility of the age rating organizations and not volunteers or publicly funded academics. PEGI has stated that the UK Government's technical working group seeking to develop better industry self-regulation of loot boxes has brought together various stakeholders (including Google) and so is optimistic about, and committed to, improving its future approach from a supervisory capacity, while the IARC and the ESRB have made no commitments to improving the future situation and appeared content with the current, objectively unsatisfactory situation.

4.2.3. The 'challenging' Google Play Store and Google's failures

PEGI has admitted that the Google Play Store (because of the sheer volume of content available on it) represents a challenge without 'a simple solution' and claimed that other digital storefronts adopting the IARC do not encounter similar difficulties (although this was not independently verified). The ESRB and PEGI (and other age rating organizations) should reconsider whether it is wise to endorse the Google Play Store with the IARC in the current circumstances, given the widespread failure to apply the loot box presence warning label (which may suggest that the self-disclosure of other content has also been left wanting and should be examined by future research). Both organizations have built a credible reputation among consumers, parents and policymakers for historical achievements in relation to video game content moderation. The ESRB and PEGI are risking that goodwill by endorsing the Google Play Store with the IARC. Neither organization can claim to have complete control over the content on the Google Play Store because they only have a supervisory role, and the present study has demonstrated that they do not have broad control even though they might fix individual cases upon request. Both organizations should work with other age rating organizations involved and investigate possibilities of improving the IARC system on the Google Play Store, and if there are no credible paths forward, withdraw their endorsement of the Google Play Store by disapplying the IARC and disallowing the use of the ESRB and PEGI trade dress, so as not to misinform consumers and parents that otherwise trust and rely on the ESRB and PEGI branding.

Indeed, Google, who owns and operates the Google Play Store, should be highlighted as a major perpetrator that has permitted, by omission, this state of non-compliance. Google has not enforced the age rating system (including the label) it supposedly adopted. It is not known whether Google has informed and encouraged companies to add the label since its introduction to the platform. In addition, the IARC label is also not prominently displayed and is difficult to access from either the web or the phone version of the Google Play Store. The label is not automatically shown on the game's page. Using 'Ctrl + F' or otherwise searching for the text of the label would not return any results. The user must always actively do something to cause the label to be displayed. There are two ways to do so on each platform. On the web version, the user must either (a) click on a tiny '(i)' symbol next to the age rating, which causes a pop-up window containing the label to show, or (b) scroll down and click on a right-pointing arrow next to 'About this game', which causes a different pop-up window that the user must then scroll down in order to view the label. On the phone version, the user must perform similar variations of the above-mentioned two methods to cause the label to show. (These are illustrated with screenshots taken of the relevant pages for *Idle Heroes* (DHGAMES, 2016), which are available at the data deposit link.) The Google Play Store has not optimized the visibility of the label to maximize the potential consumer protection benefits of this measure. Google must improve on this. The Italian Competition Authority (Autorità garante della concorrenza e del mercato; AGCM) has enforced the EU Unfair Commercial Practices Directive against Activision Blizzard and Electronic Arts and successfully got both companies to commit to more prominently displaying the PEGI loot box presence warning label on their own websites and storefronts ([13], p. 586). This shows that Google's failure to more conspicuously display the label might be a breach of consumer protection regulation.

Finally, it must also be highlighted that Apple does not even implement a loot box presence warning label on the Apple App Store as part of its own proprietary age rating system [33]. Apple must immediately catch up to the industry standard by adding this feature to better inform consumers. Failure to disclose loot box presence may also contravene consumer protection regulation.

4.2.4. *Roblox* and *Minecraft*

Besides the sample of 100 random games, *Roblox* and *Minecraft* were separately analysed due to them being unique games where third-party user-generated content (including loot boxes) can be created and published, and then subsequently bought and sold in exchange for real-world money. Neither game displayed the loot box presence warning label on the Google Play Store as of 12 January 2023.

On 30 September 2022, PEGI recognized that 'Roblox is considered as a platform with diverse content rather than an individual game product' and announced that it had changed the rating for *Roblox* from 'PEGI 7' to the 'Parental Guidance' label (which is usually reserved for non-video gaming apps that act like platforms for 'a broad, variable selection of content', such as Netflix and Spotify) due to 'the large variety of user-generated content that is available in Roblox' [73]. This occurred on the same date that the BBC reported on *Roblox*'s removal of user-generated content depicting contemporaneously ongoing real-world armed conflicts and commercially profiting from depictions thereof [74]. The PEGI announcement also referred to *Roblox*'s parental tools; however, *Roblox*'s internal 'age recommendations and content descriptors' system does not make reference to loot boxes (or any similar paid mechanic involving randomization) or take them into account when determining the appropriate 'age recommendations' for user-generated content [75]. *Roblox* provides other parental tools, such as setting monthly spending restrictions (but only generally, as a limit cannot be set on loot box spending specifically) [76]; however, no parental resources discuss loot boxes or can be used to address loot box-related concerns specifically [77–79].

The ESRB has not officially rated *Roblox* itself (as *Roblox* is a digitally released game without a corresponding physical release and so the IARC system suffices), but reportedly and confirmed through the present analysis, the ESRB age rating obtained and shown through IARC also changed from 'Everyone 10+' to 'Teen for Diverse Content: Discretion Advised' (i.e. suitable for 13+ [28]) at the same time as the PEGI age rating change [80].

Roblox knows that user-generated content within its ecosystem contains loot boxes, as demonstrated, for example, by how it has required loot box probability disclosures in relation to such third-party content since 2019 [55] (probably to ensure, or at least project, its own compliance with the Apple App Store's and the Google Play Store's platform-wide, self-regulatory requirement that probability disclosures must be made [18]). In addition, *Roblox* has reportedly led a programme of complying with Dutch and Belgian gambling laws (the latter of which forbids all paid loot boxes [35], while the exact legal position of the former is less clear following a court decision in March 2022 [81]) by removing loot boxes from those two jurisdictions, following the publication of the author's previous study on Belgium's largely unenforced and ineffective ban on loot boxes [49]. Therefore, *Roblox* is fully aware of the presence of loot boxes within its game through third-party user-generated content and should know that the loot box presence warning label must be attached. It can be fairly assumed that Roblox Corporation did not answer the relevant question on the IARC questionnaire accurately.

By contrast to *Roblox*, *Minecraft* has little published information on the loot boxes that are available through third-party user-generated content available on its platform. However, similarly to Roblox Corporation, the operator of *Minecraft*, Mojang Studios (which is a subsidiary of Xbox Game Studios, which in turn is a subsidiary of Microsoft) should be treated as having constructive, if not actual, knowledge of the presence of loot boxes within the game. Mojang Studios was similarly obliged to answer the relevant IARC question correctly and thereby ensure that the label was appended to *Minecraft*.

Roblox and *Minecraft* should now immediately amend their respective answers to the IARC questionnaire and attach the loot box presence warning label. As loot boxes are of particular concern to consumers, including parents, as the ESRB has previously publicly recognized when introducing the label [3] (although the ESRB has since denied that parents were concerned about loot boxes in its communications with me). Therefore, in addition, both games should make available parental resources that address loot boxes specifically, rather than just in-game spending generally: this should be in the forms of both (i) advisory information to highlight the loot box issue and (ii) control tools that can be used to actively intervene if the parent deems doing so necessary. To facilitate and enforce internal platform-wide self-regulation, third-party providers of user-generated content should be required by *Roblox* and *Minecraft* to prominently disclose the presence of loot boxes on the relevant platform store pages.

Lastly, *Roblox* and *Minecraft* can consider the 'nuclear' option of banning loot boxes from the games/platforms entirely. Rockstar Games recently announced in November 2022 that, in relation to 'third party "Roleplay" servers' for its popular *Grand Theft Auto* (1997–present) and *Red Dead Redemption* (2010–present) series, it forbids and will take 'legal enforcement' action against 'commercial exploitation, including the sale of 'loot boxes' for real-world currency or its in-game equivalent' [82].[2] Government authorities in Belgium may have failed to eradicate loot boxes on a national level due to a lack of resources and enforcement [35]. However, *Roblox* and *Minecraft* are platforms that can more directly and effectively regulate and enforce rules. These two games are in a position to lead the industry in terms of loot box regulation (and, if deemed appropriate, elimination). If successful, self-regulation by these two games can become a proof of concept for other bigger platforms, such as the entire Apple App Store and Google Play Store. Countries can also consider establishing legal regulation (thus not leaving the rule-making in the hands of arguably conflicted private organizations, as is the case with industry self-regulation) but placing the burden of enforcing those legal rules on the platforms, who can probably assess non-compliance and impose sanctions better than national gambling regulators [35].

The IARC refused to label *Minecraft* and *Roblox* when I asked. In relation to *Minecraft*, the IARC denied that this game contains loot boxes. This is a debatable point. One comment written by a player in response to a news report of the present study also expressed doubt as to whether *Minecraft* 'contains loot boxes' *per se*; however, this comment also pointed out that some third-party servers of *Minecraft* do sell loot boxes through their own separate stores [83]. If Rockstar Games knows about loot boxes in the third-party servers of *Grand Theft Auto* and *Red Dead Redemption*, then Mojang Studios and Microsoft should know about the same occurring in *Minecraft*'s third-party servers. The Rockstar games are generally rated suitable only for adults, while *Minecraft* is rated suitable for young people aged 7 or 10+, so Mojang Studios and Microsoft should be acting even more proactively than Rockstar Games at protecting their younger and more vulnerable players. In relation to *Roblox*, the IARC claimed that '*Roblox* is not rated as a game and as such would not qualify for [the label]'. With respect, *Roblox* is made available on the Google Play Store under the 'Games' category. The Google Play Store page for *Roblox* has a heading entitled 'About this *game*' (emphasis added). If it looks like a game, plays like a game and is advertised as a game, then it probably is a game. Young people and parents would treat *Roblox* as a video game: the IARC is ducking its responsibilities by permitting *Roblox* to masquerade as 'not a game' and escape liability. Instead, *Roblox* should be self-regulated both as a game *and* as a 'platform with diverse content' (as PEGI puts it [73]) to properly reflect the compounded potential dangers it presents.

4.3. Developing better loot box warnings

It is important for a warning to provide sufficient information without unfairly exaggerating the harms of the underlying product, unless the latter is explicitly intended by policymakers to discourage engagement with the product (such that what might have been a non-intrusive 'nudge' in the behavioural intervention context becomes a more coercive 'shove').

4.3.1. Insufficient information and unclarity

Criticisms of the ESRB, PEGI and IARC label of 'In-Game Purchases (Includes Random Items)' have already been made both theoretically after a plain reading of the text [23] and empirically under experimental conditions [31]. It does not provide enough information to help consumers to identify exactly where the loot boxes can be found in the game, such that consumers might be enabled to recognize them and choose to not engage with them or to prevent their children from engaging with them ([23], pp. 2358–2359). For all other potentially problematic content, PEGI has a graphic label that attempts to convey the relevant issue (e.g. a clenched fist to show 'Violence'); however, the loot box presence warning label only appears in plain text and is less visually prominent than other content descriptors, thus arguably suggesting that it is less concerning than other issues (figure 2). Further, under experimental conditions, 'consumers do not appear to understand the ESRB/PEGI loot box warning', ([31], p. 1) possibly due to the label's use of newly coined terminology: 'Random Items' or 'Paid Random Items' (which PEGI has since abandoned) were artificially invented as they were not used colloquially to refer to loot boxes and similar mechanics prior to the labels being introduced,

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[2]Rockstar Games' use of 'commercial exploitation' is probably only in the sense of generating revenue, rather than a value judgement on the nature of the loot box monetization model itself.

and these terms do not appear to have been adopted by player communities and the wider public discourse. Finally, these warnings do not need to be attached (and therefore can be circumvented) if the game offers no digital loot boxes but instead offers physical packs of random cards for sale that do have digital functionality within the game that allows the physical card packs to effectively act like loot boxes, as was the case with packs of randomized amiibo cards intended for use in *Animal Crossing: New Horizons* (Nintendo, 2020) ([23], p. 2359; [84], pp. 31–32).

Henceforth, it appears reasonable to suggest that the warning label should be updated to explicitly refer to both 'loot boxes' and 'gacha', which are two of the most popular terms presently used colloquially to describe 'in-game transactions with randomized elements'. Empirical studies should be conducted to determine what terms are most widely understood by various stakeholders, particularly young players and parents: '[Paid] Random Items' is likely to be one of the least widely understood. However, references to 'loot boxes' and 'gacha' should be made in a non-exhaustive way so as not to incorrectly imply that these are the only two forms of such mechanics [40]. An improved warning should perhaps read 'In-Game Purchases (Includes Loot Boxes, Gacha, or Other Products Offering RANDOM Results)'.

4.3.2. Avoid fear-mongering

On the other hand, the warning label that was under consideration at the Illinois state legislature quoted in full in the Introduction section implies causation in the sense that loot box purchasing would lead to gambling addiction. That warning also reads very similarly to pre-existing alcohol and tobacco warnings ([31], p. 12), which might cause readers to draw parallels between these products and which might then, by making this allusion, cause readers to have an overly negative perception of loot boxes. These issues meant that the Illinois warning might *overstate* the potential harms of loot boxes ([28], p. 12), in contrast to the ESRB/PEGI/IARC label which *understates* them ([31], p. 10).

To create the most appropriate warning, a balance must be struck between providing enough relevant information and not overemphasizing potential harms. Any warning should be subjected to testing prior to being adopted. Neither the ESRB nor PEGI has claimed that their labels have been tested and certified as being effective at informing consumers about loot boxes' potential harms prior to their introduction, and independent testing by academics suggests that they fail to do so [31].

4.3.3. Lack of uniformity

When the labels were first introduced on 13 April 2020, the ESRB label read 'In-Game Purchases (Includes Random Items)', while the PEGI label had 'IN-GAME PURCHASES' as a graphic symbol in addition to the text '(Includes Paid Random Items)'. Textually, these were largely identical but for PEGI's addition of 'Paid'. However, technically, they were not exactly the same. The rationale behind this difference has not been publicly explained (which should still be done for transparency). The PEGI label might have been superior as it re-emphasized the 'paid' nature of these in-game purchases involving random items (thus differentiating them from other non-paid video game mechanics involving randomization), in which case the ESRB label should have been changed, although stating 'paid' after 'in-game purchases' appears repetitive. This lack of uniformity would have been problematic, but this difference has since been resolved (perhaps in the wrong direction) because the PEGI label was changed without announcement to be the same as the ESRB label on an undeterminable date lying between 13 June 2020 (https://web.archive.org/web/20200613021408/https://pegi.info/news/pegi-introduces-feature-notice) and 12 July 2020 (https://web.archive.org/web/20200712034753/https://pegi.info/news/pegi-introduces-feature-notice), as respective web page snapshots made by the archival Wayback Machine demonstrate. The PEGI original announcement of the label has been partially amended: as of 16 January 2023, the text still refers to the outdated '(Includes Paid Random Items)' wording but the accompanying images show the 'In-game Purchase (Includes Random Items)' wording instead [24].[3]

In the IARC context, which label is used continues to be relevant because Germany's USK age rating organization has recently introduced its own new loot box presence warning label of 'In-Game-Käufe + zufällige Objekte [In-game purchases + random items]' [38], which is quite different from the 'In-Game-

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[3]The ESRB's capitalization of the 'G' in 'In-Game', which PEGI has not done, is assumed to be trivial. Indeed, on the inconsistent capitalization point, in the PEGI search tool, the label is shown as 'In-game Purchases (includes random items)' with the latter three words uncapitalized, contrary to what is written elsewhere (e.g. on physical game boxes).

Käufe (zufällige Objekte möglich) [In-Game Purchases (Random Items Possible)]' presently used by PEGI in the German language [85]. The IARC has been updated in the German context, as of 17 January 2023 (if not earlier), to use the USK label rather than the ESRB/PEGI label, as demonstrated by a printout of the updated German Google Play Store page for *Guns of Glory* (available at the data deposit link). Perhaps both labels should instead have been retained for clarity. As an aside, the policy recommendations in the preceding paragraphs regarding the ESRB/PEGI label are also applicable to the USK's new label. Closer examination of the German PEGI label (which the IARC now no longer uses) also reveals that it would be translated into English as 'In-Game Purchases (Random Items *Possible*)' (emphasis added) rather than 'In-Game Purchases (Includes Paid Random Items)', which is the original English version. A slightly different meaning is expressed by the German label as compared with the original English label. This reflects that in addition to testing the English version of the label for efficacy, other language versions of the label would also need to be separately tested (i.e. the Spanish 'Compras dentro del juego (Incluye artículos aleatorios)' [86] used by the ESRB and the 24 non-English language versions used by PEGI).

4.3.4. Toward an internationally uniform label

Uniformity of the loot box presence warning label internationally has merit. Consumers would be able to recognize this information even when travelling outside of their home jurisdiction, and companies would be able to comply more easily and efficiently as only one label (or at least only different language versions of one label) needs to be incorporated into product design. Streamlining, providing consistent information to consumers, and making it easier to conduct business internationally were some of the founding principles of the IARC system [32]. If that system could be agreed, then why could there not be a uniform loot box presence warning label? One counter-argument might be that dedicated language labels might be more informative to certain consumers, but that point remains to be empirically proven and, even after it has been proven, that one advantage must be balanced against the many advantages of an internationally uniform label. PEGI changing its label to match the ESRB's is a step in the right direction (at least in terms of uniformity, if not efficacy), while the USK's introduction of a new and somewhat different label (whose efficacy has probably also not been tested) should be criticized. Rather than introducing even more types of labels, regulators in various jurisdictions (both legislatures and self-regulatory age rating organizations) should work together to develop an effective and uniform loot box presence warning label. As part of that new label, regulators should consider disclosing more information, such as providing a link to the loot box probability disclosures, which are now generally required either by law or industry self-regulation across the world but have proven difficult for consumers to access [18,20]. Consumers should also be told exactly where loot boxes can be found in-game; how much they cost; whether they provide competitive advantages; how to turn off the ability to purchase them, etc. The final design of the label should also be kept updated to address new concerns as they arise.

4.4. Limitations

For Study 1, reliance was placed on the ESRB's and PEGI's official age rating search tools. Relying on these accredited online resources that are intended for players and parents to place their trust in and use is fair in the circumstances. However, it is nonetheless possible that data entries on these official tools may be incorrect, incomplete and inaccurate. For example, when comparing the results from two separate occasions when data were scraped (including for an exploratory analysis that is no longer part of this paper), one ESRB game was seemingly removed from the search tool. In particular, it is unlikely but possible that certain entries were missing from both the ESRB and PEGI Lists and therefore were not included within the ambit of the present study: this could be (i) due to a certain game not reporting loot box presence to both age rating organizations and this not being detected, such that the game was never correctly labelled by either, or (ii) even though a certain game did accurately report loot box presence and it was labelled as such, both systems had data entry errors and failed to correctly note this on their search tools. Further, the accuracy of the data scraping for Study 1 was manually verified for a limited number of entries; however, it remains possible that the data scraping was not perfectly accurate. It should also be noted that, even if the labels were accurately attached to the relevant games by the ESRB and PEGI and were so shown on the online search tool, it remains possible that during the production process the labels were not accurately attached to physical products and digital storefronts.

Study 1 could not consider the practical application of these labels, specifically, whether their use in real-life has been accurate. To illustrate, in relation to *Genshin Impact*, the author has received marketing emails from the operating company, HoYoverse (which is a more recent rebranding of the company that miHoYo uses outside of China [87,88]), advertising new in-game content. One such email received on 13 January 2023 has been archived at the data deposit link. Both the ESRB and PEGI age ratings were appended at the bottom of said email. However, the loot box presence warning label was attached to neither. This is despite PEGI having labelled the game (the ESRB has not at the time). This non-compliant and inaccurate marketing email appended the PEGI age rating *without* the warning label despite PEGI having attached it. PEGI has explained that this is not in breach of the *PEGI Code of Conduct* because accurate labelling obligations did not extend to promotional materials [64]. However, PEGI has promised that its guidelines will be updated to ask publishers to include the label for promotional materials (although this might not include targeted marketing emails sent to already registered users). This case demonstrates how in practice the labels might not be shown to consumers by game companies even when it has been correctly applied for from, and given by, the relevant age rating organization. This issue should be the subject of future research.

Finally, the German age rating organization, the USK, announced that it will attach its loot box presence warning label of 'In-Game-Käufe + zufällige Objekte [In-game purchases + random items]' after the present study was planned and proposed [38]. Given the dates at which the present study was planned to be conducted, not enough time would have passed for the USK to have labelled many games (if any at all), and the USK stated that it would not retroactively apply the label, so it was deemed inappropriate to include the USK in the present study. A replication of Study 1 after some time has passed should include the USK as an additional comparator with the ESRB and PEGI.

For Study 2, only the compliance situation on the Google Play Store for mobile Android games was assessed: other participating storefronts for PC and console game platforms, such as the Microsoft Store for Windows and Xbox, the Nintendo eShop and the PlayStation Store [32], may exhibit different compliance behaviours, similarly to how the prevalence rate of loot boxes differs significantly between the PC and mobile platforms ([34], p. 1770). PEGI has expressed the view that the compliance situation on those other platforms would be significantly better. However, this assertion was not independently verified and should be the subject of future research. In addition, the sample's representativeness is constrained by practical reasons, similarly to previous loot box prevalence studies. As explained in the Method section, the sample was formed of previously popular and high-grossing games. The compliance situation among this sample is not necessarily representative of the whole Google Play Store (e.g. how a sample of randomly selected Google Play Store games regardless of financial performance would have complied). The present sample was probably more compliant than average because more popular and higher-grossing games are probably operated by companies that have more resources and are more heavily scrutinized and frequently monitored for compliance by players, parents, competing companies, regulators and other stakeholders. Conversely, it is also possible (albeit highly unlikely) that the loot box presence warning label is effective at reducing spending (which empirical evidence does not support [31]), such that more-compliant games performed worse financially, and the higher-grossing games made more money because of their non-compliance. Regardless, the present sample's results are still informative and relevant because stakeholders (players, parents and policymakers) would probably be more interested in whether these popular games were complying rather than whether unknown, poorly performing games were complying.

Finally, the author's own interpretation of the official responses by PEGI and the ESRB/the IARC was presented. Readers are invited to form their own opinions by perusing those responses, which have been made publicly available at the data deposit link.

5. Conclusion

The present study assessed compliance with the ESRB's, PEGI's and IARC's loot box presence warning label of 'In-Game Purchases (Includes Random Items)' through two studies. Study 1 found that, as to physical games rated by the ESRB and PEGI, there were many instances (60.6% of all games labelled by either age rating organization or 16.1% using a more equitable methodology) where the two organizations have been inconsistent and not both applied the label to the same game. The vast majority of those inconsistencies were caused by the ESRB not retroactively labelling older games, which PEGI has done with ease and at minimal costs. The ESRB has refused to emulate PEGI's better

approach. Four cases where the ESRB and one case where PEGI culpably failed to label a game were identified. The ESRB admitted fault in relation to one game and refused to admit fault in relation to three other games, even though those failings arose from the same circumstances as the one case for which PEGI admitted fault and committed to improving. Overall, PEGI's implementation of the label is reasonably satisfactory given its proactive retroactive application and demonstrable willingness to do even better. By contrast, the ESRB's implementation is less satisfactory: because many older games are not, and will not, be labelled, the measure could not be relied upon by consumers and parents to provide accurate information in relation to historical games that remain popular presently. The ESRB must also be criticized for being unreceptive to practicable suggestions that would improve its procedure. However, in relation to newly released physical games for console/PC platforms, the labelling at both PEGI and the ESRB should be reasonably accurate and reliable.

Study 2 found that, as to digital games rated through the IARC, most games (71.0%) containing loot boxes on the Google Play Store did not accurately display the label. Most of the identified non-compliant games have since been labelled through rectifications at the author's request. However, the IARC generally denied liability (unconvincingly) by stating that older games submitted for rating prior to February 2022 are not required to display the label and has refused to apply the label to older games beyond the sample that the author has identified (which represents only a tiny proportion of all games containing loot boxes on the Google Play Store). At present, this self-regulatory measure cannot be treated as a trustworthy and dependable authentication of whether a game contains loot boxes on the Google Play Store. PEGI has admitted that the Google Play Store poses a 'challenge' that presently does not have 'a simple solution'. Consumers, parents, regulators and all other stakeholders should rely on the label cautiously: a game marked with the label will contain loot boxes; however, a game not thusly labelled may also contain loot boxes. At present, this measure fails to provide accurate information to consumers. The mere existence of this measure cannot be used to justify the non-regulation of loot boxes, given the poor compliance and doubtful efficacy (even if the measure is complied with satisfactorily). In addition, this measure (or an equivalent) is not implemented on the Apple App Store. Currently, consumers are not being provided with adequate information about loot box presence on the two major mobile app stores and the mobile platform generally.

Age rating organizations are expected to, either directly (i.e. the ESRB and PEGI in Study 1 and the IARC in Study 2) or indirectly (i.e. the ESRB and PEGI in Study 2), provide effective and accurate information and content moderation. The ESRB and PEGI promised to label games containing loot boxes on the Google Play Store by endorsing the IARC, but the IARC has demonstrably failed to do so. This ill-advised endorsement caused them to betray the trust placed in them by consumers, parents, and policymakers that rely on them to make informed purchasing decisions and self-regulate the industry. Most high-grossing games were released prior to February 2022, and this is unlikely to change for years to come. Stakeholders would naturally expect, and should demand, the measure to be applied retroactively. Otherwise, this measure would have little practical benefit (besides falsely demonstrating the industry supposedly taking action to address loot box harms). The existing system must be improved upon: loot box warning labels should be applied retroactively, as the minimal additional compliance costs are justified. Age rating organizations should collaborate and cross-check each other's labelling to correct mistakes and enhance accuracy. The IARC rating system relies solely on self-disclosure, which has demonstrably been inadequate. In relation to the highest-grossing games, the IARC ought to involve additional external scrutiny that seeks to verify the self-disclosures' accuracy and completeness. The design and consumer protection efficacy of the label in practice (e.g. whether it is well understood by parents) probably also requires improvement. Regulators should strive toward developing a uniform and effective label that provides sufficient information without overexaggerating potential harms.

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After submission to the journal, the paper received no additional external peer review, but was accepted on the basis of the Editor's recommendation according to our PCI Registered Reports policy https://royalsociety publishing.org/rsos/registered-reports#PCIRR.

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Paper 7: Take Two: PEGI's loot box presence disclosure requirement on other platforms

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Shopping Around for Loot Box Presence Warning Labels: Unsatisfactory Compliance on Epic, Nintendo, Sony, and Microsoft Platforms

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Loot boxes are gambling-like products in video games that players can buy with real-world money to obtain random prizes. Many countries are concerned by their potential harms and are considering regulation. Industry self-regulation of companies' own behavior is an alternative approach to direct government intervention through legislation. The self-regulatory age rating organizations in North America and Europe began assigning a loot box presence warning label ("In-game Purchases (Includes Random Items)") since April 2020. This consumer protection measure has also been introduced to many digital storefronts. My recent study found that only 29% of popular games containing loot boxes were correctly labeled on the Google Play Store. The age rating organizations have seemingly suggested that other digital storefronts with significantly less content would, in contrast, perform significantly better. The present study found that the compliance rates were indeed higher on the Microsoft (89.1%), Sony (70.3%), and Nintendo (54.2%) stores. However, none met the target 95% compliance rate. Concerningly, the Epic Games Store's compliance rate was only 7.1%. Some remedial actions have been taken following the present study: while appreciated, they have failed to address all outstanding concerns. Companies and platform providers must better comply with and enforce the rules. Besides poor efficacy on mobile platforms, the industry self-regulatory loot box warning label is also not sufficiently reliable on PC and console platforms.

CCS Concepts: • **Social and professional topics** → **Consumer products policy** • **Applied computing** → **Law**; **Computer games**;

Additional Key Words and Phrases: Loot boxes, computer games law, videogaming regulation, information technology law, interactive entertainment law, consumer protection, product information disclosure, industry self-regulation, social corporate responsibility, content moderation, age ratings, compliance

1   INTRODUCTION

Loot boxes are video game mechanics that players engage with to obtain random prizes. Loot boxes that require players to spend real-world money to purchase, or "paid loot boxes," are conceptually and psychologically similar to traditional gambling [1]. References to "loot boxes" below refer exclusively to "paid loot boxes," unless otherwise specified. Loot boxes are presently widely implemented in at least 60% of high-grossing mobile games [2–5] and about a third of popular PC games [5]. Many games containing loot boxes are also deemed by companies, app stores, and age rating organizations as suitable for young people, including very young children aged 4 or above [2–5]. This is because loot box presence is not a consideration that increases a game's age rating in most countries [6, 7], except under Germany's recently revised USK (Unterhaltungssoftware Selbstkontrolle) system in certain limited circumstances [8]. Indeed, the UK gambling regulator reported that 24% of 11- to 16-year-olds reported purchasing loot boxes with real-world money in 2022 [9].

   Cross-sectional player research has repeatedly and consistently found that loot box spending is positively correlated with problem gambling severity [10–12], as confirmed through meta-analyses [13, 14]. This relationship was also found amongst adolescent samples [15, 16], which generally cannot legally access traditional gambling activities but can purchase loot boxes in video games. These results suggest that, through monetizing with loot boxes, video game companies may be disproportionately profiting from vulnerable consumers [17], such as those experiencing severe psychological distress (although contrary evidence has also been presented) [18, cf. 19, 20]. Particular concerns have been raised about children and young people being vulnerable to potential harms as they may not be able to understand the risks involved and make informed purchasing decisions [16, 21–23].

   Loot box spending has also been found to be positively correlated with problem video gaming in some studies [14, 24], which suggests that highly engaged video game players may experience multiple types of harm: both financial [25] and gameplay time-related [26]. (Players may also experience harm when trying to "earn" non-paid loot boxes that can be obtained through gameplay by overspending time [27].) In light of these potential harms and concerns, the industry has promised to implement harm-minimization measures by providing more transparency [28–31]. The present study empirically assessed whether companies are disclosing, as required, the presence of loot boxes in their games on leading video game storefronts operated by Microsoft, Sony, Nintendo, and Epic to forewarn players and parents alike. The results were unsatisfactory. Many games were found to be non-compliant: they contained loot boxes but have not duly disclosed that fact as required, which also suggests that the platforms have not proactively enforced their own rules. Both individual companies and platform providers can and should do better.

1.1   Video Game Monetization: The Rise of Microtransactions

Video games used to be predominantly monetized using the **"game-as-a-product" (GaaP)** model whereby the player will purchase a license to use the video game software at a set price. Certain games, such as *World of Warcraft* (Blizzard Entertainment, 2004), adopted an alternative subscription-based monetization model whereby the player will pay a set price to temporarily gain access to gameplay for a certain period of time (e.g., 60 days) [32, 33]. However, over the last decade, games increasingly adopted the **"games-as-a-service" (GaaS)** model whereby revenue is generated through the player making various purchases (including loot boxes) within the game [34]. These are often referred to as "*micro*transactions," although the value of some in-game purchases is not trivial or "micro" and could easily be upwards of, for example, U.S. $99 and be bought in multiples. Indeed, according to SuperData's estimation, in 2020, microtransactions represented 88% of all video game industry revenue globally or US$92.6 billion in value during a 10-month period [35]. The GaaS model became more prevalent (and indeed dominant) in two ways: many

new games released under the GaaS model, while several popular "premium" GaaP games that previously required players to purchase a copy of the software, such as *Rocket League* (Psyonix, 2016) [36], also transitioned into a "free-to-play" GaaS model. These various business models could also be used in conjunction: many games already being sold as a product also additionally offer microtransactions to generate even more revenue from its playerbase, thus further underlining the critical role microtransactions now play in the commercial video game context.

1.2 Aspects of Microtransactions as Dark Patterns

Aspects of video game design have been identified by Zagal et al. as constituting so-called "dark patterns" [37] that do not seek to improve the player experience in their best interest but are instead conceived to cause some negative experience onto the player to then cause them to do or not to do something (e.g., spend money), although see Deterding et al. for a recent critique [38]. The design and implementation of microtransactions directly impacts on the player experience. The original conceptualization posited by Zagal et al. already identified one category of dark patterns as "monetary dark patterns" [37 (pp. 4–5)], for example, where some aspects of the game might be designed to be overly difficult or tedious to encourage players to spend real-world money to skip them. More recently, Petrovskaya and Zendle have identified many existing monetization techniques that have been implemented by designers that are viewed negatively by players as "unfair," "misleading," or "aggressive," for example, allowing players to spend real-world money to gain a competitive advantage over other players (so-called "pay-to-win") or forcing players to pay for basic "quality of life" features, such as limiting the player's in-game inventory space used to store items (which is crucial to an enjoyable gameplay experience in those games) unless real-world money is spent [39]. These "problematic" or "predatory" microtransactions tend to appear more often in games on mobile phone devices where the game is almost always offered for free and monetized exclusively through in-game purchases, although the same also does occur more broadly on PC and console platforms [34].

The design and implementation of fair and transparent in-game purchases is important to ensuring the player's positive gameplay experience. When viewed through most ethical lenses, there is nothing inherently wrong with intending to monetarily profit from taking the risk to create and operate a video game and bringing that new product or experience to players [40 (p. 232)]. However, a game that attempts to monetize too aggressively may be perceived as predatory and unethical by players [39], cause those players to not engage with the game and not spend money on it anymore, and thereby cause the game to be unprofitable. Game companies and their designers must balance revenue generation with providing an equitable player experience, and in any case must not engage in activities that infringe consumer protection, data protection, or contract law. One critical aspect of that is the appropriate disclosure of material information that consumers need to make an informed transactional decision [41 (p. 580)].

1.3 Potential Harms of Loot Boxes

"Loot boxes," in the context of the present study, is understood as any "in-game transactions with randomized elements" [30]. This definition is used by the **Entertainment Software Rating Board (ESRB)**, the industry self-regulator that moderates video game content and provides age ratings in North America, in lieu of "loot boxes" to be more inclusive of the wider phenomenon of gambling-like mechanisms (although the ESRB does not recognize the gambling link [42]) and the various types of in-game purchases involving randomization [30]. This wide definition encompasses both traditional loot boxes represented as a virtual container that the player purchases to open and obtain random rewards and other types of in-game purchases that involve randomization, such as (i) virtual products providing random rewards not necessarily visually portrayed as a

"box," such as character summoning or "gacha" systems [43, 44]; (ii) the player spending real-world money for a chance to potentially obtain a random improvement to their existing in-game weapon [45 (p. 353)]; and (iii) simulated or social casino games [46]. (Note that there is debate within the academic literature as to whether it is appropriate to use "loot boxes" as a catch-all term like this, and in particular, whether simulated or social casino games, which may well be more harmful than "traditional" loot boxes should be seen as a type of "loot box" [47, cf. 48].) Further, as to the diversity of loot box design features, Ballou et al. have identified many ways that these mechanics could be implemented differently: for example, what the player will receive in lieu (if anything at all) when they obtain a duplicate and redundant loot box reward that they already possess varies widely across games [49]. Sato et al. similarly examined how loot box design varied across games using a cross-regional perspective [50]. However, that variety is not relevant for present purposes: the requirement to disclose loot box presence applies uniformly, regardless of other features, so long as randomization is involved.

Loot boxes generally as a type of microtransaction have been singled out for both academic and regulatory scrutiny [34, 38] likely due to the mechanic's unique involvement of randomization, which is not present in other in-game purchases (such as season or battle passes [51, 52], which may, however, pose other risks and be criticized for not being transparent about what amount of time the player must spend playing the game before they can eventually obtain all rewards that they already seemingly bought). With loot boxes, the player does not know exactly what they are purchasing, which may impact on whether they have made an informed decision to spend money. Neely has argued that any form of in-game purchases with randomized rewards is ethically problematic, because their inclusion is not necessary: those same games could have been monetized without loot boxes (i.e., the same in-game content could have been sold without randomization) [40 (pp. 233–234)].

Goodstein has suggested that implementing loot boxes generally constitute a dark pattern [53 (pp. 300–302)], although that position is likely too extreme as it appears more reasonable to argue that certain aspects of loot box design constitute a dark pattern. Zagal et al.'s original work on video game dark patterns stated that: "We note that we do not consider gambling (or betting) as a dark pattern, *because players are complicit in the interaction.* Even in cases where the odds are distinctly against the player, *the player has presumably made an informed decision to participate.*" [37 (p. 4)] (emphasis added). If a game does not properly inform players that it involves gambling-like elements at all or the relevant probabilities of winning involved with those elements, then the player cannot be said to have knowingly and willingly decided to engage with them (meaning that they would not have been "complicit in the interaction" nor have "made an informed decision to participate" in Zagal et al.'s words [37 (p. 4)]). It is therefore more convincing to suggest that loot box implementations without proper disclosure of the relevant material information about the product (the fact that the game contains them and also the probabilities of winning rare rewards) would be a dark pattern. Similarly, such questionable aspects of loot box implementation (e.g., failures to disclose material information) are more likely to constitute illegal commercial practices that are contrary to consumer protection law, as compared to the loot box concept as a whole [cf 54].

Cross-sectional studies identifying the risk factors (e.g., experiencing problem gambling, problem videogaming, and psychological distress) for loot box-related financial harms have been summarized in the Introduction section [11, 13, 14]. The demographics of players who engage more with loot boxes (e.g., younger age, male sex, non-university educational attainment, and unemployment) are similar to those who engage with and experience harms from other addictive behaviors [55]. The major criticism against previous loot box research, that the studies were all cross-sectional and therefore could not demonstrate causality, has recently started being addressed in longitudinal studies that have established that young people who purchase loot boxes are more

likely to participate in, and spend more money on, traditional gambling six months later [56, 57], thus strengthening the case for loot boxes to be subject to regulatory scrutiny.

Given the potential harms, besides academic and policy interests, the loot box issue is also considered highly relevant by players themselves. This is illustrated by how, in the study by Petrovskaya and Zendle seeking to assess how players felt about *other* types of in-game monetization *besides* loot boxes, many players still decided to discuss loot boxes despite being instructed otherwise [39 (p. 1074)]. Qualitative studies on loot box-purchasing players have found that many hold negative opinions against loot boxes and companies that implement them [58]. Vulnerable players said they were motivated by compulsion and the **fear of missing out (FOMO)** to buy loot boxes [59]. Some players have self-reported experiencing harm due to loot box engagement [60]. Parents of underage players are naturally also concerned about the content that they decide to allow their children access to [61] and the emotional and financial harms that they may cause [21]. Developers and publishers are also interested in developments in this realm as they may need to take specific actions (e.g., change their loot box design [2, 62] or display mandated information about the product [3, 4, 41 (p. 580)]) to comply with regulatory requirements.

1.4   Loot Box Regulation

A few countries have already acted to legally regulate loot boxes [41, 62–65]. Belgium has attempted to "ban" loot boxes by enforcing preexisting gambling law (which is drafted more widely than other countries') [66]. However, empirical research has found that loot boxes continue to be widely implemented in high-grossing mobile games, because the gambling regulator does not have sufficient resources to enforce the law by criminally prosecuting companies in practice [2]. The gambling regulator in the Netherlands attempted to enforce their gambling law against Electronic Arts' loot boxes in the *FIFA* series [67], but the Dutch court has since decided that loot boxes are generally not regulable under national gambling law [68]. China has taken a less restrictive approach and did not prohibit loot box sales; instead, video game companies are required to make probability disclosures to better inform consumers about the likelihood of receiving specific rewards [69]. This provides transparency and would help consumers to make more informed purchasing decisions. However, empirical research has found that, although the vast majority of companies complied by disclosing probabilities, most disclosures were not visually prominent and were difficult for players to access: for example, with the loot box purchase screen as the starting point, one game required the player to tap multiple buttons and follow multiple hyperlinks before displaying the probabilities [4]. These examples demonstrate that regulating loot boxes with law is practically difficult and that companies often either did not comply or complied sub-optimally.

One alternative to legal regulation is industry self-regulation [65]. This is when hardware providers (such as Microsoft, Sony, and Nintendo), digital storefronts (such as the Google Play Store and the Apple App Store [3, 61]), trade bodies (such as the **U.S. Entertainment Software Association (ESA)** [28] and **UK Interactive Entertainment (Ukie)** [70]), or individual companies (both developers and publishers) decide to adopt certain measures to enhance consumer protection by going above and beyond existing legal requirements [71, 72]. This approach has certain benefits, such as being quicker than legal regulation at responding to novel developments in the industry and possessing specialist video game knowledge that more general governmental regulators might lack [3]. However, when self-regulating, the industry is always conflicted, as any effective regulation (e.g., that demonstrably reduces spending) acts against its own commercial self-interest of revenue generation. The adoption of industry self-regulation has also been relied upon by the industry to argue against the imposition of more stringent legal regulation [73, 74]. Research on other industries offering (potentially) harmful products, such as alcohol, has found that companies might promote their industry self-regulation of untested efficacy to placate
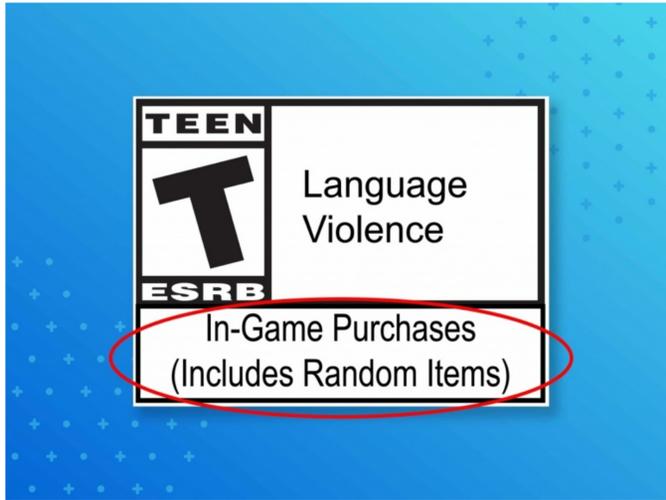
Fig. 1. The ESRB "In-game Purchases (Includes Random Items)" interactive element. © 2020 Entertainment Software Rating Board (ESRB).

consumer concerns, reduce public scrutiny, and dissuade more effective and restrictive legal regulation, rather than to genuinely enhance consumer protection [75]. Recognizing those pros and cons, the UK Government recently decided to rely on industry self-regulation to address loot box harms, rather than to impose legal regulation [76]. The Ukie self-regulatory principles and guidance have since been published [77]. (In contrast, other countries, such as Brazil and Australia [78], are presently considering direct legislative intervention to reduce loot box-related harms [79].)

1.5 Industry Self-regulation: Loot Box Presence Warning Labels

In the loot box context, two types of industry self-regulation have been adopted. First, many hardware and software platforms now require loot box probability disclosures. This means that consumers living outside of territories that require probability disclosures by law (e.g., China) would also benefit from this information. However, it appears that only two-thirds of games containing loot boxes were complying with industry self-regulation in the UK [3], as compared to nearly all games with loot boxes complying in China [4]. Second, age rating organizations that moderate video game content (e.g., the ESRB in North America and **PEGI (Pan-European Game Information)** in Europe) introduced a loot box presence warning label. Specifically, since April 2020, games containing loot boxes or indeed any "in-game transactions with randomized elements" [30] were labeled with the following phrase: "In-Game Purchases (Includes Random Items)" (see Figures 1 and 2). The Ukie self-regulatory principles and guidance of mid-2023 have reiterated that these are required to provide enhanced consumer protection [77].

This label was introduced to inform consumers about whether a game contains loot boxes so that they are not surprised by their presence after purchasing or downloading a game [30, 31]. This measure can help consumers and parents to not purchase or download games containing loot boxes, if they do not want (their child) to engage with these mechanics. This loot box presence warning label has previously been criticized for not providing sufficient information and for inventing unfamiliar language that players and consumers do not already know, rather than simply referencing "loot boxes" or "gacha" [61, 80]. Under experimental conditions, these labels were not understandable to most consumers and therefore, in practice, likely "fail to adequately inform consumer spending decisions" [81].

Fig. 2. The current PEGI "In-game Purchases (Includes Random Items)" content descriptor. © 2020 PEGI (Pan-European Game Information).

The label is applied to physically released and digitally released games differently. With physical games, my recent study identified that both the ESRB and PEGI have made at least one rating error by failing to attach the label to a game containing loot boxes [61]. Further, because the ESRB decided that games originally rated prior to the label being introduced (i.e., before 13 April 2020) need not be retroactively labeled, many games containing loot boxes were not, and will not be, correctly labeled in North America, such that consumers cannot rely on the label to provide accurate information [61]. In contrast, PEGI decided to apply the measure retroactively, meaning that nearly all games rated before 13 April 2020 containing loot boxes are now labeled in Europe [61].

In relation to digital games, age ratings and content information are provided through the **International Age Rating Coalition (IARC)**, which generates age ratings and attaches the loot box label to games globally based on companies' self-disclosure in a questionnaire [82]. The Google Play Store uses the IARC system and so games containing loot boxes could be labeled on that platform. However, only 29% of 100 popular games containing loot boxes were correctly labeled when independently checked in January 2023 [61]. The majority was not labeled. The IARC has attempted to justify this widespread non-compliance by stating that the measure was only adopted on the Google Play Store in February 2022 and arguing that only games rated after that time needed to comply with the measure and be labeled [61]. This means that most games containing loot boxes are not liable for labeling, and so this measure cannot be relied upon by consumers and parents to provide accurate information on loot box presence. Considering that most presently high-grossing and popular games were released prior to February 2022 and the fact that this is unlikely to change for the next few years, this measure was poorly implemented on the Google Play Store. PEGI, which endorses the IARC, and the IARC, in response to my recent study [61], have argued that the Google Play Store poses a unique regulatory challenge because of the sheer volume of content available ("hundreds of thousands of games" according to the IARC [83] and estimated to be 500,000 individual games by another source [84]) and the practical difficulties of accurately revisiting the rating decisions for all those games. PEGI, specifically, stated that: "we [meaning PEGI] don't have these issues with other storefronts" [85].

1.6 Those "Other Storefronts": Better Compliance with Smaller Volume?

The IARC is also implemented on, *inter alia*, the Epic Games Store, the Microsoft Store for Windows and Xbox, the Nintendo eShop, and the Sony PlayStation Store, as shown in the promotional material published on the IARC's official website displayed as Figure 3. (The other storefronts shown in Figure 3, such as the Meta Quest Store, are significantly smaller and have more niche focuses, and therefore are not discussed further.) PEGI, and by extension the IARC, has suggested

	Amazon Luna	Epic Games Store	Google Play	Meta Quest Store	Microsoft Store for Windows and Xbox	Nintendo eShop	Pico Store	PlayStation Store
Australian Government Classification Board (Games Only)		✓	✓	✓	✓	✓	✓	✓
CLASSIND		✓	✓	✓	✓	✓	✓	✓
ESRB	✓	✓	✓	✓	✓	✓	✓	✓
GRAC (Games Only)			✓	✓	✓	✓		✓
PEGI		✓	✓	✓	✓	✓	✓	✓
USK		✓	✓	✓	✓	✓	✓	✓

Fig. 3. A table published by the IARC showing the various participating digital storefronts and participating rating authorities of the IARC as of February 2023. © 2023 IARC (International Age Rating Coalition).

that compliance with loot box presence labeling would be significantly better on those other stores. (However, in response to the results of the present study, PEGI has stated in a remote meeting with me on 17 March 2023 that it did not intend to make that claim [85] and has since clarified that it did not intend to suggest that the other storefronts will necessarily perform better and was merely pointing out that the vast volume of content was a unique difficulty that is faced on the Google Play Store. Regardless, the present study was originally motivated by and conducted based on my interpretation that PEGI did seemingly make that claim and is narrated below as such.) On the face of it, this assertion seems believable, because: (i) much fewer games are available on these other stores (such that enforcement is a lot more practicable); (ii) the platform providers are major video game companies that scrutinize submissions more than Google does on its platform (such that unlabeled games are less likely to be accepted for publication); and (iii) a far smaller percentage of games contain loot boxes on console and PC hardware platforms than on mobile platforms (thus further reducing the number of games that need to be labeled and whose labeling needs to be monitored). The present study was conducted to independently and empirically verify that claim seemingly made by PEGI and, by extension, the IARC.

2   METHOD

My recent study [61] identified 186 games (which included two duplicates, as they both appeared in two of the lists below) that were confirmed to contain loot boxes: (i) 38 games were self-labeled by the company as containing loot boxes on the Google Play Store; (ii) 79 games were independently verified to contain loot boxes by the IARC, after being reported for potential labeling by said study, and have since been labeled; and (iii) 69 games were labeled as containing loot boxes by either the ESRB or PEGI and that labeling status was not successfully disputed by the other (the four physical games that were false positives that were incorrectly identified as containing loot boxes by one age rating organization when they did not and the one physical game whose loot boxes were not purchasable from PEGI territories were excluded).

After removing the two duplicates, these 184 games were entered into the search tools for the Epic Games Store (https://store.epicgames.com/en-US/), the Microsoft Store for Windows and Xbox (https://www.xbox.com/en-gb/), the Nintendo eShop (https://www.nintendo.co.uk/), and the Sony PlayStation Store (https://store.playstation.com/en-gb/) to attempt to identify a version of the same game on those platforms. This replicates how my recent study [61] used the Google Play Store search tool to identify a game's labeling status. The region and language settings for the storefronts were put to the UK (except for the Epic Games Store, where this could not be done) to receive PEGI-based information. In relation to the Epic Games Store, PEGI-based information was still captured (even though the web address contained "US [United States]"). This was due to my being located in a PEGI territory during data collection and thus showing an IP address that the Epic Games Store would have recognized as being from within the PEGI region. To confirm that the Epic Games Store changed the age ratings it displayed depending on the user's IP address, rather than based on region and language settings, a **VPN (Virtual Private Network)** was used to spoof my IP address to instead appear as coming from the U.S. instead; doing so caused ESRB-based information to be shown in lieu when visiting the same link. The present study focused on compliance in PEGI territories, because the aforementioned claim that is being tested was made by PEGI. A total of 60 games were found in at least one of those four digital storefronts: this formed the sample.

A further 12 games known to contain loot boxes based on my prior knowledge and through a review of the list of only 102 "free games and apps" then available on the Nintendo eShop (as discussed below) were added into the sample to bolster the number of games available for scrutiny on the Epic Games Store and the Nintendo eShop, as much fewer games were available on those two storefronts when compared to the Microsoft Store for Windows and Xbox and the Sony PlayStation Store.

The following two variables were measured on 14 February 2023 in relation to those 72 games.

Availability: Whether said game was available on the four storefronts, respectively, by having a dedicated product page. Games that were still displayed but were no longer available for purchase were duly noted as bearing that status but included in the sample (as the game may have been available for purchase until very recently, e.g., August 2022 [86], i.e., well after the label was introduced in April 2020). Games that were once available but are no longer displayed were counted as "not available" as their *Labeling status* could not be verified.

Labeling status: Whether said game was attached with and displaying the "In-game Purchases (Includes Random Items)" label on the four storefronts, respectively.

A labeling "compliance rate" for each of the four storefronts was, respectively, calculated as follows:

$$\frac{\text{Total number of games labeled}}{\text{Total number of games available on that storefront}}.$$

Screenshots showing the labeling status and Safari .webarchive files preserving the webpages visited were recorded. These are made publicly available at the data deposit link in the Open Science Framework: https://doi.org/10.17605/OSF.IO/3MS2C.

The results of the present study were then sent to PEGI and the USK (the self-regulatory German age rating organization [87] who also participates in the IARC [88]) and, by extension, the IARC. I also understand that the results have been forwarded by PEGI to the relevant storefronts with a request for a response (although, after more than seven months, none were personally received as of October 2023). I discussed the present findings with PEGI in a remote meeting on 17 March 2023, which clarified a number of points that have been incorporated into the Discussion section. Official written responses were subsequently received from PEGI (which may indirectly include

Table 1. Compliance with Loot Box Presence Warning Labeling on Various Digital Storefronts ($N = 72$)

Storefront	Number of available games	Number of labeled games	Compliance rate
Epic Games Store	14	1	7.1%
Microsoft Store for Windows and Xbox	55	49	89.1%
Nintendo eShop	24	13	54.2%
Sony PlayStation Store	37	26	70.3%

Table 2. Labeling Status Post-study of Games Identified to be Unlabeled on Various Digital Storefronts

Labeling status post-study	Sony (n = 11)	Microsoft (n = 6)	Nintendo (n = 11)
Updated and labeled	6	2	4
license very recently updated to include label; should be updated and labeled soon	1	N/A	N/A
license not updated by publisher (i.e., continues to be unlabeled and inaccurate)	2	2	1
No longer available	1	1	3
No longer available; likely did not contain loot boxes	1	N/A	N/A
No loot boxes found (different version of a game with the same title)	N/A	1	N/A
Investigated; "did not meet the criteria for paid random items"	N/A	N/A	1
Still under investigation [but since updated and labeled as verified by me]	N/A	N/A	1
Already labeled (internal inconsistency detailed below)	N/A	N/A	1

Italicization used to emphasize outstanding issues.

perspectives from the storefronts) and the USK: these are published for transparency and wider scrutiny at the data deposit link.

3 RESULTS

3.1 Labeling Compliance Rates

The labeling compliance rates of the four storefronts are shown in Table 1.

3.2 PEGI and USK Responses: Post-study Labeling Status

The detailed response received from PEGI stating the post-study status of each game that was found to be unlabeled, including the remedial actions that have since been taken to fix some of the issues, are presented in Table 2.

A number of games were no longer available for purchase or download; these are not scrutinized further. As factual background, PEGI decided to invite publishers to voluntarily retroactively label their games as containing loot boxes if that game was rated prior to the label being introduced in April 2020 (in contrast to the ESRB, which has decided not to retroactively label any games); laudably, most publishers did do so [61]. This meant that the labeling status and rating information of a number of games have retroactively changed in the PEGI system. However, this "update" to now additionally include the label had to be manually actioned and was not implemented effectively. The games affected by this issue have now been accurately labeled. However, notably, two highly popular games containing loot boxes, *Tom Clancy's Rainbow Six Siege* (Ubisoft, 2015)

and *PUBG Battlegrounds* (PUBG Studios & Krafton, 2016), remain unlabeled and continue to provide inaccurate information (i.e., fail to disclose loot box presence), because the publishers have *not* voluntarily retroactively updated their rating information. No other issues are outstanding in relation to the Microsoft Store for Windows and Xbox and the Sony PlayStation Store.

The situation on the Nintendo eShop is more complicated. The games that were missing the label were rated using the expedited IARC procedure for digital releases, rather than the more complex PEGI procedure for games intended for physical release [61]. Most of these unlabeled games were, according to PEGI, rated prior to the label's introduction. As factual background, it is IARC policy that games rated prior to the label being introduced to a storefront (the dates of which are not publicly known) are not obliged to attach the label [61]. Nonetheless, all but one game identified to contain loot boxes by the present study and subsequently verified to do so by PEGI have now been labeled. That one remaining game continues to be unlabeled, because its license has not been updated by the publisher: it is not understood why this has not been done compulsorily as the IARC system has been retroactively applied against other identified games (and it is not known whether the consent of the publisher to attach the label was obtained in all such previous cases, which appears unlikely). Two other games remained unlabeled at the time the PEGI response was sent. One game, *Pokémon UNITE* (TiMi & The Pokémon Company, 2021), continued to be under investigation at that time as to whether it met the criteria for the label (i.e., whether it contained in-game purchases with randomized elements) but, as of 16 May 2023, the game has since been duly labeled as verified by me. The other game, *Pokémon Quest* (Game Freak & Nintendo, 2018), was determined by PEGI as to have not met the criteria for the label (i.e., it did not contain in-game purchases with randomized elements according to PEGI).

The state of affairs on the Epic Games Store was due to the storefront undergoing "full development" and so has not properly implemented the age rating system, despite the official claim that it is allegedly a "participating storefront" of the IARC system [88].

PEGI also argued that games that were "viewable but no longer purchasable" should have been excluded from the sample when calculating compliance rates on the bases that "consumers cannot buy or access these games" and "if a publisher or a game is no longer active, a lingering storefront listing will obviously not be updated." This critique is addressed in the Discussion section.

In response to the results, the USK only confirmed that the Epic Games is in the process of implementing the IARC system and suggested that "lengthy implementation processes" are to be expected and acceptable. The USK did not express a view when asked to comment on the current unsatisfactory compliance situation on various stores and did not state how it intends to improve the situation.

4 DISCUSSION

The present study assessed whether games containing loot boxes were duly labeled as required by industry self-regulation on four storefronts governed by the IARC. My recent study [61] proposed that: a compliance rate of at least 95% should be deemed as the self-regulation having been nearly perfectly complied with and worthy of commendation; a compliance rate between 80%–95% would be deemed as the measure having been mostly complied with, although requiring improvements; and a compliance rate below 80% means that the measure was *not* adequately complied with and must be significantly improved to achieve its regulatory aims. These cut-off values and corresponding interpretations were based on what I personally thought "would be a 'satisfactory' self-regulatory measure and what [I] deemed most policymakers would agree with" [61 (p. 7)]. The Microsoft Store for Windows and Xbox had a compliance rate of 89.1% and therefore came close to achieving, but did *not* achieve, the highest tier of compliance. This demonstrates that the measure could be enforced well (at least on a platform with fewer games) and that a 95% compliance rate

is potentially achievable. The Sony PlayStation Store (70.3% compliance rate) and the Nintendo eShop (54.2% compliance rate) performed worse. These results show that, even on platforms that are more manageable than the Google Play Store, the platform providers did not perform their monitoring and enforcement duties in a satisfactory manner. Both Sony and Nintendo should follow Microsoft's example and do more to ensure that the labeling is accurate, for example, by more regularly reviewing games as to whether they are labeled and compliant.

The Nintendo results were poorer than those of Microsoft and Sony likely due to the inclusion of a greater number of free-to-play titles that were rated through the IARC system, which is heavily (and potentially solely) reliant on self-disclosures by companies with conflicting self-interests and which did *not* invite companies to retroactively attach loot box labels, rather than through the PEGI system, which involves additional manual examination by independent assessors [89] and which *did* invite companies to retroactively label their games. The latter obviously has a more accountable procedure but is not used in relation to exclusively digitally released games [61]. Note that, as of 20 March 2023, there were only 102 "free games and apps" for the Nintendo Switch on the Nintendo eShop (as evinced by webpage printouts available at the data deposit link). This partially demonstrates the significantly lower volume of content that must be regulated through the IARC system on these other stores, as compared to the vast volume of IARC-regulated content that is available on the Google Play Store. This means that enforcing compliance on these other stores *should* have been significantly easier. Indeed, given the limited amount of available content, these stores could even consider adopting a two-step rating process that involves both (i) the game company completing a self-disclosure questionnaire (which the present IARC system already requires) and (ii) independent reviewers assessing content pre-release to verify the self-disclosures, similarly to what is currently done by the ESRB and PEGI with physically released games [61].

All three aforementioned storefronts (Microsoft, Sony, and Nintendo) performed better (some significantly so) than the Google Play Store, which achieved a compliance rate of only 29% in my recent study [61]. In contrast, the Epic Games Store performed *even worse* than the Google Play Store and only labeled one out of 14 games containing loot boxes (7.1%). For example, *FIFA 23* (Electronic Arts, 2022), which is part of arguably the most infamous series of video games containing loot boxes, was not labeled on the Epic Games Store; instead, a generic "In-game Purchases" label was displayed. *FIFA 23* shows a release date of 30 September 2022 on the Epic Games Store. The only game that was labeled on the Epic Games Store, *Roller Champions* (Ubisoft, 2022), shows a release date of 23 June 2022, and an earlier "initial release" date of 25 May 2022. *FIFA 23* was released after *Roller Champions*. Therefore, even a potential argument based on how the label was only adopted on the Epic Games Store very recently and was not retroactively applied cannot be used to exonerate *FIFA 23* for missing its label. The Epic Games Store is operated by Epic Games. This company has taken a very anti-loot box stance in recent years, in contrast to other members of the industry that have adopted pro-loot box or neutral stances. For example, Epic Games' CEO has publicly criticized loot boxes and encouraged companies to stop selling them to treat consumers more fairly [90]. Indeed, Epic Games has "put its money where its mouth is" by taking a lead in removing loot boxes from games in its portfolio [72]: loot boxes were removed from *Fortnite* (Epic Games, 2017) [91, 92] and from *Rocket League* [93, 94]. Epic Games even settled class-action complaints in the US and Canada and agreed to compensate players who bought loot boxes (without admitting any liability or wrongdoing) [79]. It is contradictory, therefore, that the Epic Games Store has not been enforcing the loot box label.

Besides the platform providers needing to better enforce the rules, individual companies that failed to label their games and broke the rules in the first place must also improve by better understanding their compliance obligations and strengthening their internal legal and compliance procedures. For example, *PUBG Battlegrounds* failed to attach the label on all three platforms where

it is available. Interestingly, the company publishes information about loot boxes and probability disclosures on its website [95]. The most recent post contained the following sentence four times: "Due to legal regulations, the [loot boxes] are not available for purchase in Belgium and the Netherlands." Given the two specific countries cited (whose loot box regulations have been highly publicized, although see Section 1.1 above for the accurate, current legal positions), these "legal regulations" must be referring to gambling laws. Therefore, the companies behind *PUBG Battlegrounds* appear to understand and respect their *legal* obligations; however, it has not fulfilled its *industry self-regulatory* obligations. These companies were either unaware of the relevant industry self-regulation (which is hard to believe, because this is one of the most popular games operated by well-established companies and so should have a knowledgeable legal and compliance team) or have actively chosen to not comply with industry self-regulation (but *did* choose to comply with Belgian and Dutch law). If the latter is true, then the reliability and efficacy of industry self-regulation is greatly challenged, and legal regulation with more effective deterrence should be preferred.

4.1 Accessibility and Visual Prominence

On the Epic Games Store, the Microsoft Store for Windows and Xbox, and the Sony PlayStation Store, the label, when it is shown, is displayed quite prominently. The consumer would be able to see it when visiting the relevant product page without needing to perform any additional action. Using "Ctrl+F" or another function to search for the text of the label would also allow the consumer to easily find the label on the webpage. This is in contrast to how the label was difficult to access on the Google Play Store, which required the consumer to perform additional actions (e.g., tapping or clicking on a small (i) button next to the age rating) before showing the label. The label was similarly more difficult to access on the Nintendo eShop: it is not automatically shown on the first webpage for the product (and so was also not text searchable at that point), and the consumer must click on a "Details" hyperlink to be taken to a different webpage where the label is shown. On the Nintendo Switch version of the Nintendo eShop, the label is similarly not prominently displayed. The consumer must enter the product page and scroll all the way down to the bottom of the page to see the label. The PEGI age rating is actually shown immediately on the product page on the right-hand side and is "pinned" there as the consumer scrolls further down the product page. There is sufficient space to display the loot box label (and other rating information) just under the age rating. Nintendo should improve the visual prominence of the label. Indeed, the Italian Competition Authority (Autorità garante della concorrenza e del mercato; AGCM) has successfully enforced consumer protection regulation to force Activision Blizzard and Electronic Arts to commit to always displaying the label prominently (e.g., on the first product page shown without requiring the player to perform any action) by arguing that not doing so potentially infringes the EU Unfair Commercial Practices Directive [2005] OJ L149/22 (or rather national implementations thereof) [41, 61, 79].

Notably, one internal inconsistency was found on the Nintendo eShop. *PUZZLE & DRAGONS Nintendo Switch Edition* (Gungho Online Entertainment, 2022) was not labeled on the web version of the Nintendo eShop, but *was* labeled on the Switch version, as shown in Figure 4. Other interesting cases where a game disclosed loot box presence through other means were also discovered: a few companies put a disclaimer about loot box presence into the game's description on the product page, and one company put a similar disclaimer into the space usually reserved for copyright and privacy notices. Curiously, some of these companies did not attach the loot box label to their game (and were therefore non-compliant), but chose to otherwise highlight loot box presence. These additional sources of information would not hinder the consumer experience and could only increase the opportunities for the consumer to see information about loot box presence. Therefore,
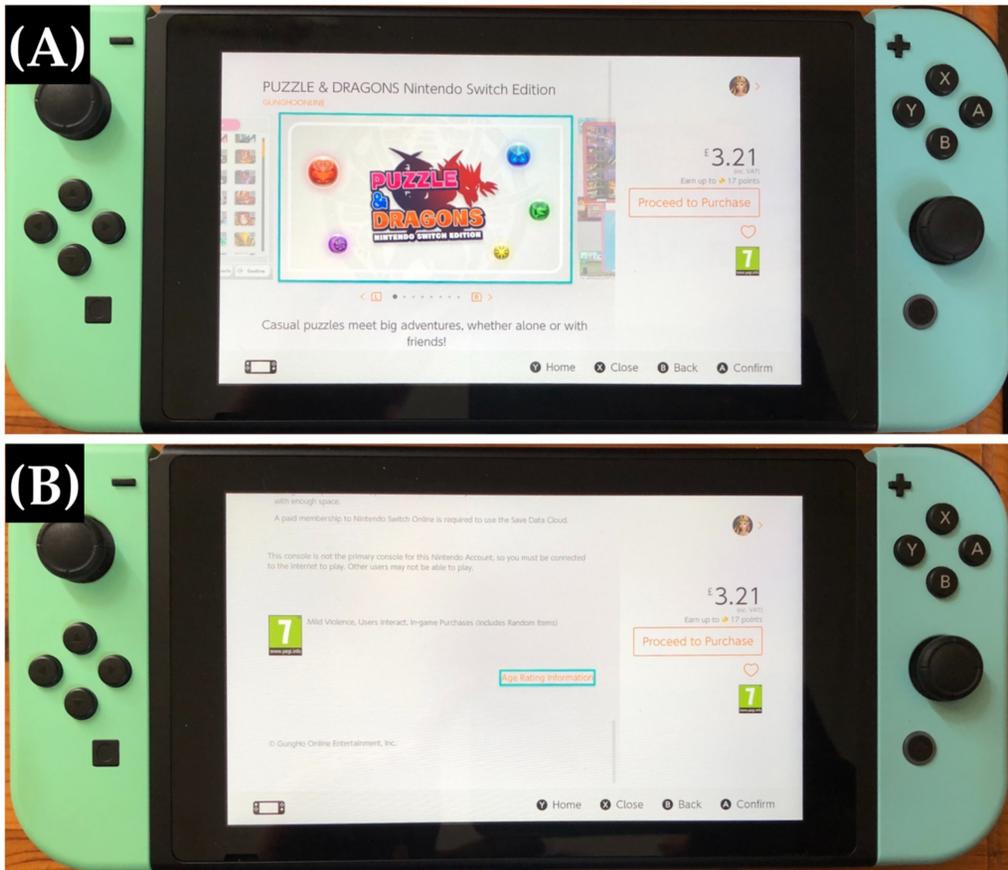
Fig. 4. Two photographs showing how the label is sub-optimally displayed on the Switch version of the Nintendo eShop. Photograph A shows the top of the product details page. Photograph B shows that the label could only been seen after scrolling down to the bottom of the product page. (Screenshots were not allowed to be taken on the Switch version of the Nintendo eShop.) © 2023 GungHo Online Entertainment & Nintendo.

other companies are encouraged to also make similar additional disclosures. Companies can also choose to do this on storefronts that have not implemented the label or a similar feature, e.g., the Apple App Store, to proactively inform their consumers about loot box presence.

4.2 Responding to PEGI and the USK Responses

As detailed in the Results section, despite PEGI having led the storefronts and the companies in taking remedial action to address the concerns raised by the present study (e.g., re-labeling games), a few, but highly popular, games containing loot boxes remain unlabeled on the major storefronts presently. This means that consumers are still not being provided with accurate information. According to PEGI/IARC policy, it is within the publishers' discretion whether to voluntarily attach the label for games rated prior to the label's introduction. The disadvantages of failing to label "older" games and giving them more unfair privileges, such as misleading consumers into trusting the labeling status in all cases and anti-competition concerns, have been argued elsewhere previously [61 (pp. 20–22)]. These companies should attach the label at the earliest instance.

Indeed, not displaying the label (or an equivalent message highlighting loot box presence) infringes UK advertising regulation [96, 97], specifically the *Guidance on advertising in-game purchases* [98 (p. 10)]; Ukie's self-regulatory principles and guidance [77]; and potentially infringes consumer protection law in other regions, e.g., the EU Unfair Commercial Practices Directive (or rather national implementations thereof) [41, 61].

   The PEGI response concerning the Nintendo eShop has again spotlighted the difficulties surrounding finding an appropriate definition for a "loot box" or for "an in-game transaction with randomized elements" that would warrant the warning label [47, cf. 48]. The implementation of the relevant monetization mechanic involving randomization in certain games is more insidious than just a virtual container with random rewards that can be directly purchased and opened. PEGI has determined that one game, *Pokémon Quest*, does not contain monetization mechanics that would need to be labeled. However, in this game, the player is able to spend real-world money to purchase a "premium currency" (i.e., virtual currency that can be purchased using real-world money) that can then be used to purchase "energy" that can subsequently be used to complete in-game quests, which reward random content. The energy may be viewed as a second type of "premium currency" that can be bought with real-world money through an additional layer of exchange and is used to complete the quest, which represents the "loot box," as the process eventually provides random rewards [99]. The distinction that PEGI is attempting to draw is difficult to justify, even though there might have been one more level of transfer between real-world money to the second type of premium currency. Indeed, on previous occasions, PEGI has seemingly agreed that such energy mechanics that can ultimately be recharged using real-world money and then used to obtain random rewards do warrant the label, as it has re-labeled a number of games containing such a mechanic on the Google Play Store upon request and following independent verification [61 (p. 22)]. PEGI appears to be inconsistently enforcing its rules. If more hidden implementations of loot boxes that require multiple currency exchanges or other additional steps are not similarly regulated as regular, simple loot boxes, then companies are being incentivized to implement more concealed variations, which would pose higher risks for consumers than obvious loot box implementations that are more honest about their properties. These more disguised loot box variations would also be more difficult for regulators to identify: It is interesting to note that PEGI stated that one game, *Pokémon UNITE*, remained "under investigation" one month after it was put on notice to examine the game. As of 16 May 2023, the game has since been duly labeled. Companies should *never* be encouraged to implement more elaborate monetization schemes that are eventually revealed to nevertheless involve randomization.

   The excuse that has been provided on behalf of the Epic Games Store is unsatisfactory: the situation might be characterized as an *epic* failure. If a storefront is not actually ready to display accurate age rating information to consumers, then that storefront should not be listed as a platform that has implemented the IARC system so as not to give consumers the incorrect impression that the system has been duly implemented and can now be relied upon. The one sole instance where the game was duly labeled on the Epic Games Store may cause further confusion as it appears to suggest that the system has already been put in place. The USK has refused to reveal the expected timeline for the Epic Games Store to implement the IARC system. As of 15 October 2023, *FIFA 23* remained unlabeled eight months after the study was conducted. A popular game containing loot boxes that was released in April 2023 *after* the present study was conducted, *Honkai: Star Rail* (miHoYo, 2023), also remained misleadingly unlabeled on the Epic Games Store as of 14 October 2023 (despite being duly labeled on the Google Play Store). These omissions suggest that properly implementing the IARC age rating system is not a priority for the Epic Games Store even though it should be, especially considering that the task is not onerous and indeed appears quite simple. Until the IARC system is duly implemented, the IARC website should be amended by removing the Epic Games Store as

a participating storefront (as it is not in fact participating). The agreement by a storefront to aspirationally participate in the future should not be advertised as actual participation. A disclaimer should be provided stating that Epic Games Store has not properly implemented the system, and an expected timeline should be provided to better inform consumers and align expectations.

Regarding the methodological decision to include "viewable but no longer purchasable" games in the sample, this was done because these product pages continued to provide information. Although these games were no longer purchasable, at least some of them remained available for download by consumers who have already purchased them in the past. The decision of whether to re-download the game may also be impacted by the label, just like the original purchasing decision could have been so influenced (which was the "legislative intent" behind introducing the label in the first place [30, 31]), for example, if an "older" game is being downloaded for another member of the family to try. Indeed, some of those "viewable but no longer purchasable" games were correctly labeled and were counted as compliant. The compliance rates may therefore either increase *or decrease*, if such games are removed from the calculations. In any case, updating the label would incur only minimum costs given how few games on these platforms actually contain loot boxes, so it should be done. If a game or company is truly no longer active, such that the product page can no longer be maintained as PEGI suggests, then it should be removed entirely from the storefront so as not to leave open any possibility of misleading consumers.

Finally, the USK refused to answer my question as to what it intends to do to improve compliance and provide better consumer protection when the situations on the Google Play Store and the Epic Games Store are objectively unsatisfactory as many games containing loot boxes still remain unlabeled and are failing to warn consumers and parents [61]. This suggests that the USK may not be viewing the loot box issue as a priority. Unique features about the German self-regulatory regime for video game age ratings mean that it is technically a form of "co-regulation" (whereby broader regulatory aims are set out by legislation but are carried through in practice by partially discretionary industry self-regulation) and not pure industry self-regulation (whereby all relevant matters are at the sole discretion of the industry self-regulator or the industry at large). Under the USK system, boarder legislative interventions can force the USK to take certain actions and address specific issues: for example, a recent change in the law that listed "in-game purchases" and "gambling-like mechanisms" as risks for young people that must be addressed caused the USK to then introduce its own loot box presence warning label for physically released games effective 1 January 2023 [8, 100]. Therefore, if deemed appropriate, German legislators should consider requiring the USK to do more in relation to digitally released games: perhaps setting out how the USK should actively participate in, and attempt to improve, the IARC system. This also shows how different "participating rating authorities" of the IARC are not identical and may have different legal statuses and interests: indeed, the Australian Classification Board is a government body and not an industry self-regulator [101] and therefore should not be as conflicted from acting against industry interests (e.g., be less pressured to not more strictly demand better compliance).

4.3   Limitations

The sample was biased toward games that were previously confirmed or known to contain loot boxes. Most of these games were, and presently remain, highly popular and receive heavy scrutiny from age rating self-regulators and other stakeholders. Indeed, the vast majority of the sample had its loot box presence labeled elsewhere, thus putting the relevant company on notice about needing to similarly attach labels on other storefronts. Therefore, the compliance rate amongst this sample is likely higher than the overall true value, similarly to other previous studies examining loot box-related compliance issues amongst high-grossing and popular games [2–4, 61].

The region settings were set to the UK, which is a PEGI region, where possible to produce PEGI-based information. This meant that only compliance with the label in PEGI territories was assessed. The compliance and enforcement situations in North America (i.e., ESRB territories) and in other parts of the world may differ (although perhaps not greatly given the IARC's supposed global application). For example, one game, *Mobile Suit Gundam Battle Operation 2* (Bandai Namco Entertainment, 2018), was *not* labeled by PEGI on the UK Sony PlayStation Store, but *was* labeled by the ESRB on the US Sony PlayStation Store. My recent study [61] found that the *physical* version of *Mobile Suit Gundam Battle Operation 2* was labeled incongruently in a similar manner (i.e., labeled by the ESRB but not PEGI). This suggests that the Sony PlayStation Store was actually displaying the age ratings for the game's physical release, rather than that of its digital release as generated through the IARC, even though the storefront is technically selling the digital version. It appears that these digital storefronts may actually be implementing a combination of the PEGI/ESRB system for physically released games and the IARC for digitally released games to provide age ratings for *digital* purchases. It is likely that had a PEGI/ESRB rating been available for the physical version, then that rating would have been displayed in lieu of a newly generated IARC rating. Therefore, the results of the present study may be more reflective of how the storefronts did not accurately attach the label to games even after PEGI and the ESRB have duly labeled them, rather than how the IARC system (which, according to PEGI, only the additional Nintendo Switch games in the present sample actually used) was not well-implemented, complied with, and enforced. I could not independently verify whether each game on each storefront displayed its traditional PEGI/ESRB rating or a newly generated IARC rating.

Although the present study was undertaken to broaden the literature by examining storefronts that previous research did not have an opportunity to assess, this was not a comprehensive exercise. The labeling situation on other digital storefronts that are not part of the IARC remains unknown. Other prominent candidates for future research are the Steam platform by Valve, GOG.com owned by CD Projekt, and Humble Bundle for PC games.

My recent study [61] and the present study have exposed flaws with the implementation and enforcement of (self-)regulation in video game content moderation contexts. Whether or not other aspects of video game software (e.g., whether the player can share their real-life location with other users or whether the game gives the player unrestricted access to any internet content through a browser [6]) have been duly highlighted as promised by age rating organizations should be further studied as failure to disclose those could lead to even more direct harm to players, particularly children, than loot boxes.

Loot boxes have been the most heavily scrutinized video game mechanic. Other potentially predatory forms of in-game monetization have been identified [34, 51]. Future research should consider how those elements (which are arguably more subjective than the presence of loot boxes) could be regulated either by law or industry self-regulation.

4.4 Toward Better Industry Self-regulation

As mentioned, the UK Government recently decided to rely on industry self-regulation to address loot box harms, rather than to legislate: citing a desire to avoid incurring public costs if possible [76]. The detailed self-regulatory principles and guidance have since been published by Ukie and explicitly include the requirement of making loot box presence warning disclosures [77]. Relevantly, previous experience with loot box presence warning labels has identified two points that any future regulation must address.

First, industry self-regulation should be actively scrutinized externally to ensure compliance. The industry merely promising that a measure is to be adopted does not necessarily mean that said measure will in fact be adopted widely by industry members in practice: as demonstrated in

the present case. Rather than choosing between pure industry self-regulation or direct state legal regulation, both of which sit at their respective extreme ends of the regulatory spectrum, it may be wise to go between those two options and instead adopt middle-ground "co-regulation" [102] (p. 26)]. This approach means that, although the rules are still generally managed by the industry, there is some legal footing or back-stop that guides the regulatory efforts and can be relied on to ensure that the regulatory aims will be met, for example, by setting out what issues must be addressed and legal requirements as to how compliance must be monitored and enforced. The German USK system may be characterized as such. Other countries may benefit from moving beyond a purely industry self-regulated system with no official guidance for video games and toward a co-regulated environment where the general policy agenda is set out through legislation but then the exact practical requirements are (within reason) left to the industry's discretion to take advantage of the industry's subject matter expertise and ability to respond more quickly to novel issues. This can be achieved in the UK, for example, by requiring that the loot box industry self-regulation (whose content the industry is allowed, again within reason, to decide) to contain an internal enforcement mechanism and explicitly state that it is a "code of conduct" within the meaning of Regulation 2(1) of the Consumer Protection from Unfair Trading Regulations 2008, such that any failure to comply with verifiable self-regulatory commitments by a signatory company can ultimately be subject to external enforcement, i.e., criminal prosecution [103].

Second, industry self-regulation should be founded on the same principles as legal regulation. Just like policymaking, the design and imposition of industry self-regulation must be evidence-based. No research was conducted on the potential effectiveness of either probability disclosures or presence warning labels at reducing loot box harm before they were imposed (and repeated in the Ukie self-regulatory principles and guidance [77]). Subsequent research following implementation has found that probability disclosures likely do not influence the majority of players (and may even cause some players to spend more money) [104] and that "consumers do not appear to understand the [ESRB/PEGI/IARC] warning" label and thus likely do not derive much benefit from it [81]. What the video game industry has voluntarily done up to present in relation to loot boxes bears resemblance to how the tobacco industry initially reacted to concerns by acceding to the voluntary adoption of relatively ambiguous, text-based warnings (that are ineffective). However, the tobacco industry then fought hard against the adoption of stronger graphic warnings (that are more effective) when these were later proposed. It is plausible that the existing self-regulations that have been adopted were voluntarily adopted, because they have little effect on reducing harm (and, by extension, the industry's commercial interests) but do shine the industry in a positive light as seemingly taking action to address potential harms. Forthcoming loot box regulation must be evidence-based: the measures that the industry proposes should be empirically assessed as to their potential effectiveness. If it is deemed appropriate to immediately bring in certain untested measures to quickly address harms, then those measures must be assessed post-implementation and continually monitored for effectiveness. The adoption of ineffective measures must not be allowed to be presented, and perceived by the public, as the industry taking responsibility.

These two points are relevant beyond the video game regulation context. The present study therefore also speaks to the shortcomings of industry self-regulation more widely. The potential adoption of this approach and the "privatization of regulation" in general [105] in relation to the technology sector must be treated with due caution and critically analyzed to identify which stakeholders truly stand to benefit and what other consequences (both positive and negative) there might be. For example, in the context of privacy and data protection, often internal **data protection officers (DPOs)** are tasked with enforcing rules and policing behavior within a company to reduce costs [106], but this may lead to inconsistent standards being applied between companies. With content moderation, barring certain extreme exceptions, various platforms themselves

decide what is the acceptable community standard: marginalized users might be censored on biased grounds [107]. Many intellectual property infringement disputes (e.g., copyright strikes on YouTube) are also being resolved using platform rules [108], which do not necessarily align with what the law actually says in a certain country and may not provide for adequate due process (see *Moviebox Megastores Intl v Rahi* [2023] EWHC 501 (Ch)).

5 CONCLUSION

My recent study [61] demonstrated that the IARC loot box presence warning label was poorly complied with and enforced on the Google Play Store for mobile games. The present study replicated that study's methodology and found that the labeling requirement was also unsatisfactorily complied with and enforced on other IARC digital storefronts for PC and console games, contrary to the age rating organizations' suggestion that the Google Play Store is a uniquely difficult platform to regulate and that these other platforms would perform significantly better if assessed. Notwithstanding, a reasonably high compliance rate of 89.1% was achieved by the Microsoft Store for Windows and Xbox. This shows that better compliance and enforcement is possible and near-perfect compliance is achievable (at least on platforms with a reasonably low number of games). At present, the compliance situation is generally better on PC and console platforms when compared to mobile platforms. However, the compliance rates remained unsatisfactory and below the 95% target: the Sony PlayStation Store reached 70.3%; the Nintendo eShop managed 54.2%; and the Epic Games Store performed especially poorly (7.1%). The remedial actions (e.g., adding labels) since taken by the various platforms at the request of PEGI are appreciated, but as discussed, they failed to resolve all outstanding issues. In particular, the poor implementation of the IARC system on the Epic Games Store (including the failure to label a highly popular game with loot boxes released *after* the present study was conducted) is wholly irresponsible. Consumers *still* cannot confidently rely on the label to provide accurate information about loot box presence, even on these non-mobile platforms. Digital storefront providers, companies, and age rating organizations must improve the labeling and enforcement processes. As it stands, players and parents are therefore advised to not overly rely on loot box-related information disclosures provided by video game companies. It would be their right to demand more accountable forms of regulation (including even legislation) for loot boxes, without which they are forced to treat unlabeled games with due caution as they may still unexpectedly contain loot boxes. More broadly, industry self-regulation must be evidence-based and, in any case, treated with a degree of skepticism and externally scrutinized to ensure compliance and effectiveness.

DATA AVALIBILITY STATEMENT

The underlying data, a full library of screenshots showing the labeling status, Safari .webarchive files preserving the webpages visited, and peer review and editorial history are publicly available in the Open Science Framework at https://doi.org/10.17605/OSF.IO/3MS2C. Previous draft versions are available via: https://doi.org/10.31219/osf.io/sbtcf.

POSITIONALITY STATEMENT

In terms of the author's personal engagement with loot boxes, he plays video games containing loot boxes, but he has never purchased any loot boxes with real-world money.

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provisions of copyright law in accordance with Sections 29(1) and 30(1) of the UK Copyright, Designs and Patents Act 1988.

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CONFLICT OF INTEREST

gifts and hospitality register-equivalent for L.Y.X. is available via: https://sites.google.com/view/leon-xiao/about/gifts-and-hospitality-register. The up-to-date version of L.Y.X.'s conflict of interest statement is available via: https://sites.google.com/view/leon-xiao/about/conflict-of-interest.

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Paper 8: The USK's loot box presence disclosure requirement

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Is loot box presence in video games being correctly and consistently labelled? Comparing all age rating decisions made by the German USK, the American ESRB, and the European PEGI in 2023

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Abstract—**Loot boxes in video games that provide random rewards in exchange for real-world money have been identified as gambling-like and potentially harmful. Many stakeholders are concerned. One regulatory approach is to label games with loot boxes with a presence warning. This has been adopted by the age rating organizations of Germany (the USK), North America (the ESRB), and Europe (PEGI). Previous research, by cross-checking the historical age rating decisions made by the ESRB and PEGI between April 2020 and September 2022, has identified mistakes where one or both organizations failed to label certain games with loot boxes as containing them. The USK only started identifying loot box presence from 2023 and so could not previously be studied. All age rating decisions concerning games with loot boxes made in 2023 by the USK, the ESRB, and PEGI were compared. This process identified how the USK has seemingly (i) failed to label two games as containing loot boxes and (ii) adopted an unspoken policy of giving games with loot boxes a USK 12 rating (*i.e.*, 'approved for children aged 12 and above') at a minimum. Confirmation of the above has been sought from the USK, and an official reply has been promised and is expected imminently. In addition, the ESRB and PEGI have correctly labelled all games with loot boxes that they assessed in 2023 as containing them, thus giving the public more confidence in the reliability of their age rating information and demonstrating an improvement from their performance in previous years.**

Keywords—loot boxes, video games law, computer gaming regulation, consumer protection, age ratings, information disclosure

I. INTRODUCTION

Loot boxes are mechanics inside video games that players engage with to obtain random rewards [1]. Particular concerns have been raised about loot boxes that players buy with real-world money, including overspending and experiencing gambling-related harms [2], [3], [4], [5], [6]. In addition, there are other in-game purchasing mechanics that contain randomised elements causing similar concerns: for example, so-called character summoning 'gacha' mechanics in East Asian games (such as *Genshin Impact* (miHoYo, 2020)) [7], [8] and social or simulated casino games that allow players to spend real-world money to participate in traditional gambling activities

without the opportunity to convert any potential winnings back into cash (such as *Zynga Poker* (Zynga, 2007)) [9], [10]. Popular media has reported on cases where individual players, including children, have spent significant sums on these mechanics [11], [12], [13]. Hereinafter, references to 'loot boxes' mean only paid loot boxes unless otherwise specified and shall be a shorthand expression that encompasses all in-game purchasing opportunities that involve both real-world money and randomisation.

Loot boxes are prevalently implemented, particularly on mobile platforms (*e.g.*, iOS and Android) where approximately 80% of the highest-grossing games contain them in Western countries [14], [15] and over 90% do in Mainland China and, presumably, other Far East Asian regions [16]. Whether or not a game contains loot boxes generally does not affect the advisory age rating given to the game to inform players and parents, with the exceptions of Australia and Germany [17]. In Australia, starting from September 2024, games with loot boxes must be rated M or not recommended for those under 15 at a minimum, whilst games with simulated gambling must be rated R 18+ or restricted to adults [18]. In Germany, recent changes in youth protection law (§ 10b(3) JuSchG (Jugendschutzgesetz [Protection of Young Persons Act])) require the age rating organisation to take into account the presence of loot boxes when making age rating decisions from 2023 onwards without specifying a minimum age rating that must be given [19]. Elsewhere, games with loot boxes are often deemed suitable for young children by age rating organisations and digital storefronts (such as the Apple App Store and the Google Play Store): 57% of iPhone games rated 4+ contained loot boxes, as did 69% of those rated 9+ or lower and 76% of those rated 12+ or lower [14]. In the UK, surveys have consistently reported that just over 20% of 11–16-year-olds reported buying loot boxes with real-world money [20], [21].

Policymakers in many countries share the concerns raised, and different regulatory approaches have been taken in various countries [22]. Most restrictively, Belgium has 'banned' loot boxes by applying its pre-existing gambling law [23]; however,

the ban has not been enforced in practice meaning that loot boxes remained widely available for purchase in the country [15]. Mainland China, South Korea, and Taiwan have adopted regulations requiring that companies disclose the probabilities of obtaining different potential rewards; however, compliance has been sub-optimal: although games disclosed the required information for their most obvious loot boxes, the disclosures were often difficult to access [16]. Italy and the Netherlands have decided to enforce pre-existing consumer protection law to require certain information be disclosed (*e.g.*, probabilities and the presence of in-game purchases) [17]. Most other countries, such as the UK, have not adopted new laws and are instead relying on the application of pre-existing laws [24], [25] and the industry to self-regulate its own behaviours [26], [27], [28].

One way by which the industry has self-regulated is through the introduction of a loot box presence warning label that is supposed to be attached to any video games containing loot boxes. The American Entertainment Software Rating Board (ESRB) [29] and the European PEGI (Pan-European Game Information) [30] announced in April 2020 that they will start attaching the label 'In-Game Purchases (Includes Random Items)' to games with loot boxes intended for physical release (*e.g.*, as a disc), as shown in Fig. 1. This same measure has also been adopted by the International Age Rating Coalition (IARC) for use with exclusively digitally-released games, such as those available on the Google Play Store and the Epic Games Store [31].

In early 2023, I conducted a study examining (i) whether the ESRB and PEGI have consistently labelled the same games as containing loot boxes through cross-checking their age rating decisions and (ii) whether games with loot boxes on the Google Play Store have been correctly labelled under the IARC system [32]. I identified how both ESRB and PEGI have made mistakes (that both have since admitted to) and failed to identify loot box presence, which were caused presumably by the relevant video game company failing to disclose the required information to them [33], [34]. On the Google Play Store, 71 of 100 popular games with loot boxes were found to have not disclosed loot box presence alongside their IARC age rating [32]. My follow-up study examining other digital storefronts adopting the IARC system also found unsatisfactory and, in the case of the Epic Games Store, particularly poor compliance with loot box presence labelling [35].

Fig. 1. The ESRB 'In-Game Purchases (Includes Random Items)' interactive element used to indicate loot box presence as shown on a mock-up age rating. © 2020 Entertainment Software Rating Board (ESRB)

Fig. 2. The PEGI 'In-game Purchases (Includes Random Items)' content descriptor used to indicate loot box presence as shown on mock-up age ratings. © 2020 Pan-European Game Information (PEGI)

As detailed previously, Germany started requiring that the presence of loot boxes be taken into account when the national age rating organisation, the USK (Unterhaltungssoftware Selbstkontrolle), makes age rating decisions. (PEGI, which is widely used in other European countries, is not used in Germany.) The USK must also label any games with loot boxes with the presence warning of 'In-Game-Käufe + zufällige Objekte [In-game purchases + random items],' as shown in Fig. 2, which is very similar to the ESRB/PEGI loot box presence label. When my study that compared the ESRB's rating decisions made between April 2020 and September 2022 with PEGI's ratings from the same period was conducted at the start of 2023 [32], the USK had just begun to label loot boxes (from 1 January 2023 onwards [36]) meaning that there were not enough USK entries to also cross-check their rating decisions. However, a year has passed since then, meaning that a corpus of age rating decisions that were made after all three age rating organisations started reporting whether or not a game contains loot boxes has developed. It therefore became possible to cross-check the results from all three different organisations against each other to identify potential rating mistakes. The present study assessed whether age rating organisations in three different regions made correct and consistent decisions as to whether a game contained loot boxes by examining all relevant decisions made by all three in the 2023 calendar year.

Fig. 3. The USK 'In-Game-Käufe + zufällige Objekte [In-game purchases + random items]' label used to indicate loot box presence as shown on a mock-up age rating. © 2023 Unterhaltungssoftware Selbstkontrolle (USK)

II. Method

Emulating the data collection method described in my previous study [32], all age rating decisions made in 2023 by the ESRB and PEGI were scraped again using their respective public search tools that showed all decisions.

Specifically, for the ESRB, it continued to be impossible to search for only games with the loot box presence warning label using the 'Search ESRB Game Ratings' tool provided to the public (https://www.esrb.org/search/). However, it remained possible to generate a reverse chronological list of all games that were rated by the ESRB in the past year (by clicking on the 'RECENTLY RATED GAMES' tab and then selecting 'Past

Year' as the 'Time Frame' in the relevant dropdown menu). The list of all 692 game titles that were rated by the ESRB in the year leading up to 14 January 2024 was thereby generated. Only 18 of these titles (2.6%) were labelled with the loot box presence warning. Two of the entries bore the same title as another entry (because title releases for different hardware platforms are sometimes, but not always, shown as separate entries in the ESRB search tool) and were therefore discounted as the relevant game is already included in the list by virtue of an earlier entry, thus leaving 16 individual titles.

For PEGI, the public search tool (https://pegi.info/search-pegi) permitted all games that have been attached with the generic 'In-Game Purchases' label (signifying that the game contains some form of in-game purchases but not any that involve randomisation, such as loot boxes) and those with the 'In-game purchases (includes random items)' loot box label to both be listed as results by using the 'EXTENDED SEARCH' tool and toggling on 'In-Game Purchases' under the 'DESCRIPTOR' dropdown menu. This list was examined to produce a list of 14 games with a 2023 release date that were attached with the loot box presence warning label by PEGI.

The USK similarly provided a public search tool (https://usk.de/?s&jump=usktitle&post_type=usktitle). It did not permit games to be searched for based on whether they were labelled with 'In-Game-Käufe + zufällige Objekte [In-game purchases + random items].' Therefore, it was necessary to scrape the entire reverse chronological list (which the search tool automatically shows by default) of all 1,107 game titles that were rated by the USK in 2023 (*i.e.*, those with a 2023 'Prüfdatum [testing date]'). Only 27 of those entries (2.4%) were attached with the loot box presence label, and 17 of them bore the same title as another (because the USK separately lists the rating decision for each hardware platform as an individual entry). After removing the duplicates, a list of 10 unique games that were labelled as containing loot boxes by the USK in 2023 was produced.

Three separate lists of games that each age rating organisation respectively decided contained loot boxes in 2023 were thereby produced. The lists were combined, and the rating decisions were compared against each other.

This study was preregistered (after limited data had already been collected) in the Open Science Framework at: https://doi.org/10.17605/OSF.IO/W89JE.

III. RESULTS

In 2023, amongst a list of 22 total unique titles that have been identified as containing loot boxes by at least one age rating organization, 16 games were identified as having been labelled as containing loot boxes by the ESRB; PEGI identified 14, whilst the USK identified 10, as shown in Table 1. A number of games were either not rated by certain age rating organisations at all or were only rated by an organisation prior to that organisation beginning to highlight loot box presence (*e.g.*, *WWE 2K23* (2K, 2023) was released in 2023 but was rated by the USK on 22 December 2022 under its previous rating guidelines that did not account for loot box presence), meaning that they were not rated under the current rating guidelines that consider loot boxes. In fairness to the age rating organisations,

such cases are marked 'Not rated' in Table 1 and were not treated as the organisation having failed to identify loot box presence because it either had no opportunity to do so or was not yet obliged to do so.

TABLE I.   LIST OF 22 GAMES LABELLED AS CONTAINING LOOT BOXES BY AT LEAST ONE AGE RATING ORGANISATION IN 2023

Game title	Labelled as Containing Loot Boxes by…		
	ESRB	PEGI	USK
AdventureQuest 3D	Yes	Not rated	Not rated
Blue Protocol	Yes	Not rated	Not rated
Counter-Strike 2	Not rated	Not rated	Yes
DRAGON BALL XENOVERSE 2	Yes	Not rated	Not rated
EA SPORTS FC 24	Yes	Yes	Yes
eFootball 2024	Yes	Yes	Not rated
Fallout 76 - Atlantic City	Not rated	Yes	Not rated
FINAL FANTASY VII EVER CRISIS	Yes	Yes	Not rated
Game of Goats	Not rated	Not rated	Yes
GODDESS OF VICTORY : NIKKE	Yes	Yes	Not rated
Guild Wars 2: Secrets of the Obscure	Not rated	Yes	**NO!**
Heroes vs. Hordes	Not rated	Not rated	Yes
MADDEN NFL 24	Yes	Yes	Yes
MLB® The Show™ 23	Yes	Not rated	Not rated
My Hero Ultra Rumble	Yes	Yes	Not rated
NBA 2K24	Yes	Yes	Yes
NHL 24	Yes	Yes	Yes
Port Liberty	Not rated	Not rated	Yes
Sword Art Online: Integral Factor	Yes	Yes	Yes
SYNCED	Yes	Yes	Yes
The Elder Scrolls Online Collection: Necrom	Yes	Yes	**NO!**
WWE 2K23	Yes	Yes	Not rated

Importantly, the present study identified that the USK failed to label two games, *Guild Wars 2: Secrets of the Obscure* (ArenaNet, 2023) and *The Elder Scrolls Online Collection: Necrom* (ZeniMax, 2023), as containing loot boxes despite PEGI identifying both of them as containing loot boxes and the ESRB identifying one of them as containing loot boxes (the other game was not rated by the ESRB).

PEGI should also be commended for providing additional information about the loot boxes contained in each game in their respective age rating decisions displayed through the public search tool. For example, for *Guild Wars 2: Secrets of the Obscure*, PEGI's age rating states under the 'Other issues' heading: 'This game offers players the opportunity to purchase in-game items, in the form of a currency (gems) which can be acquired via real-money transactions… These gems can be used

to purchase … a randomized reward box (the Black Lion Chest), which some parents or carers may want to be aware of. Parents, carers, or other responsible adults should check to see what is being offered before making any purchase on behalf of a child. It should be noted that the game can still be played without the need to purchase such items.' The PEGI age rating for *The Elder Scrolls Online Collection: Necrom* similarly states: 'This game offers players the opportunity to purchase in-game items, such as cosmetic items, which some parents or carers may want to be aware of. Some of these items ('Crown Crates') are randomised in nature.' Specifically identifying and naming the relevant controversial loot box product is helpful for players and parents alike. PEGI could provide even more information: such as the real-world monetary price for these mechanics; how they are accessed (*e.g.*, which part of the game world); and details of other loot boxes contained in the game. Other age rating organisations should provide similar information to better inform consumers.

In addition, it was found that the USK is seemingly giving USK 12 (*i.e.*, 'approved for children aged 12 and above') *at a minimum* to any games containing loot boxes as a matter of policy. *EA Sports FC 24* (Electronic Arts, 2023) is a continuation of the EA *FIFA* series of football simulation video games that releases a new version annually. Previous entries have always received a USK 0 rating (*i.e.*, 'approved without age restrictions'). *EA Sports FC 2024* still received only the lowest PEGI 3 ('suitable for all age groups') and ESRB E (*i.e.*, 'generally suitable for all ages') from the other two age rating organisations, thus demonstrating they are not taking loot box presence into account and only rating the game based on other content. Similarly, *Madden NFL 24* (Electronic Arts, 2023), the new annual entry to the American football simulation series, also received USK 12, whilst all previous entries only received USK 0, and the PEGI and ESRB ratings have remained the lowest 3 and E, respectively. Finally, *NBA 2K24* (2K Games, 2023) also received USK 12, whilst only getting ESRB E and PEGI 3, although the previous entry of *NBA 2K23* (2K Games, 2022) also received USK 12. The USK has published an article explaining that these sports games are receiving higher age ratings than their previous entries because of the presence of loot boxes but did not explicitly state that this is indeed the new policy [19].

A further exploratory analysis was conducted to examine the USK age ratings of games on the Google Play Store: this was done because the USK article mentioned *eFootball 2024* (Konami, 2023), which is a game that has only been rated through the IARC system and not by the USK through its own system, given that the game could not be found in the USK age rating search tool.

A list of 30 popular games marked as containing loot boxes on the Google Play Store but having a PEGI age rating lower than PEGI 12 (*i.e.*, PEGI 3 or 7) was collated from the results of previous studies. The USK age ratings that the IARC has produced for these games were recorded. As shown in Table 2, 12 of these games were rated USK 0; two were rated USK 6; 13 were rated USK 12; and three were rated USK 16. These results suggest certain more recently released games with loot boxes were also given USK 12 at a minimum under the IARC system (as applied to Germany) despite otherwise not having

controversial content. However, the application of this presumed rule did not appear to be uniform or apply retroactively to extend to all games released before 2023, at least some of which continued to have USK age ratings lower than USK 12 (*i.e.*, USK 0 or USK 6).

TABLE II.   USK and PEGI Age Ratings of 30 Google Play Store Games Labelled as Containing Loot Boxes

Game title	Age rating	
	USK	PEGI
F1 Clash - Car Racing Manager	0	3
Family Island — Farming game	0	3
Gardenscapes	0	3
Golf Clash	0	3
Hay Day	0	3
Match Masters - PvP Match 3	0	3
Merge Dragons!	0	3
Merge Mansion	0	3
MONOPOLY GO!	0	3
Seaside Escape: Merge & Story	0	3
Top Eleven Be a Soccer Manager	0	3
Township	0	3
CSR 2 - Realistic Drag Racing	6	3
Guns of Glory: Lost Island	6	7
Brawl Stars	12	7
Clash Royale	12	7
EA SPORTS FC™ 24 Companion	12	3
EA SPORTS FC™ Mobile Soccer	12	3
eFootball™ 2024	12	3
Empires & Puzzles: Match 3 RPG	12	7
Gossip Harbor®: Merge & Story	12	3
Hero Wars: Alliance	12	7
June's Journey: Hidden Objects	12	7
Lords Mobile Shrek Kingdom GO!	12	7
MARVEL SNAP	12	7
Top War: Battle Game	12	7
Whiteout Survival	12	7
Age of Origins:Tower Defense	16	7
Dice Dreams™	16	3
Evony	16	7

Communications have been sent to the USK in January 2024 asking for clarification as to whether it has indeed mistakenly failed to label two games as containing loot boxes and whether it is now USK policy to label any games with loot boxes USK 12 at a minimum. Clarification has also been sought as to the application of any German loot box-related rules under the IARC system. In March 2024, the USK has expressed that a reply will be provided in due course.

IV. DISCUSSION AND CONCLUSION

All games with loot boxes that both the ESRB and PEGI have had the opportunity to examine in 2023 were correctly labelled, thus giving us more confidence in the reliability of loot box labelling with physically released games. The USK appears to have failed to identify two games as containing loot boxes despite having the opportunity to thoroughly examine both games: it is possible that these omissions were due to both entries being an expansion pack to an original game, rather than a new release. Any further commentary must be reserved for until after the USK responds and provides its perspective.

Giving games with loot boxes a minimum age rating and suggesting that they are only suitable for teenagers and those older, but not younger children, is one potential regulatory approach that Australia and Germany have taken. This arguably reduces the amount of video game content that young children have access to: a football simulation game without loot boxes would not be objectionable. A better approach might be to ask companies to release separate versions of the game for young children and those who are older or to instead implement robust parental control features so that young children would not have access to loot boxes whilst playing the game: this means that younger children are protected from loot box harm without being deprived of video game content.

Some parents may also disagree with the decision to rate games containing loot boxes as being suitable only for teenagers, despite the game otherwise being suitable for younger children. This may reduce the confidence parents have in age ratings. The minimum age rating required in Australia of M (or not recommended for those under 15) is advisory only and can be overridden. This represents a middle-ground approach whereby the government appropriately warns parents and players about potential risks without depriving them of the right to choose and decide what is appropriate for their child or themselves.

The public through, for example, academic researchers, should continue to regularly and independently scrutinise the performances of industry self-regulators (and indeed government regulators): just because a law or a rule has been adopted does not necessarily mean that it has been correctly and consistently applied in practice for the public benefit. Continuous assessment can ensure accountability.

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Paper 9: Impacts on policymaking and corporate practice

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Opening the compliance and enforcement loot box: A retrospective on some practice and policy impacts achieved through academic research

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ARTICLE INFO

ABSTRACT

Loot boxes are gambling-like products in video games that can be purchased with real-world money to obtain random rewards. Regulations have been imposed in some jurisdictions to attempt to address potential harms. Two recent policy studies assessed companies' compliance (but more often, non-compliance) with those regulations. The first study found that a supposed 'ban' on loot boxes in Belgium was not enforced so the product remained widely accessible. A preprint reporting this was widely publicised by the media. This enhanced awareness led to companies newly complying with the law and helped policymakers to view the practicality of banning loot boxes with more due scepticism. Researchers should consider actively sharing non-peer-reviewed preprint results to protect consumers more promptly. The second study found that, contrary to regulations, many games with loot boxes were not labelled. Subsequent engagement with the media and the industry self-regulators caused remedial actions to be taken: unlabelled games have since been correctly labelled, and non-compliant companies have been punished with (albeit insignificant) fines. The societal impacts of loot box policy studies demonstrate the importance of actively communicating research results to the public through media engagement and challenging companies and regulators when they are not complying with or enforcing regulations.

1. Social impact

Loot boxes are mechanics inside video games that players can engage with to obtain random rewards. Loot boxes that require purchase with real-world money, or 'paid loot boxes,' have been the subject of significant public controversy and regulatory scrutiny due to their structural and psychological similarities to traditional gambling [1,2] and the well-replicated link between loot box purchasing and problem gambling [3–5]. Hereinafter, 'loot boxes' refers to only paid loot boxes, unless otherwise specified, and the term is inclusive of all in-game purchases with randomised elements however aesthetically portrayed [6], including social casino games [7,8(p. 22),cf 9]. Many countries are considering regulating loot boxes [10,11]. A wide range of regulatory options are available from a public health perspective [12], and a number of legal and industry self-regulatory measures have already been adopted [13,14].

One important issue is whether these imposed measures have been adequately complied with by companies against whom they apply. Compliance is one crucial aspect of effectiveness; the other being whether the measure is effective at influencing the underlying behaviour it is intended to target or, i.e., whether it has efficacy. If a measure is not well-complied with (for example, if only half of all companies are actually implementing it), then even if the measure possesses practical efficacy when applied, it cannot be said to be an effective policy. Indeed, previous research has argued that existing loot box-related industry self-regulation, such as providing a label disclosing loot box presence on the packaging, fails to assist consumers even when properly implemented [15(p. 660),16,17]. However, examining the implementation of, and compliance with, potentially practically unhelpful measures remains a valuable exercise because the insights derived from such research would assist in ensuring future measures that do actually have efficacy will be well-complied with once they are eventually invented and adopted: for

example, through building better platform-wide infrastructure and monitoring regimes to enhance compliance.

This article summarises the impacts on corporate practice and regulatory enforcement that two loot box policy studies have made after their results were published. Specific regulatory rules that have already been imposed were identified, and content analysis was conducted on video games and related marketing materials to check whether those rules have been complied with. Notably, fully according with open science principles, both studies were conducted in the registered report format, which meant that the research motivation and methodology were peer reviewed prior to data collection [18]. All underlying data, comments from reviewers, and responses to those comments and various revisions made to the manuscripts are publicly available for scrutiny.

2. Methodology

2.1. Belgian 'ban' on loot boxes

In the first study [19], I examined whether companies have complied with the 'ban' on loot boxes imposed by the Belgian gambling regulator in 2018 [20]. Even though all loot boxes were deemed to be illegal gambling in an official report that was widely publicised by the media and known to the player community [e.g., 21,22], I found that 82 of the 100 highest-grossing iPhone games were still generating revenue using in-game purchases with randomised elements in mid-2022. Policymakers in other countries, such as the Netherlands, have suggested that their country should emulate the Belgian regulatory position [23]. However, my study revealed that adopting such a restrictive position might not be practically enforceable against the millions of video games presently available and may lead to unintended negative consequences, such as giving parents a false sense of security.

2.2. Industry self-regulatory loot box warning label

In the second study [8], I assessed (i) whether the North American (ESRB; Entertainment Software Rating Board) and European (PEGI; Pan-European Game Information) video game age rating organisations accurately labelled games as containing loot boxes and (ii) whether popular games containing loot boxes listed on the Google Play Store were accurately labelled. The industry self-regulatory measure of attaching the warning label of 'In-Game Purchases (Includes Random Items)' to games containing loot boxes was introduced in 2020 [6,24]. The ESRB and PEGI independently conduct content moderation and decide whether a game should be labelled. By comparing their rating decisions against each other, I found that both have made rating mistakes (that they have since admitted to) by failing to label certain games with loot boxes as containing them. Separately, I also examined whether popular games on the Android platform containing loot boxes have been accurately labelled on the Google Play Store: 71 of 100 games failed to be attached with the warning. As part of the research process, after the initial results were found independently, I contacted the age rating organisations to seek their responses and remedial actions.

3. Results and implications

3.1. Belgian 'ban' on loot boxes

The results from the preprint of my first study was reported on by the leading video game industry media, GamesIndustry.biz, without any prompting from me because at the time I was hesitant to actively promote non-peer-reviewed, preprint results [25]. More than 50 media venues around the globe then reported on the findings in over 16 languages [e.g., 26,27]. This included work by the Belgian journalist, Timon Ramboer, who obtained an official response from the Minister of Justice admitting to the current unsatisfactory state-of-affairs [28]. The arguably viral media reporting allowed for the results to be publicised to

a wide audience of players, industry stakeholders, and policymakers.

This appears to have led to companies deciding to change their corporate behaviour and comply with the law by changing the availability of loot boxes and video games in Belgium during the month after the initial media reporting of the research results. For example, *Roblox* (Roblox Corporation, 2006) is one of the most popular games played by young people today. The company claimed in 2020 that '*over half* of US kids and teens under the age of 16 play the game' (emphasis original) [29]. However, loot boxes are sold in exchange for real-world money to children in many parts of *Roblox* [8]. There was reportedly 'a Roblox-led program to comply with laws in [...] Belgium' which led to content being removed from the Belgian version of the game [30]. Some of that content was later amended after their removal to allow for a compliant version that no longer contained illegal loot boxes to be re-released [31]. Another company 'indefinitely turned off in-app purchases in Belgium' for *Empires & Puzzles* (Small Giant Games, 2017) to ensure compliance [32]. Interestingly, when the Belgian 'ban' was initially announced in 2018, some companies quickly took compliance action back then [e.g., 33–35]. This suggests that my Belgian study, or rather the media reporting thereof, was likely responsible for causing the changes in corporate compliance behaviour in 2022, some four years too late. This also reveals that the Belgian gambling regulator might have achieved better enforcement had it more actively and widely promoted its regulatory position. For example, it might have been practicable to contact the companies behind the 500 highest-grossing games and demand compliance. Actively monitoring and enforcing the law against those games would likely have captured and prevented the vast majority of loot box spending given how video game spending is highly concentrated in the most popular games [36]. This could have been a more effective policy.

Besides impacts on commercial practice, policymakers in other countries have also taken note of the ineffectiveness of the Belgian approach as implemented and the relevant shortcomings. For example, the UK Government stated in the House of Lords that it is monitoring the 'research' in Belgium and will not blindly copy that approach without considering its practical application and effectiveness (or lack thereof) [37]. Australian policymakers similarly took this into account when recommending law reform [38(pp. 144–145, paras. 6.76–6.77)].

It is impossible to know whether the same policy and practice impacts could have been achieved without widespread media reporting of the academic results. I doubt it, which is why I encourage active engagement with journalists to allow academic knowledge to be popularised. A second issue worth considering is whether preprint results (as compared to peer-reviewed results) should be publicised. The Belgian paper was published after relatively rapid peer review in January 2023, about six months after the preprint was initially posted. Had the preprint not been posted or had the preprint results not been reported on, and assuming that the peer-reviewed publication would have received the same media treatment that the preprint in fact did, then the changes in corporate compliance behaviour would have been delayed by more than six months (this period would have been longer had the peer review process been more protracted). Consumers would have been exposed to more potential harms during that period. Similarly, the UK Government would not have had access to the results when debating the issue in Parliament in October 2022, and policymaking would have been less evidence-informed. Research in other domains has identified how preprint results do not usually change significantly following peer review [39]. The preprint results might also be reported on by journalists without any active prompting (as occurred with the Belgian paper). Active promotion of the preprint results would allow the authors to better control the narrative and provide a point of contact for journalists to resolve any misinterpretation. I decided after this experience that, henceforth, where appropriate, preprint results clearly stating that they are preliminary and subject to change following peer review should be sent to trusted journalists to allow for rapid popular dissemination.

3.2. Industry self-regulatory loot box warning label

Accordingly, following the publication of a preprint of my second study, I actively approached journalists to inform them of the results. This allowed both industry stakeholders [40] and players [41] to be promptly informed of the results and to provide comments which were incorporated into the eventual peer-reviewed publication. It cannot be known whether the age rating organisations would have communicated with me had the media not helped to publicly put them on notice. In any event, the organisations engaged with me to discuss the results. The email exchanges have been placed into the public domain [42,43]. Both organisations admitted to making mistakes, but also disputed whether they were at fault in certain cases. A number of games that have not been labelled were since corrected and duly labelled. However, notably, tens of thousands of other games with loot boxes likely remain unlabelled.

Four months following the study, PEGI has also since publicly announced that it took enforcement action by fining two companies €5000 each for failing to disclose loot box presence when applying for age ratings, which caused their respective game to not have been duly labelled [44]. This failure on the part of the companies constituted a 'serious' breach of the PEGI Code of Conduct and would have attracted a fine between €5000 to €20,000 for a first breach [45]. PEGI decided to impose the lowest possible fine within that range. Notably, *Diablo Immortal* (Blizzard Entertainment & NetEase, 2022), one of the two games fined, reportedly made over US$525 million (or about €480 million) in the year since its original release without having the required label attached [46]. Thusly, the €5000 fine represents a mere 0.001% of the revenue generated. Such an insignificant fine is unlikely to act as an effective deterrence against future non-compliance. (For context, the monetisation strategy of using loot boxes in *Diablo Immortal* was highly controversial and heavily criticised by the player community and media as 'predatory' around the game's release [47,48]. Indeed, there were widely circulated media reports of how the game would not release in Belgium in order to comply with loot box regulation prior its release elsewhere [49,50]. Therefore, PEGI should have known, even before my study results were published, that the game contained loot boxes but did not disclose that fact and taken enforcement actions more promptly without the need for external intervention.) The PEGI Code of Conduct should be updated to allow it to impose higher fines, including GDPR (General Data Protection Regulation)-type, percentage-based fines on global turnover, so that larger companies can be properly deterred. A recent resolution of the European Parliament recognised that PEGI is the trusted source for age rating information in Europe and is required by law in some countries now and proposed to consider enshrining it under EU law [51(para. 41)]. Companies would still participate in the PEGI system even if the potential fine is significantly higher and would in any case be forced to do so if a revised version of PEGI is adopted as EU law.

Interestingly, *Diablo Immortal* is a game that failed to disclose loot box presence to both PEGI and the ESRB, which is why it was labelled by neither. This actually was one of the disclosed limitations of the original study, as such games could not be identified using the adopted methodology. Other games like this may exist. When asked, the ESRB stated that it does not publicly discuss enforcement. It is therefore unknown whether the ESRB took enforcement actions. Not making this information public means that the deterrence effects of any enforcement actions that were taken (if any) have been significantly reduced.

Video game industry media (in over 60 venues and over 12 languages) has reported on the enforcement actions taken by PEGI, including highlighting how small the fines were [52,53]. This may lead to further public debate on the inefficacy of industry self-regulation and the need for stricter and more accountable regulation of loot boxes.

3.3. Use of preprints during policy consultations

These two studies' peer review and publication process, and that of at least one other academic study on loot boxes by other authors [54],

also coincided with the Australian House of Representatives Standing Committee on Social Policy and Legal Affairs' 'Inquiry into online gambling and its impacts on those experiencing gambling harm,' which considered imposing stricter regulations on loot boxes [38]. Whether reliance should be placed on preprints during policy consultations is worth further consideration. Some reflections stemming from the Australian experience are shared.

Firstly, preprint results that directly speak to a specific issue that the policymakers are considering should be duly presented to them, so as not to deprive decision-makers of relevant information. The Terms of Reference for the Inquiry specifically asked for comments on whether the legal definition of 'gambling' should be broadened in Australia to encapsulate loot boxes [38(p. xvii)], so that the national loot box regulatory position would effectively emulate that of Belgium. It would be disingenuous for any stakeholder, with knowledge, to not discuss the results of my first study showing that such an approach is unlikely to be practicable. A submission to the Inquiry by another academic team referred to my Belgian study to make the point, but it correctly clearly signified that the paper was a preprint [55(p. 7)]. Indeed, the submission by the main video game industry trade body also referred to my study because it happened to support industry interests [56(p. 11)], although it failed to highlight the then preprint nature of the results. (I also referred to my study in my own submission, although the study has already been peer-reviewed and was forthcoming in a journal by that point [57(pp. 2–6)]).

Secondly, preprint results should rightfully be referred to in response to contrary arguments. Industry stakeholders have suggested in their submission to the Inquiry that the industry self-regulatory loot box warning label allegedly 'clearly signals upfront to the consumer prior to purchase that a game contains for-purchase loot boxes' [56(p. 13)]. However, my second study clearly indicated that this was not the case as many games with loot boxes were not even implementing the measure. I therefore believed it was appropriate to refer to preprint results (as they then were and highlighted as such) in my first supplementary submission to the Inquiry to provide balance and prevent decision-makers from being misled by bare industry assertions that were not backed-up by *any* evidence (as compared to my assertions expressed through the preprint, which were at least backed-up with *some* evidence, e.g., the publicly available data that I have shared and may be independently analysed by any interested party) [58(pp. 1–3)]. This reveals how industry assertions, which are often bare (in the sense that they have not been evidenced in any way) or may potentially be based on industry-funded reports that are published on a discretionary basis, are not held to the same standards as peer-reviewed academic research but may nonetheless be relied upon by policymakers. Therefore, it is justifiable, and indeed incumbent on relevant researchers and stakeholders, to present all contrary evidence to ensure a balanced debate.

As it later transpired, all relevant preprint research referred to in the submissions were peer-reviewed and published by the time that the Inquiry report expressing the policymakers' opinions was itself published. There were no major changes to the research results, and the assertions based on the preprints all held through peer review. The industry is justified to point out to decision-makers that a certain academic study has not yet been peer-reviewed and caution against over-reliance on it, as the industry did in a previous 2018 Australian Senate inquiry concerning loot boxes [59(pp. 43–44, paras. 3.55–3.57)], even though that study did eventually pass through peer review without major amendments to its findings [3]. Similarly, any stakeholder is justified to highlight that industry assertions may be biased and caution decision-makers against over-reliance on them. Indeed, the industry has demonstrated that it is perfectly happy to ask policymakers to rely on a preprint that support its commercial interests (and failed to provide a similar caution about over-reliance) [56(p. 11)].

To conclude, if the only evidence that exists that policymakers would need is in preprint form, then it should be referred to, so as to not hide what little information there is. Further, if the preprint results are

contrary to assertions made by another stakeholder using evidence that is less robust than what an academic preprint presents (or were even made without *any* evidence), then researchers should rightfully bring the preprint results to the attention of policymakers to provide balance and prevent them from being misled. In either case and regardless of who is presenting preprint results, policymakers should be prominently informed that the preprint results have not yet been peer-reviewed and are subject to change and be warned against over-reliance.

Positionality statement

In terms of the author's personal engagement with loot boxes, he plays video games containing loot boxes, but he has never purchased any loot boxes with real-world money.

Declaration of Competing Interest

L.Y.X. was employed by LiveMe, then a subsidiary of Cheetah Mobile (NYSE:CMCM), as an in-house counsel intern from July to August 2019 in Beijing, People's Republic of China. L.Y.X. was not involved with the monetisation of video games by Cheetah Mobile or its subsidiaries. L.Y. X. undertook a brief period of voluntary work experience at Wiggin LLP (Solicitors Regulation Authority (SRA) number: 420659) in London, England in August 2022. L.Y.X. has contributed and continues to contribute to research projects that were enabled by data access provided by the video game industry, specifically Unity Technologies (NYSE:U) (October 2022 – Present). A full gifts and hospitality register-equivalent for L.Y.X. is available via: https://sites.google.com/view/leon-xiao/about/gifts-and-hospitality-register. The up-to-date version of L.Y.X.'s conflict-of-interest statement is available via: https://sites.google.com/view/leon-xiao/about/conflict-of-interest.

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