Breaking Ban: Assessing the effectiveness of Belgium's gambling law regulation of loot boxes

Leon Y. Xiao*†‡ [0000-0003-0709-0777] <lexi@itu.dk>

*: Center for Computer Games Research, IT University of Copenhagen, Rued Langgaards Vej 7, 2300 København, Denmark

†: School of Law, Queen Mary University of London, Mile End Road, London E1 4NS, United Kingdom

‡: The Honourable Society of Lincoln's Inn, Lincoln's Inn, London WC2A 3TL, United Kingdom

Abstract

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 enforcing gambling law and 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) will be assessed. Virtually no video game company should have continued to implement paid loot boxes in Belgium following the ban, particularly amongst games deemed suitable for underage children. The loot box prevalence rate in Belgium, where the ban applies, should be lower than previously observed in other Western countries where no effective loot box regulatory restrictions have been applied. The 100 highest-grossing iPhone games in Belgium will be analysed to identify their Apple Age Rating and the presence/absence of paid loot boxes. **Results:** tbd. **Conclusions**: tbd.

Keywords (10 Max):

Loot boxes; Gambling law; Video gaming regulation; Consumer protection; Belgium

Deleted: **Objective:** Paid l

Deleted: Hypotheses: Firstly

Deleted: ,

Deleted: has

Formatted: Font: Not Bold

Deleted: Secondly, the

Deleted: will

Deleted: the UK, which is a different Western European

Deleted: y

Deleted: **Method:**

Deleted: The present results will be compared to previous UK results.

1. Introduction

Paid loot boxes are randomised monetisation methods in video games that are purchased by players to obtain randomised rewards of varying value [1]. Loot boxes are prevalent in video games internationally and across different hardware platforms [2–5]. 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 [6–8] and why they have been considered 'predatory' and potentially abusive of consumers [7,9–11]. Loot boxes have also been identified as sharing certain psychological similarities with gambling [12,13]. Indeed, loot box purchasing has been found to be positively correlated with problem gambling severity in 16 studies in various countries [14,15], including the US [16,17], Canada [18], the UK [19,20], Spain [21], Germany [22], Denmark [23], Australia [16,24] and Aotearoa New Zealand [16], and internationally in general [25–31]. Specifically, players that self-reported higher scores on problem gambling severity scales tend to buy more loot boxes and the theorised implication of which is that video game companies are likely disproportionally profiting from such potentially at-risk players [32]. 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 [20]. 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 [11,33–40].

Deleted: , rather than, *e.g.*, wealthy players

The predominant regulatory approach, adopted by gambling regulators [41–45] and policymakers [46–50] 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 [10,11,38]. 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 [10,11,38]. To summarise, there are two types of paid loot boxes, *i.e.*, those that require players to pay real-world money to buy: 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 does *not* possess real-world monetary value) [1,7,10]. 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[41–44], although only the Belgian regulator has actively enforced the law[11]. In contrast, the Dutch gambling regulator also previously opined that the first type constitutes gambling [45] and has enforced the law by imposing a financial penalty on Electronic Arts for allegedly illegal loot box implementation in its *FIFA* games [51,52]; 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 boxes has been confirmed not to constitute gambling. However, as far as can be discerned, the second type constitutes gambling only under existing Belgian law [44] and Manx law [53,54] and not in other jurisdictions [11,38]. Belgium has been popularly referred to as a country that has 'banned' both types of loot boxes [55]: this is technically incorrect because the law did not change and the Belgian gambling regulator merely announced their interpretation of the law and declared an intention to enforce it by criminally prosecuting non-compliant video game companies for contravening existing gambling law [44]. Offering either type of paid loot boxes would be illegal under the gambling law of the Isle of Man unless licensed because the definition for 'money's worth' differs between Manx and UK law [53,54]; however, this paper omits further Manx law discussion because it is effectively identical to the Belgian position but practically it appears that video game companies simply treats 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

Deleted: ost, if not all,

Deleted:

Deleted: [51]

Deleted: [45]

[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].

recognises as the correct legal interpretation [10,11,38], even though video game companies have expressed their disagreement with this interpretation [56–58] but have not attempted to appeal it), a number of prominent video games companies have reported either disabling player's ability to purchase both types of loot boxes in Belgium [56–58] 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 [59]. 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 Belgium 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 [11]. The Belgian ban has arguably infringed upon the freedom and right to choose of players who would never have been harmed [60]. 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 [3,61]. Researchers have also suggested restricting loot box sales only to a certain extent by limiting player's spending on loot boxes to a 'reasonable' amount, *e.g.*, US$50 [62,63], and designing more 'ethical' loot boxes that players are less likely to overspend on [61,64,65].

Deleted: .

Deleted: T

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 [47,49], and this is presently being considered by the UK Government [66]. 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 [67] and by a Bill that an Australian Member of Parliament intended to propose [68] 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 confirmed by the Belgian Gaming Commission [44]) revealed that a number of games, which were found to contain loot boxes in the UK [4,5] and in the People's Republic of China [3] and whose revenue likely mostly derived from loot box sales, occupy prominent positions on the top-grossing list. 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 has been known to have been granted to video game companies).

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 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 [69]. 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, for example, 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 [70] and where video game companies have reportedly taken dedicated, national compliance action [56–59].

Secondly, the legal position in relation to loot boxes in the Netherlands changed in March 2022 [71]. 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[51,52]). 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 boxes are confirmed to be generally lawful [71]. 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 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 [10,11,38]. 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 [4], 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 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 [56], 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 [72].

Deleted: although
Formatted: Font: Italic
Deleted: its
Deleted: ,
Deleted:
Formatted: Font: Italic
Deleted: ,
Deleted: s
Deleted: can
Deleted: means
Deleted: should
Deleted: is
Deleted: be
Deleted: is
Deleted: s
Deleted: s

Therefore, a survey replicating the methodology of previous loot box prevalence studies [3–5] will be 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') [44] 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 will be attempted: specifically, UK version of certain games that are known to contain paid loot boxes will be downloaded and loot box purchasing using those games within geographical and jurisdictional Belgium will be attempted.

The following research questions will be addressed.

Research Question 1: Has the Belgian ban on paid loot boxes been effective, such that virtually no Belgian video games contain paid loot boxes?

Research Question 2: Has the Belgian ban on paid loot boxes been effective, such that virtually no Belgian video games deemed suitable for children contain paid loot boxes?

Research Question 3: Has the Belgian ban on paid loot boxes been effective, such that the prevalence rate of paid loot boxes in Belgium is different from that of another Western country which has not restricted loot box sales?

Research Question 4: How effective has the Belgian ban on paid loot boxes been at reducing the prevalence rate of paid loot boxes in Belgium?

Research Question 5: Is it possible for a player to circumvent the Belgian ban on paid loot boxes and purchase them from within the country?

The following hypotheses will be preregistered at <[OSF registry link]>.

Hypothesis 1: More than two of the 100 highest-grossing iPhone games in Belgium will contain paid loot boxes.

Deleted: None

Hypothesis 2: More than two of 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.

Deleted: None

Hypothesis 3: Of the 100 highest-grossing iPhone games, the percentage that will contain paid loot boxes in Belgium will be significantly different from the percentage of a hypothetical Western country that has not restricted loot box sales.

Deleted: Fewer highest-grossing iPhone games will contain paid loot boxes in Belgium than in the UK.

Hypothesis 4: The paid loot box prevalence rate amongst the 100 highest-grossing iPhone games in Belgium will be lower than 50%.

Hypothesis 5: The paid loot box prevalence rate amongst the 100 highest-grossing iPhone games in Belgium will be lower than 25%.

Hypothesis 6: The UK version of three games (*Hearthstone*, *Brawl Stars*, and *Genshin Impact*) known to contain paid loot boxes in the UK and/or China will continue to offer them for sale even when the phone is within geographical and jurisdictional Belgium.

Deleted: 4

Put plainly, Hypotheses 1 and 2 mean that a Belgian loot box prevalence rate of less than or equal to 2% will be found amongst all games studied and amongst those games studied that were deemed suitable for underage players, respectively. The rate of 2% was chosen instead of 0% to provide type 1 error control. 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 will be 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, will be sought and, a summary will be made available at the data deposit link (<[OSF deposit

Deleted: 0

Deleted: T

link]>). Hypothesis 2 is included because the Commission may not respond: 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.

The 100 highest-grossing games will be chosen to form the sample for Hypotheses 1–3, following the methodology of previous studies [3–5] 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 [73]. 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 will be recognised in the Discussion section); however, the 100 highest-grossing games do represent the most objective and reasonably practicable sample[3,5]. For Hypothesis 3 in particular, a sample size of 100 games will allow for the present study to be directly comparable to the Zendle *et al.* (2020) [4], the Xiao *et al.* (2021) [3], and the Xiao *et al.* (2021) [5] 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 Hypothesis 6, the sample size will be limited to three games due to practical constraints on research resources: as detailed below, these three highly popular games, in which paid loot boxes are central to both gameplay and monetisation, will be chosen to represent how companies from three different regions of the world might have taken technological steps to comply with Belgian law.

The contribution from the present study also has wider implications to other regulatory domains because it empirically examines and assesses companies'

Deleted: summarily reported in the Discussion section

Deleted: .

Deleted: in the UK

Deleted: 4

compliance with criminal law, specifically in relation to the challenging regulation of novel technologies and new mediums: 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 (cryptocurrency) gambling websites (whose relative popularity and financial performance are more difficult to measure and compare).

2. Method

Replicating the established methodology of Xiao *et al.* (2021) [3] 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 [Day] [Month] 2022 as reported by App Annie (since rebranded to data.ai), an authoritative independent analytics company, will be selected to form the sample. If a game on the captured list is (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 *et al.* (2021) [3]), then it will be 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 will be coded.

Deleted: A priori power analysis using G*Power has determined, given an α value of .05, that even assuming, randomly, 50% of Belgian video games contain paid loot boxes (because the variable is binary): a sample of only 35 games would achieve 0.95 power for finding a statically significant difference between the Belgian and the UK prevalence rates (see Fig. A1); a sample of 100 games achieves over 0.99 power (see Fig. A2) [73].

The Country/Region setting of the Apple ID that will be used on the coder's iPhone will be set to Belgium to ensure that the Apple App Store that loads is the Belgian Apple App Store. This guarantees that the game that will be downloaded from then on will be the Belgian version of the game specifically uploaded to and made available on the Belgian Apple App Store (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 will physically travel to Belgium to ensure that they are within the Belgian geographical and legal jurisdiction when conducting the data collection. This is 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 they are not physically within the country), even if they are playing the Belgian version of the game downloaded from the Belgian Apple App Store.

The following variables will be measured:

Apple age rating
This variable will be 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' will be defined as being either an Embedded-Isolated random reward mechanism or an Embedded-Embedded random reward mechanism, as defined by Nielsen & Grabarczyk (2019) [7]. An amendment must be made to the methodology of Xiao *et al.* (2021) [3], 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 they observe were captured from a Belgian version of the game. Only by playing a Belgian version of the game can the coder be confident that they are 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 will spend up to an hour playing the video game instead. If a paid loot box cannot be identified within that timeframe, then the game will be coded as not containing paid loot boxes.

This design decision may cause the Belgian loot box prevalence rate that will be 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 *et al.* (2021), 95.4% of games were coded through gameplay and *only* 4.6% of games had to be coded through internet browsing, so the potential bias caused by coding games that must be coded through internet browsing as not containing loot boxes would be

very minor [5]. 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 [3,5]) 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* or *Roblox*, that contains a significant amount of third-party user-generated content is included in the sample, then that game will be 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 will be 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 published [74].

Deleted: ,

Deleted: unless

Finally, it is noted that the coder will only access and screenshot the loot box purchase screen and the Apple App Store payment pop-up screen for the paid loot box. The coder will not go through with the transaction by paying real-world money in exchange for paid loot boxes and confirm that the sale will 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, will possess the knowledge that the relevant video game company likely

does not have a gambling licence and therefore would arguably be committing a crime if they 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 will be used by Belgium at the data collection period), on and at which paid loot boxes were searched for will be recorded.

Two previous studies, whose methodology the present study is replicating, calculated for inter-rater reliability by dual-coding 15% of the sample [3,5]. The methodology has therefore been previously refined and been found to be reliable (near-perfect or perfect agreement was achieved). Therefore, the present study will 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 will be available via <[OSF deposit link]> for public scrutiny.

Hypothesis 1 will be rejected if more than two of the 100 highest-grossing games that will be coded contain paid loot boxes.

Hypothesis 2 will be rejected if more than two of the games, within the 100 highest-grossing games that will be coded, that received an Apple Age Rating of 4+, 9+, or 12+ (*i.e.*, *not* 17+) contain paid loot boxes.

Hypothesis 3 will be tested using a binomial test (two-sided test, $p = .05$) to identify whether the percentage of the 100 highest-grossing iPhone games containing loot boxes in Belgium that will be found by the present study will be 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. Then, if a significant difference is found and the Belgian loot box prevalence rate is numerically lower than 65.0%, a binomial test (one-sided test, $p = .05$) will be used to identify whether the Belgian rate is significantly lower than 65.0%. Alternatively, if a significant difference is found and the Belgian loot box prevalence rate is numerically higher than 65.0%, a binomial test (one-sided test, $p = .05$) will be used to identify whether the Belgian rate is significantly higher than 65.0%.

Deleted: any one

Deleted: any one

Deleted: one

Deleted: tailed

Deleted: lower

Deleted: than

Deleted: the August 2021 UK iPhone paid

Deleted: 77

Deleted: found by Xiao *et al.* (2021) [5]

Formatted: Font: Italic

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%[4]; 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%[2]; Xiao *et al.* (2021) found the Chinese iPhone loot box prevalence rate amongst the 100 highest-grossing games in June 2020 to be 91.0% [3]; and Xiao et al. (2021) found the UK iPhone loot box prevalence rate amongst the 100 highest-grossing games in June 2021 to be 77.0% [5]. 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 will assess) tend to contain more loot boxes[4]; 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.'s 2019 UK data with Xiao et al.'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 [75]. Xiao et al.'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 et al. UK 77.0% value, will be 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, based on intuition, it is proposed that a reduction from the abovementioned hypothetical 65.0% loot box

Deleted:

prevalence rate to 50.0% or lower in Belgium would justify a law researcher to argue in favour of the Belgian Gaming Commission's regulatory enforcement actions as having been effective at providing improved consumer protection in comparison to other countries that have taken no regulatory actions. 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 Fig. A1)[76].

If a statistically significant difference is found, then Hypothesis 3 is confirmed. As to interpretation, if the Belgian value is significantly different from and significantly lower than 65.0%, then the present study will conclude 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 will then recommend 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 will be put by the present study depends on the results of Hypotheses 4 and 5, as detailed below. In contrast, if the Belgian value is significantly different from and significantly higher than 65.0%, then the present study will conclude that the Belgian ban has been ineffective, noting the same abovementioned limitations. The present study will then caution against other countries' policymakers and regulators from making the assumption that a loot box ban will necessarily be effective, and conclude that the Belgian measure was likely ineffective and 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 will also be made. However, if no significant difference is found, then the present study will state 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 will be discussed.

Formatted: Font: Italic

Deleted: :

Formatted: Font: Italic

Deleted: two

Deleted: (August 2021 for Xiao *et al.* (2021) [5] compared to when the present study will be conducted [month year])

Deleted: If the Belgian paid loot box prevalence rate that will be found is statistically significant *and* equal to or lower than 40%, then the present study will additionally conclude that there is a stronger case supporting the proposition that the Belgian 'ban' is effective at reducing paid loot box prevalence, but that this would still be subject to the aforementioned limitations. …

Deleted: conclude

Deleted: '

Deleted: '

Deleted: did not appear to

Deleted: disconfirming

Deleted: The present study will then conclude that the measure is likely ineffective and should not be adopted by other countries unless effective enforcement can be guaranteed. Further, reasoned criticism of the apparent lack of enforcement actions by the Belgian Gaming Commission will also be made.

Hypothesis 4 will be tested using a binomial test (one-sided test, $p = .05$) to identify whether the Belgian loot box prevalence rate that will be found by the present study will be significantly lower than 50.0%.

Hypothesis 5 will be tested using a binomial test (one-sided test, $p = .05$) to identify whether the Belgian loot box prevalence rate that will be found by the present study will be significantly lower than 25.0%.

One-sided tests are appropriate for Hypotheses 4 and 5 because Research Question 4 is only concerned with the possibility of the Belgian loot box prevalence rate having been reduced by the ban and to what degree that reduction has been. Assuming the loot box prevalence rate in Belgium to be 2%, in line with Hypotheses 1 and 2, a priori power analyses using G*Power have determined, given an α value of .05 and setting the Hedges' g to −.48 for Hypothesis 4 and −.23 for Hypothesis 5: the present sample of 100 games would achieve .99 power in a one-sided test for finding a statistically significant difference for both tests (see Figs. A2 and A3) [76]. These two tests will only be run and reported if the Belgian loot box prevalence rate that will be found by the present study is significantly lower than 65.0% (as will be determined through Hypothesis 3) and numerically lower than 50.0% and 25.0%, respectively. The 50.0% and 25.0% values were chosen based on intuition, due to the absence of any guidance on what reduction would objectively be deemed in law as 'effective' or 'particularly effective.'

Hypothesis 4 is confirmed, if a statistically significant difference is found. The interpretation will be that the measure has been effective at reducing paid loot box prevalence in Belgium. If no significant result is found, then the interpretation will proceed on the basis that the loot box prevalence rate was significantly lower than 65.0%.

Hypothesis 5 is confirmed, if a statistically significant difference is found. The interpretation will be that the measure has been *very* effective at reducing paid loot box prevalence in Belgium. If no significant result is found, then the interpretation will proceed on the basis that the loot box prevalence rate was significantly lower than 50.0%.

For Hypothesis 6, firstly, the coder will arrive 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.. 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). 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 will be chosen to replace that game. With the Country/Region setting of the Apple ID initially set to the UK, the coder will then attempt 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 will be changed from the UK to Belgium, and the coding process will be repeated. Thusly, the two potential possibilities of setting the phone's geographic location to either Belgium or a non-Belgian country will be tested. Subsequently, the three games will be deleted from the iPhone. Secondly, whilst within geographical and jurisdictional Belgium, the coder will change 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 will attempt to access the loot box purchase 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 will be 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.

Deleted: 4

Deleted: s

Deleted: T

In accordance with the *Danish Code of Conduct for Research Integrity*[77], 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 are involved and only publicly available information is examined and recorded.

Formatted: Font: Italic

Deleted: No ethics

Deleted: will be required

Deleted: the

Deleted: present study examines and records

3. Results

tbd

4. Discussion

tbd

5. Conclusion

tbd

Acknowledgement

Thanks to Rune Kristian Lundedal Nielsen for helpful comments on earlier drafts of this manuscript. Thanks to David Zendle for inspiring this study. Thanks to Veli-Matti Karhulahti, Andrew Moshirnia, Joseph Macey, and Jason Chin for valuable feedback during the review process.

References

1. Xiao, L. Y., Henderson, L. L., Nielsen, R. K. L., Grabarczyk, P., & Newall, P. W. S. (2021). Loot Boxes, Gambling-Like Mechanics in Video Games. In N. Lee (Ed.), *Encyclopedia of Computer Graphics and Games*. Springer.
2. Rockloff, M., Russell, A. M., Greer, N. M., Lole, L. R., Hing, N., & Browne, M. (2020). *Loot Boxes: Are they grooming youth for gambling?* Central Queensland University. https://doi.org/10.25946/5ef151ac1ce6f
3. Xiao, L. Y., Henderson, L. L., Yang, Y., & Newall, P. W. S. (2021). Gaming the system: Suboptimal compliance with loot box probability disclosure regulations in China. *Behavioural Public Policy*, *Advance Online Publication*, 1–27. https://doi.org/10.1017/bpp.2021.23
4. Zendle, D., Meyer, R., Cairns, P., Waters, S., & Ballou, N. (2020). The prevalence of loot boxes in mobile and desktop games. *Addiction*, *115*(9), 1768–1772. https://doi.org/10.1111/add.14973
5. Xiao, L. Y., Henderson, L. L., & Newall, P. (2021). What are the odds? Lower compliance with Western loot box probability disclosure industry self-regulation than Chinese legal regulation. In *OSF Preprints*. https://doi.org/10.31219/osf.io/g5wd9
6. Drummond, A., & Sauer, J. D. (2018). Video Game Loot Boxes Are Psychologically Akin to Gambling. *Nature Human Behaviour*, *2*(8), 530–532. https://doi.org/10.1038/s41562-018-0360-1
7. Nielsen, R. K. L., & Grabarczyk, P. (2019). Are Loot Boxes Gambling? Random Reward Mechanisms in Video Games. *Transactions of the Digital Games Research Association*, *4*(3), 171–207. https://doi.org/10.26503/todigra.v4i3.104
8. Xiao, L. Y. (2021). Conceptualising the Loot Box Transaction as a Gamble Between the Purchasing Player and the Video Game Company. *International Journal of Mental Health and Addiction*, *19*(6), 2355–2357. https://doi.org/10.1007/s11469-020-00328-7
9. King, D. L., & Delfabbro, P. H. (2018). Predatory Monetization Schemes in Video Games (e.g. 'Loot Boxes') and Internet Gaming Disorder. *Addiction*, *113*(11), 1967–1969. https://doi.org/10.1111/add.14286
10. Xiao, L. Y. (2022). Which Implementations of Loot Boxes Constitute Gambling? A UK Legal Perspective on the Potential Harms of Random Reward Mechanisms. *International Journal of Mental Health and Addiction*, *20*(1), 437–454. https://doi.org/10.1007/s11469-020-00372-3
11. Xiao, L. Y. (2021). Regulating Loot Boxes as Gambling? Towards a Combined Legal and Self-Regulatory Consumer Protection Approach. *Interactive Entertainment Law Review*, *4*(1), 27–47. https://doi.org/10.4337/ielr.2021.01.02
12. DeCamp, W. (2020). Loot Boxes and Gambling: Similarities and Dissimilarities in Risk and Protective Factors. *Journal of Gambling Studies*, *Advance online publication*. https://doi.org/10.1007/s10899-020-09957-y
13. Larche, C. J., Chini, K., Lee, C., Dixon, M. J., & Fernandes, M. (2021). Rare Loot Box Rewards Trigger Larger Arousal and Reward Responses, and Greater Urge to Open More Loot Boxes. *Journal of Gambling Studies*, *37*, 141–163. https://doi.org/10.1007/s10899-019-09913-5
14. Garea, S. S., Drummond, A., Sauer, J. D., Hall, L. C., & Williams, M. N. (2021). Meta-analysis of the relationship between problem gambling, excessive gaming and loot box spending. *International Gambling Studies*, *Advance Online Publication*, 1–20. https://doi.org/10.1080/14459795.2021.1914705
15. Spicer, S. G., Nicklin, L. L., Uther, M., Lloyd, J., Lloyd, H., & Close, J. (2021). Loot boxes, problem gambling and problem video gaming: A systematic review

and meta-synthesis. *New Media & Society*, 14614448211027176. https://doi.org/10.1177/14614448211027175
16. Drummond, A., Sauer, J. D., Ferguson, C. J., & Hall, L. C. (2020). The relationship between problem gambling, excessive gaming, psychological distress and spending on loot boxes in Aotearoa New Zealand, Australia, and the United States—A cross-national survey. *PLOS ONE*, *15*(3), e0230378. https://doi.org/10.1371/journal.pone.0230378
17. Zendle, D., & Cairns, P. (2019). Loot boxes are again linked to problem gambling: Results of a replication study. *PLOS ONE*, *14*(3), e0213194. https://doi.org/10.1371/journal.pone.0213194
18. Brooks, G. A., & Clark, L. (2019). Associations between loot box use, problematic gaming and gambling, and gambling-related cognitions. *Addictive Behaviors*, *96*, 26–34. https://doi.org/10.1016/j.addbeh.2019.04.009
19. Zendle, D. (2019). *Gambling-like video game practices: A cross-sectional study of links with problem gambling and disordered gaming*. PsyArXiv. https://doi.org/10.31234/osf.io/fh3vx
20. Wardle, H., & Zendle, D. (2021). Loot Boxes, Gambling, and Problem Gambling Among Young People: Results from a Cross-Sectional Online Survey. *Cyberpsychology, Behavior, and Social Networking*, *24*(4), 267–274. https://doi.org/10.1089/cyber.2020.0299
21. González-Cabrera, J., Basterra-González, A., Montiel, I., Calvete, E., Pontes, H. M., & Machimbarrena, J. M. (2021). Loot boxes in Spanish adolescents and young adults: Relationship with internet gaming disorder and online gambling disorder. *Computers in Human Behavior*, 107012. https://doi.org/10.1016/j.chb.2021.107012
22. von Meduna, M., Steinmetz, F., Ante, L., Reynolds, J., & Fiedler, I. (2020). Loot boxes are gambling-like elements in video games with harmful potential: Results from a large-scale population survey. *Technology in Society*, *63*, 101395. https://doi.org/10.1016/j.techsoc.2020.101395
23. Kristiansen, S., & Severin, M. C. (2019). Loot box engagement and problem gambling among adolescent gamers: Findings from a national survey. *Addictive Behaviors*, *103*, 106254. https://doi.org/10.1016/j.addbeh.2019.106254
24. Rockloff, M., Russell, A. M. T., Greer, N., Lole, L., Hing, N., & Browne, M. (2021). Young people who purchase loot boxes are more likely to have gambling problems: An online survey of adolescents and young adults living in NSW Australia. *Journal of Behavioral Addictions*, *Advance Online Publication*. https://doi.org/10.1556/2006.2021.00007
25. Hall, L. C., Drummond, A., Sauer, J. D., & Ferguson, C. J. (2021). Effects of self-isolation and quarantine on loot box spending and excessive gaming—Results of a natural experiment. *PeerJ*, *9*, e10705. https://doi.org/10.7717/peerj.10705
26. Macey, J., & Hamari, J. (2019). eSports, Skins and Loot Boxes: Participants, Practices and Problematic Behaviour Associated With Emergent Forms of Gambling. *New Media & Society*, *21*(1), 20–41. https://doi.org/10.1177/1461444818786216
27. Zendle, D. (2019). Problem gamblers spend less money when loot boxes are removed from a game: A before and after study of Heroes of the Storm. *PeerJ*, *7*, e7700. https://doi.org/10.7717/peerj.7700
28. Zendle, D., Cairns, P., Barnett, H., & McCall, C. (2019). Paying for loot boxes is linked to problem gambling, regardless of specific features like cash-out and pay-to-win. *Computers in Human Behavior*, *102*, 181–191. https://doi.org/10.1016/j.chb.2019.07.003

29. Zendle, D., Meyer, R., & Over, H. (2019). Adolescents and loot boxes: Links with problem gambling and motivations for purchase. *Royal Society Open Science*, *6*, 190049. https://doi.org/10.1098/rsos.190049
30. Zendle, D., & Cairns, P. (2018). Video game loot boxes are linked to problem gambling: Results of a large-scale survey. *PLOS ONE*, *13*(11), e0206767. https://doi.org/10.1371/journal.pone.0206767
31. Li, W., Mills, D., & Nower, L. (2019). The Relationship of Loot Box Purchases to Problem Video Gaming and Problem Gambling. *Addictive Behaviors*, *97*, 27–34. https://doi.org/10.1016/j.addbeh.2019.05.016
32. Close, J., Spicer, S. G., Nicklin, L. L., Uther, M., Lloyd, J., & Lloyd, H. (2021). Secondary analysis of loot box data: Are high-spending "whales" wealthy gamers or problem gamblers? *Addictive Behaviors*, *117*, 106851. https://doi.org/10.1016/j.addbeh.2021.106851
33. Moshirnia, A. (2018). Precious and Worthless: A Comparative Perspective on Loot Boxes and Gambling. *Minnesota Journal of Law, Science & Technology*, *20*(1), 77–114.
34. Schwiddessen, S., & Karius, P. (2018). Watch Your Loot Boxes! – Recent Developments and Legal Assessment in Selected Key Jurisdictions From a Gambling Law Perspective. *Interactive Entertainment Law Review*, *1*(1), 17–43. https://doi.org/10.4337/ielr.2018.01.02
35. Castillo, D. J. (2019). Unpacking the Loot Box: How Gaming's Latest Monetization System Flirts with Traditional Gambling Methods. *Santa Clara Law Review*, *59*(1), 165–202.
36. Hong, E. (2019). Loot Boxes: Gambling for the Next Generation. *Western State Law Review*, *46*(1), 61–84.
37. Liu, K. (2019). A Global Analysis into Loot Boxes: Is It 'Virtually' Gambling? *Washington International Law Journal*, *28*(3), 763–800.
38. Cerulli-Harms, A., Münsch, M., Thorun, C., Michaelsen, F., & Hausemer, P. (2020). *Loot boxes in online games and their effect on consumers, in particular young consumers* (PE 652.727). Policy Department for Economic, Scientific and Quality of Life Policies (EU). https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652727/IPOL_STU(2020)652727_EN.pdf
39. Harvey, D. J. (2021). Should loot boxes be considered gambling or can Self-Regulation and Corporate Social Responsibility solve the loot box issue? A review of current UK law and international legislation. *Interactive Entertainment Law Review*, *4*(1), 48–62. https://doi.org/10.4337/ielr.2021.01.03
40. Honer, P. (2021). Limiting the loot box: Overview and difficulties of a common EU response. *Interactive Entertainment Law Review*, *4*(1), 63–83. https://doi.org/10.4337/ielr.2021.01.04
41. Spillemyndigheden [Danish Gambling Authority]. (2017, November 29). *Statement about loot boxes / loot crates*. https://www.spillemyndigheden.dk/en/news/statement-about-loot-boxes-loot-crates
42. UK Gambling Commission. (2017). *Virtual Currencies, eSports and Social Gaming—Position Paper*. https://web.archive.org/web/20210111075348/http://www.gamblingcommission.gov.uk/PDF/Virtual-currencies-eSports-and-social-casino-gaming.pdf
43. Autorité de regulation des jeux en ligne (ARJEL) [Regulatory Authority for Online Games (France)]. (2018). *Rapport d'activité 2017-2018 [Activity Report 2017-2018]*.

https://web.archive.org/web/20200414184944/http://www.arjel.fr/IMG/pdf/rapport-activite-2017.pdf
44. Belgische Kansspelcommissie [Belgian Gaming Commission]. (2018). *Onderzoeksrapport loot boxen [Research Report on Loot Boxes]*. https://www.gamingcommission.be/opencms/export/sites/default/jhkswebb_nl/documents/onderzoeksrapport-loot-boxen-final-publicatie.pdf
45. Kansspelautoriteit [The Netherlands Gambling Authority]. (2018). *Onderzoek naar loot boxes: Een buit of een last? [Study into Loot Boxes: A Treasure or a Burden?]*. https://web.archive.org/web/20190503232356/https://kansspelautoriteit.nl/publish/library/6/onderzoek_naar_loot_boxes_-_een_buit_of_een_last_-_nl.pdf
46. Parliament of the Commonwealth of Australia Senate Environment and Communications References Committee. (2018). *Gaming Micro-Transactions for Chance-based Items*. https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Gamingmicro-transactions/Report
47. Digital, Culture, Media and Sport Committee of the House of Commons (UK). (2019). *Immersive and Addictive Technologies: Fifteenth Report of Session 2017–19* (HC 1846). https://web.archive.org/web/20210609191037/https://publications.parliament.uk/pa/cm201719/cmselect/cmcumeds/1846/1846.pdf
48. Federal Trade Commission (US). (2019, August 7). *Inside the Game: Unlocking the Consumer Issues Surrounding Loot Boxes*. Public Workshop, Washington, DC, US. www.ftc.gov/news-events/events-calendar/inside-game-unlocking-consumer-issues-surrounding-loot-boxes
49. Select Committee on the Social and Economic Impact of the Gambling Industry of the House of Lords (UK). (2020). *Report of Session 2019–21: Gambling Harm—Time for Action* (HL Paper 79). https://web.archive.org/web/20200702195336/https://publications.parliament.uk/pa/ld5801/ldselect/ldgamb/79/79.pdf
50. Parliament of the Commonwealth of Australia House of Representatives Standing Committee on Social Policy and Legal Affairs. (2020). *Protecting the age of innocence: Report of the inquiry into age verification for online wagering and online pornography*. https://www.aph.gov.au/Parliamentary_Business/Committees/House/Social_Policy_and_Legal_Affairs/Onlineageverification/Report
51. *Electronic Arts Inc & Electronic Arts Swiss Sàrl v Kansspelautoriteit (2020) Rechtbank Den Haag [District Court of The Hague]*. (2020, October 15). https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RBDHA:2020:10428
52. Kansspelautoriteit [The Netherlands Gambling Authority]. (2020, October 29). *Imposition of an order subject to a penalty on Electronic Arts for FIFA video game*. https://web.archive.org/web/20201127222346/https://kansspelautoriteit.nl/nieuws/nieuwsberichten/2020/oktober/imposition-an-order/
53. Hood, V. (2017, October 20). What the UK can learn from the Far East's battle with loot boxes. *Eurogamer*. https://www.eurogamer.net/articles/2017-10-19-what-the-uk-can-learn-from-the-far-easts-battle-with-loot-boxes
54. Isle of Man Gambling Supervision Commission. (2017, January 4). *Guidance for Online Gambling (Amendments) Regulations 2016*. https://www.gov.im/media/1355106/guidance-for-online-gambling-amendments-regulations-2016.pdf

55. BBC. (2019, September 12). Gaming loot boxes: What happened when Belgium banned them? *BBC News*. https://www.bbc.com/news/newsbeat-49674333
56. 2K Games. (2018). *Statement Belgium*. 2K Games Official Website. https://www.2k.com/myteaminfo/be/
57. Blizzard Entertainment. (2018, August 27). *Paid Loot Boxes and Loot Chests Disabled for Players in Belgium*. Official Overwatch Forums. https://eu.forums.blizzard.com/en/overwatch/t/paid-loot-boxes-and-loot-chests-disabled-for-players-in-belgium/8139
58. Electronic Arts. (2019, January 29). *FIFA Points in Belgium*. Electronic Arts Official Website. https://www.ea.com/en-ca/news/fifa-points-belgium
59. Nintendo. (2019, May 21). *Belangrijke informatie voor gebruikers in België [Important Information for Users in Belgium]*. Nintendo Belgium. https://www.nintendo.be/nl/Nieuws/2019/mei/Belangrijke-informatie-voor-gebruikers-in-Belgie-1561911.html
60. Xiao, L. Y. (2021). Reserve Your Judgment on "Draconian" Chinese Video Gaming Restrictions on Children. In *OSF Preprints*. https://doi.org/10.31219/osf.io/4583f
61. Xiao, L. Y., & Newall, P. W. S. (2021). *Probability disclosures are not enough: Reducing loot box reward complexity as a part of ethical video game design*. PsyArXiv. https://doi.org/10.31234/osf.io/nuksd
62. Drummond, A., Sauer, J. D., & Hall, L. C. (2019). Loot Box Limit-setting: A Potential Policy to Protect Video Game Users With Gambling Problems? *Addiction*, *114*(5), 935–936. https://doi.org/10.1111/add.14583
63. King, D. L., & Delfabbro, P. H. (2019). Loot Box Limit-setting is Not Sufficient on Its Own to Prevent Players From Overspending: A Reply to Drummond, Sauer & Hall. *Addiction*, *114*(7), 1324–1325. https://doi.org/10.1111/add.14628
64. King, D. L., & Delfabbro, P. H. (2019). Video Game Monetization (e.g., 'Loot Boxes'): A Blueprint for Practical Social Responsibility Measures. *International Journal of Mental Health and Addiction*, *17*(1), 166–179. https://doi.org/10.1007/s11469-018-0009-3
65. Xiao, L. Y., & Henderson, L. L. (2021). Towards an Ethical Game Design Solution to Loot Boxes: A Commentary on King and Delfabbro. *International Journal of Mental Health and Addiction*, *19*(1), 177–192. https://doi.org/10.1007/s11469-019-00164-4
66. Department for Digital, Culture, Media & Sport (UK). (2020). *Loot Boxes in Video Games: Call for Evidence*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/920393/Loot_Box_Call_for_Evidence_Document_.pdf
67. Xiao, L. Y. (2021). *Drafting Video Game Loot Box Regulation for Dummies: A Chinese Lesson*. https://doi.org/10.31219/osf.io/b6x97
68. Rousseau, J. (2021, July 12). *Australian legislator to propose loot box law*. GamesIndustry.Biz. https://www.gamesindustry.biz/articles/2021-07-12-australia-proposes-loot-box-law
69. Economic Affairs Division of the Cabinet Office (Isle of Man). (2017, March). *2016 Isle of Man Census Report GD 2017/004*. https://www.gov.im/media/1355784/2016-isle-of-man-census-report.pdf
70. Belgian Federal Government. (2021, June 16). *Structure of the Population*. STATBEL Belgium In Figures. https://statbel.fgov.be/en/themes/population/structure-population

71. Abteilung Verwaltungsrechtsprechung Raad van State [Administrative Jurisdiction Division of the Council of State (The Netherlands)]. (2022, March 9). *Uitspraak [Ruling] 202005769/1/A3, ECLI:NL:RVS:2022:690 (9 March 2022)*. Raad van State; Raad van State. https://www.raadvanstate.nl/actueel/nieuws/@130150/202005769-1-a3/
72. 2K Games. (2018). *Statement Netherlands*. 2K Games Official Website. https://www.2k.com/myteaminfo/nl/
73. Chapple, C. (2021, June). *The Top 100 Mobile Games Accounted For 64% of U.S. Player Spending in 2020*. Sensor Tower. https://sensortower.com/blog/mobile-game-revenue-share-analysis-2021
74. Roblox Corporation. (2019, July 9). *Guidelines around users paying for random virtual items*. https://web.archive.org/web/20210713091731/https://devforum.roblox.com/t/guidelines-around-users-paying-for-random-virtual-items/307189
75. Xiao, L. Y., Henderson, L. L., & Newall, P. W. S. (n.d.). Loot boxes are more prevalent in United Kingdom video games than previously considered: Updating Zendle et al. (2020). *Addiction*, *n/a*(n/a). https://doi.org/10.1111/add.15829
76. Buchner, A., Erdfelder, E., Faul, F., & Lang, A.-G. (2020). *Universität Düsseldorf: G*Power*. https://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-psychologie-und-arbeitspsychologie/gpower
77. Ministry of Higher Education and Science (Denmark). (2014). *Danish Code of Conduct for Research Integrity*. https://ufm.dk/en/publications/2014/the-danish-code-of-conduct-for-research-integrity

Appendix 1: A priori Power Analysis

Deleted:

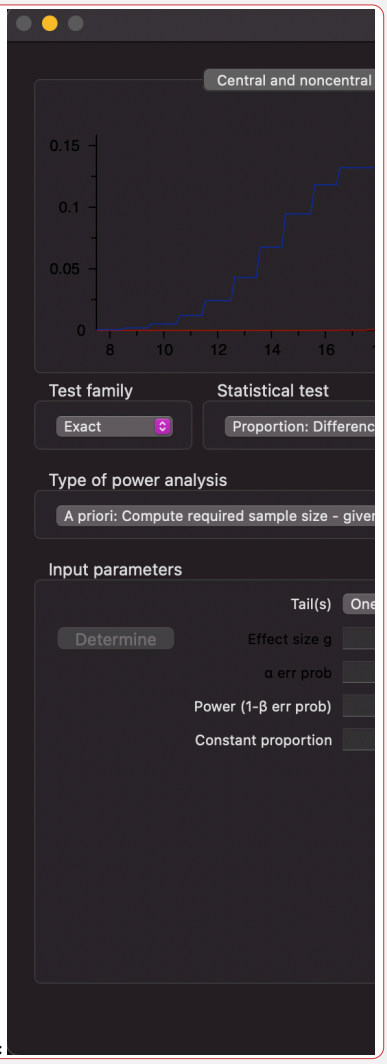

Fig. A1: A priori power analysis for Hypothesis 3 using G*Power, given an α value of .05 and assuming an effect size of Hedges' $g = -.15$, A sample size of 100 games achieves .86 power.

Deleted: 0

Deleted: 27

Deleted: , which is derived from the difference between the Xiao et al. (2021) [5] 77% UK prevalence rate and an assumed Belgian prevalence rate of 50%

Deleted: 35

Deleted: 0

Deleted: 95

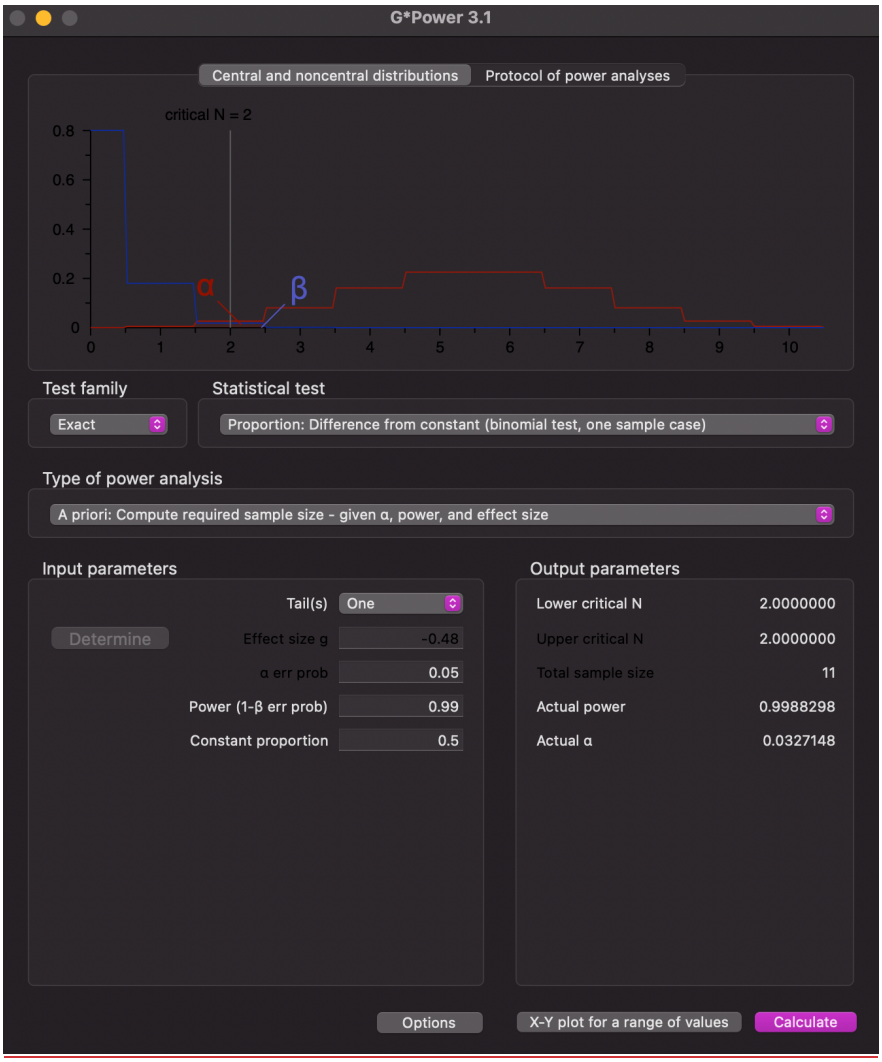

Fig. A2: A priori power analysis for Hypothesis 4 using G*Power, given an α value of .05 and assuming an effect size of Hedges' $g = -.48$. A sample size of 100 games achieves 0.99 power.

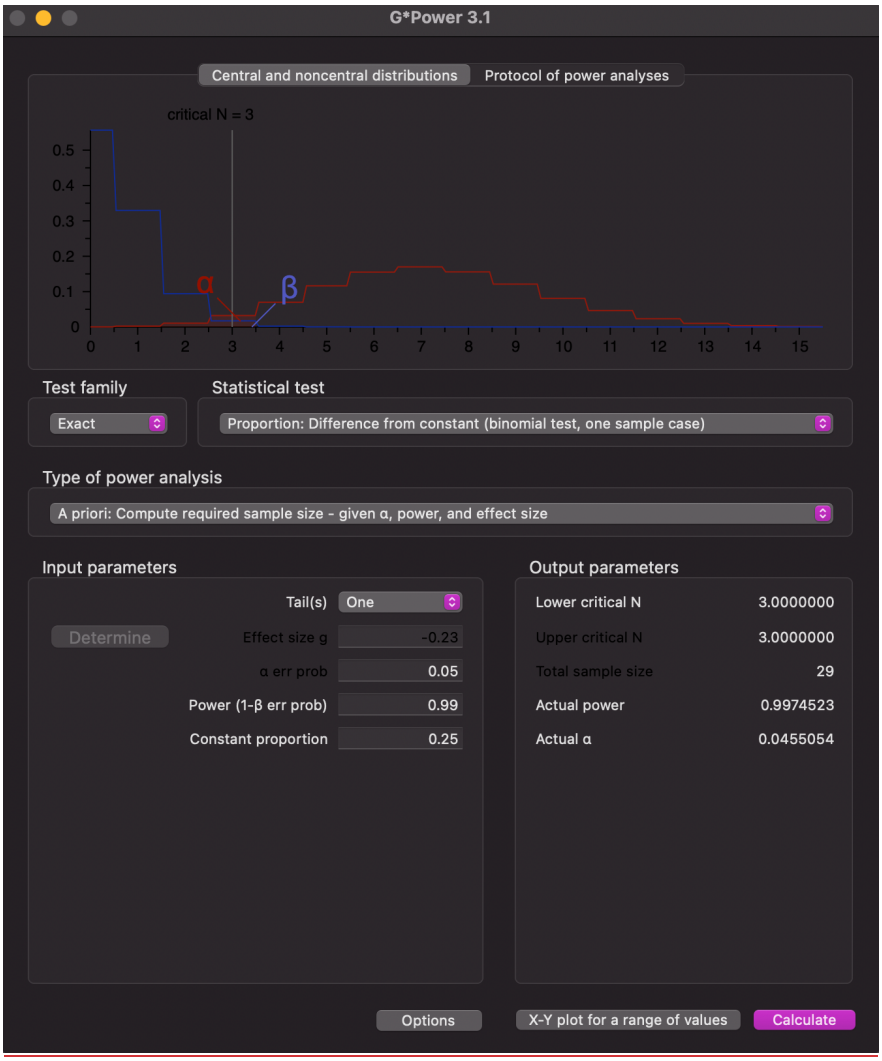

Fig. A3: A priori power analysis for Hypothesis 5 using G*Power, given an α value of .05 and assuming an effect size of Hedges' $g = -.23$. A sample size of 100 games achieves 0.99 power.

Deleted: ¶

¶

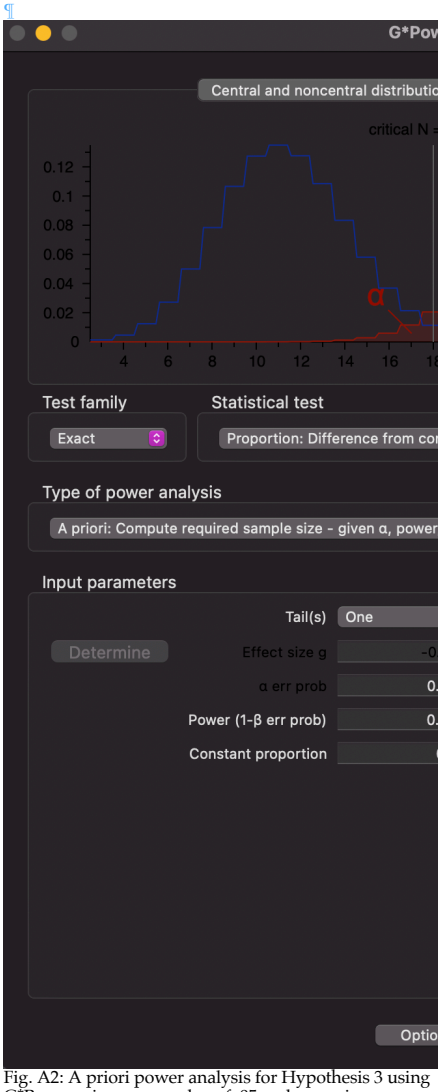

Fig. A2: A priori power analysis for Hypothesis 3 using G*Power, given an α value of .05 and assuming an effect size of Hedges' $g = -0.27$, which is derived from the difference between the Xiao et al. (2021) [5] 77% UK prevalence rate and an assumed Belgian prevalence rate of 50%. A sample size of 49 games achieves 0.99 power.