

1 **Breaking Ban: Belgium’s ineffective gambling law regulation of video game loot**
2 **boxes**

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14 **Abstract**

15 Loot boxes in video games are gambling-like mechanics that players buy to obtain
16 randomised rewards of varying value. Loot boxes are conceptually and
17 psychologically similar to gambling, and loot box expenditure is positively
18 correlated with self-reported problem gambling severity. Citing consumer protection
19 concerns, the Belgian Gaming Commission opined that such mechanics constitute
20 gambling under existing law and effectively 'banned' loot boxes by threatening
21 criminal prosecution of non-compliant companies implementing paid loot boxes
22 without a gambling licence. The effectiveness of this ban at influencing the
23 compliance behaviour of video game companies (and, by implication, consumers',
24 including children's, exposure to and consumer protection from loot boxes) was
25 assessed. Paid loot boxes remained widely available amongst the 100 highest-
26 grossing iPhone games in Belgium: 82.0% continued to generate revenue through a
27 randomised monetisation method, as did 80.2% of games rated suitable for young
28 people aged 12+. The Belgian 'ban' on loot boxes has not been effectively enforced.
29 Although the initial imposition of this measure promoted public discussion and
30 debate about loot box regulation (both domestically and internationally) and likely
31 provided better consumer protection in relation to specific games operated by well-
32 known companies, an unenforced 'ban' has many negative consequences, including
33 (i) giving consumers, parents, and policymakers a false sense of security and (ii)
34 allowing non-compliant games to replace games that have been removed from the
35 national market by more socially responsible companies. On a theoretical level,
36 eIndeed, even an effectively enforced ban also has several potential disadvantages,
37 including (i) stigmatisation; (ii) promoting the 'forbidden fruit effect'; (iii) curtailing
38 companies' commercial interests; (iv) unfairly distributing more revenue to non-
39 compliant companies; (v) restricting players' choices and accessibility to video
40 games; (vi) negatively affecting the gameplay experience; (vii) unfairly
41 disadvantaging Belgian players; and (viii) damaging the country's eSports industry.
42 Finally, technical measures taken by companies to comply with the ban were easily
43 circumvented, and some highly dedicated players (who are likely to be the highest
44 spending and most vulnerable) could reasonably be expected to do so. Therefore, the
45 complete elimination of the loot box mechanic from a country is may not be
46 practically achievable. Belgium should re-evaluate its regulatory position. A blanket
47 ban approach to loot box regulation cannot be recommended to other countries.
48 Other less restrictive approaches to loot box regulation should be considered.

49 [Preregistered Stage 1 protocol: https://doi.org/10.17605/OSF.IO/5MXP6](https://doi.org/10.17605/OSF.IO/5MXP6) (date of
50 [in-principle acceptance: 7 April 2022](#)).

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53 **Keywords (10 Max):**

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

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57 **1. Introduction**

58 Paid loot boxes are randomised monetisation methods in video games that are
59 purchased by players to obtain randomised rewards of varying value ^[1]. Loot boxes
60 are prevalent in video games internationally and across different hardware
61 platforms ^[2-5]. The loot box purchasing process hides what rewards the player will
62 actually receive (and their value) until after the purchase decision and payment have
63 already been made, which is why paid loot boxes have been identified as being
64 structurally similar to gambling ^[6-8] and why they have been considered ‘predatory’
65 and potentially abusive of consumers ^[7,9-11]. Loot boxes have also been identified as
66 sharing certain psychological similarities with gambling ^[12,13]. Indeed, loot box
67 purchasing has been found to be positively correlated with problem gambling
68 severity in 16 studies in various countries ^[14,15], including the US ^[16,17], Canada ^[18], the
69 UK ^[19,20], Spain ^[21], Germany ^[22], Denmark ^[23], Australia ^[16,24] and Aotearoa New
70 Zealand ^[16], and internationally in general ^[25-31]. Specifically, players that self-
71 reported higher scores on problem gambling severity scales tend to buy more loot
72 boxes, and the theorised implication of which is that video game companies are
73 likely disproportionately profiting from such potentially at-risk players ^[32]. The same
74 correlation has also been found within samples of underage players, and it has been
75 suggested that young people might be a group that is particularly vulnerable to
76 potential harms ^[20]. Many countries have considered, or are considering, whether to
77 regulate loot boxes because of their potentially harmful link to problem gambling,
78 and because of consumer protection concerns, particularly in relation to vulnerable
79 groups, such as children ^[11,33-40].

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81 The predominant regulatory approach, adopted by gambling regulators ^[41-45] and
82 policymakers ^[46-50] in many countries, has been to consider whether to regulate paid
83 loot boxes as gambling: particularly, whether different types of loot boxes that have
84 already been implemented in various video games fall afoul of existing gambling
85 law ^[10,11,38]. If paid loot boxes constitute gambling, then video game companies would
86 be prohibited from offering loot boxes for sale unless they possess a gambling
87 licence (and therefore be regulated under gambling laws, and would be prohibited
88 from selling them to underage players in most countries even with a licence).
89 Regulators in different countries have come to divergent conclusions on this

90 particular legal point because the definitions for gambling in law varies from
91 jurisdiction to jurisdiction depending on the drafting language of the law in each
92 country ^[10,11,38].

93

94 -To summarise, paid loot boxes (*i.e.*, those that require players to pay real-world
95 money to buy) can be divided into two types: firstly, those containing rewards
96 which can be transferred to other players (and therefore possess real-world
97 monetary value) and, secondly, those containing rewards which *cannot* be
98 transferred to other players (and therefore does *not* possess direct real-world
99 monetary value) ^[1,7,10]. The first type constitutes gambling under existing law in
100 many countries, as recognised by various European national gambling regulators,
101 including in the UK, Denmark, and Belgium^[41-44], although only the Belgian
102 regulator has actively enforced the law^[11]. In contrast, the Dutch gambling regulator
103 also previously opined that the first type constitutes gambling ^[45] and has enforced
104 the law by imposing a financial penalty on Electronic Arts for allegedly illegal loot
105 box implementation in its *FIFA* games ^[51,52]; however, that interpretation has since
106 been successfully appealed and was overruled by the highest Dutch administrative
107 court. Therefore, the Netherlands is the first country where the first type of loot
108 boxes has been confirmed not to constitute gambling.

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110 -However, as far as can be discerned, the second type constitutes gambling only
111 under existing Belgian law ^[44] and Manx law ^[53,54] and not in other jurisdictions ^[11,38].
112 Belgium has been popularly referred to as a country that has ‘banned’ both types of
113 loot boxes ^[55]: this is technically incorrect because the law did not change and the
114 Belgian gambling regulator merely announced its interpretation of the law and
115 declared an intention to enforce it by criminally prosecuting non-compliant video
116 game companies for contravening existing gambling law ^[44]. Offering either type of
117 paid loot boxes would be illegal under the gambling law of the Isle of Man unless
118 licensed because the definition for of ‘money’s worth’ differs between Manx and UK
119 law ^[53,54]. H: however, this paper omits does not focus on further Manx law
120 discussion because it is effectively identical to the Belgian position but practically it
121 appears that video game companies simply treats the Isle of Man as the UK and
122 have not taken dedicated Manx compliance action, in contrast to taking exclusive
123 compliance action in Belgium, as discussed in detail below.

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125 In order to comply with Belgian gambling law (the Gambling Act of 7 May 1999),¹ as
126 interpreted by the Belgian gambling regulator (which the academic literature
127 recognises as the correct legal interpretation ^[10,11,38], even though video game
128 companies have expressed their disagreement with this interpretation ^[56-58] but have
129 not attempted to appeal it), a number of prominent video games companies have
130 reported either disabling player's ability to purchase both types of loot boxes in
131 Belgium ^[56-58] or even removing their games from the jurisdiction outright and
132 having stopped providing the video gaming service (including the sale of loot boxes)
133 to Belgian players ^[59]. These are demonstrations of how enforcement of Belgian
134 gambling law has caused at least some video game companies to behave differently
135 in Belgium as they do in other countries. Therefore, Belgian players will likely find it
136 more difficult to purchase loot boxes (if they are able to do so at all) than players
137 from other countries who continue to have unrestricted access. Belgian consumers
138 are thereby likely better protected from the potential harms of loot boxes: players
139 who cannot spend any money at all on loot boxes could not 'overspend' and would
140 not suffer potential financial harms.

141
142 However, the restrictive course of action taken by Belgian policy is potentially
143 overregulation because not all consumers will be harmed by loot boxes, yet now all
144 Belgian players, both children and adults alike, cannot buy loot boxes. Loot boxes
145 and other newer monetisation methods, compared to the old model of selling the
146 software, allow for many players (including some who might not be able to afford
147 purchasing the software) to gain access to entertainment and play certain games for
148 free ^[11]. The Belgian ban has arguably infringed upon the freedom and right to
149 choose of players who would never have been harmed ^[60]. Indeed, in contrast to this
150 prohibiting approach, other alternative regulatory approaches that better ensure
151 consumer choice (although potentially providing less consumer protection) are
152 available. For example, China legally requires video game companies to disclose
153 the probabilities of obtaining randomised loot box rewards, thus providing a degree
154 of transparency and consumer protection, whilst not restricting the player's freedom
155 to purchase loot boxes, nor the video game companies' commercial interests in
156 selling loot boxes ^[3,61]. Researchers have also suggested restricting loot box sales only

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].

157 to a certain extent by limiting player's spending on loot boxes to a 'reasonable'
158 amount, *e.g.*, US\$50 ^[62,63], and designing more 'ethical' loot boxes that players are less
159 likely to overspend on ^[61,64,65].

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161 Despite a loot box 'ban' being (arguably overly) paternalistic, two UK parliamentary
162 committees have recommended that the second type of loot boxes (currently only
163 illegal in Belgium) should also be regulated in the UK through an amendment of its
164 gambling law by expanding the definition of what constitutes gambling ^[47,49], and
165 this is presently being considered by the UK Government ^[66]. Other countries are
166 also considering adopting a similar prohibition of the second type of loot boxes that
167 would mirror the current restrictive position in Belgium: as demonstrated by Bills
168 proposed in the US that have since failed ^[67] and by a Bill that an Australian Member
169 of Parliament intended to propose ^[68] that would restrict loot box sales to underage
170 players.

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172 Given that there is significant interest in emulating this regulatory approach, it is
173 important to assess whether this Belgian 'ban' on loot boxes has been effective. One
174 objective measure is to assess whether loot boxes have been effectively removed
175 from games marketed in Belgium. A preliminary examination of the top-grossing
176 iPhone games list in Belgium (more than three years after the ban was confirmed by
177 the Belgian Gaming Commission ^[44]) revealed that a number of games occupying
178 prominent positions on the top-grossing list, which were found to contain loot
179 boxes in the UK ^[4,5] and in the People's Republic of China ^[3] and whose revenue
180 likely mostly derived from loot box sales, occupy prominent positions on the top-
181 grossing list. It is not known whether these games are monetising using methods
182 which do not involve loot boxes in Belgium, or whether these games are continuing
183 to sell loot boxes in Belgium. If the latter is true, then these video game companies
184 are either operating contrary to Belgian gambling law and liable for criminal
185 prosecution or operating under a gambling licence (which appears unlikely as none
186 has beenare known to have been granted to video game companies at the time of
187 writing).

188

189 Belgium is the appropriate jurisdiction to study in this context because the other two
190 candidate jurisdictions (the Isle of Man and the Netherlands) are less suitable.

191 Firstly, in relation to the Isle of Man, the jurisdiction is a Crown Dependency of the

192 UK that, although [it](#) has its own laws, is not necessarily recognised as a separate
193 jurisdiction in practice by video game companies. The jurisdiction's small
194 population of approximately only 80,000 residents and geopolitical status potentially
195 give rise to certain idiosyncrasies ^[69]. It is unlikely that video game companies would
196 actively seek to comply with Manx law by making a special 'national' version of
197 their software. Indeed, [for example](#), there is no Manx Apple App Store (where such
198 an adapted 'national' version of the game could potentially be published) based on
199 which a highest-grossing list might be captured for research purposes. This is in
200 contrast to Belgium which has a much larger population of more than 11.5 million
201 legal inhabitants ^[70] and where video game companies have reportedly taken
202 dedicated, national compliance action ^[56-59].

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204 Secondly, the legal position in relation to loot boxes in the Netherlands changed in
205 March 2022 ^[71]. Previously, the Dutch gambling regulator *incorrectly* interpreted the
206 law and has actively enforced existing gambling law to regulate the first type of loot
207 boxes by sanctioning allegedly non-compliant companies (specifically, imposing a
208 financial penalty on Electronic Arts for allegedly illegal loot box implementations in
209 its *FIFA* games^[51,52]). This is unlike other countries (*e.g.*, the UK) whose regulators
210 came to the same interpretation of their gambling laws but have not sought to take
211 enforcement actions against potential contraventions. The present Dutch position is
212 that the first type of loot boxes [is](#) confirmed to be generally lawful ^[71]. The Dutch
213 Apple App Store would therefore likely be experiencing change to reflect that new
214 regulatory position, which would render it inappropriate to study for answering the
215 present research question. Even assuming that the regulatory change did not take
216 place, it would not have been appropriate to study the Netherlands because the
217 previously enforced Dutch regulation focused on the presence of the ability for
218 players to transfer loot box rewards to other players in exchange for real-world
219 money ^[10,11,38]. A previous loot box prevalence study attempted to assess the presence
220 and prevalence of this so-called 'cashing out' process: however, *Zendle et al.* (2020)
221 importantly failed to reliably do so ^[4], possibly due to video game companies
222 actively preventing this from happening such that the availability of third-party
223 cashing out platforms is extremely transient. Even if the presence of cashing out
224 features could have been reliably assessed, the previous Dutch regulatory position
225 meant that only a reduction in the prevalence of 'cashing out' features would have
226 been observable and that a reduction in paid loot box prevalence was not necessarily

227 observable and, indeed, highly unlikely to have been true because the removal of
228 paid loot boxes was not legally required. This is contrasted with Belgium, where a
229 reduction in paid loot box prevalence should be observable as an outright removal
230 of the feature is required to comply with the law, as compared to only amendments
231 to a certain aspect of some loot boxes' implementation that Dutch law previously
232 required. This is demonstrated by how the same video game company removed paid
233 loot boxes entirely from a game in Belgium ^[56], but did not remove paid loot boxes
234 from the same game in the Netherlands and only changed them such that cashing
235 out is no longer possible ^[72].

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237 Therefore, a survey replicating the methodology of previous loot box prevalence
238 studies ^[3-5] was conducted in Belgium to assess: (i) the effectiveness of the Belgian
239 Gaming Commission's threat to criminally prosecute video game companies for
240 implementing paid loot boxes without a gambling licence (*i.e.*, the Belgian 'ban') ^[44]
241 and (ii) whether the loot box prevalence rate in Belgium is consequently lower than
242 in other Western countries where no loot box regulation has been enforced, *e.g.*, the
243 UK. Doing so sheds light on whether the Belgian ban has effectively changed video
244 gaming companies' behaviour. In addition, potential circumventions of the Belgian
245 ban on paid loot boxes were attempted: specifically, the UK version of certain games
246 that are known to contain paid loot boxes was downloaded and loot box purchasing
247 using those games within geographical and jurisdictional Belgium was attempted.

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249 The following research questions were addressed.

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251 Research Question 1: Has the Belgian ban succeeded in eliminating paid loot
252 boxes from mobile games?

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254 Research Question 2: Has the Belgian ban on paid loot boxes been effective?

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256 Research Question 3: Is it possible for a player to circumvent the Belgian ban
257 on paid loot boxes and purchase them from within the country?

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259 Because loot boxes have been effectively banned by the Belgian Gaming
260 Commission's public pronouncement of its interpretation of Belgian gambling
261 law^[44], no loot boxes should be found amongst video games available in Belgium:

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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 tThe Commission's response is described in the Results section, if any is received, was sought and, a summary will be made available at the data deposit link (<<https://doi.org/10.17605/OSF.IO/7KJS9>>).

Hypothesis 2 is included because in case the Commission may could have not respondeddid 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 ^[3–5], because these are the most

297 popular games that generate the most amount of revenue for video game companies.
298 Globally, the 100 highest-grossing mobile games reportedly accounted for 53.5% of
299 all player spending on those platforms in 2020 ^[73]. Generally, players are most likely
300 to encounter and engage with these games, and the Belgian Gaming Commission
301 should be most heavily scrutinising these games when undertaking compliance
302 actions. Relevant stakeholders, including players, parents and regulators, would be
303 most interested in the compliance situation amongst these best commercially
304 performing games. Previous studies have noted that the highest-grossing games
305 should be the most compliant and therefore do not necessarily reflect the compliance
306 situation with lower grossing games (and this limitation is recognised in the
307 Discussion section); however, the 100 highest-grossing games do represent the most
308 objective and reasonably practicable sample^[3,5]. For Hypothesis 3 in particular, a
309 sample size of 100 games allowed for the present study to be directly comparable to
310 the Zendle *et al.* (2020) ^[4], the Xiao *et al.* (2021) ^[3], and the Xiao *et al.* (2021) ^[5] samples
311 of the 100 highest-grossing iPhone games and remove any potential biases that
312 might arise from choosing a differently justified and constituted sample of a
313 potentially different size.

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315 For the Belgian ban on loot boxes to be deemed fully effective, it must not only
316 reduce loot box availability through the usual domestic channel of downloading
317 iPhone games from the *Belgian* Apple App Store but also prevent potential technical
318 circumventions (*e.g.*, downloading the games from the UK Apple App Store from
319 within Belgium and purchasing loot boxes in that version of the game). Preventing
320 such circumventions appears technically difficult and is therefore unlikely to have
321 been accomplished:

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323 Hypothesis 4: UK iPhone games known to contain paid loot boxes will
324 continue to offer them for sale even when the phone is within geographical
325 and jurisdictional Belgium.

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327 The contribution from the present study also has wider implications to_for other
328 regulatory domains because it empirically examines and assesses companies'
329 compliance with criminal law, specifically in relation to the challenging regulation of
330 novel technologies and new mediaiums: have companies changed their corporate
331 behaviours because of a specific legal development? Such an exercise is nearly

332 impossible to do objectively in most other contexts. However, the highest-grossing
333 list of video games provides for an impartial way to assess compliance with
334 gambling law amongst the best commercially performing companies that would be
335 far more difficult, if not impossible, to do in relation to, *e.g.*, physical, traditional
336 gambling venues or online (including cryptocurrency) gambling websites (whose
337 relative popularity and financial performance are more difficult to measure and
338 compare).

339

340 2. Method

341 Replicating the established methodology of Xiao *et al.* (2021) ^[3] and aiming to collect
342 data from a relatively diverse range of video games, the 100 highest-grossing iPhone
343 games on the Belgian Apple App Store on 28 May 2022 as reported by App Annie
344 (since rebranded to data.ai), an authoritative independent analytics company, were
345 selected to form the sample. If a game on the captured list is (i) no longer available
346 for download by the data collection period or (ii) a duplicate of a higher-ranked
347 game whose data was already collected (two exclusion criteria applied in Xiao *et al.*
348 (2021) ^[3]), then it was excluded from the sample and replaced with the next highest-
349 ranking game, *e.g.*, the 101th highest-grossing game in the first instance. In total, 100
350 games were coded.

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352 The Country/Region setting of the Apple ID that was used on the coder's iPhone
353 was set to Belgium to ensure that the Apple App Store that loads is the Belgian
354 Apple App Store. This guarantees that the game that was downloaded from then on
355 was the Belgian version of the game specifically uploaded to and made available on
356 the Belgian Apple App Store (whether or not the video game company actually
357 made it different from the version(s) uploaded to other country's Apple App Stores).

358 In addition, the coder physically travelled to Belgium to ensure that they he are was
359 within the Belgian geographical and legal jurisdiction when conducting the data
360 collection. This is was preferable to, for example, using a VPN (Virtual Private
361 Network) to spoof the coder's IP (Internet Protocol) address to be in Belgium even
362 though the coder has remained physically in a non-Belgian jurisdiction, because
363 such a coder would technically not be under the jurisdiction of Belgian gambling law
364 (as they he is not are not physically within the country), even if they he is are playing
365 the Belgian version of the game downloaded from the Belgian Apple App Store.

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367 The following variables were measured:

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369 *Apple age rating*

370 This variable was coded using the relevant age rating information displayed on the
371 game's Belgian Apple App Store page.

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373 *Presence of paid loot boxes*

374 A 'paid loot box' was defined as being either an Embedded-Isolated random reward
375 mechanism (which are video game mechanics that players must pay real-world
376 money to activate and which provide randomised rewards that do *not* possess direct
377 real-world monetary value) or an Embedded-Embedded random reward mechanism
378 (whose activation also must be paid for by players with real-world money but which
379 *do* provide randomised rewards that possess direct real-world monetary value), as
380 defined by Nielsen & Grabarczyk (2019) ^[7]. An amendment must be made to the
381 methodology of Xiao *et al.* (2021) ^[3], which assessed this variable based firstly on 40
382 minutes of gameplay and, if no such mechanic was found within that time, then
383 based on up to 2 hours of internet browsing of video streams and screenshots. This is
384 because it is not possible to rely upon internet browsing at all for the present study
385 as the coder cannot know whether the video streams or the screenshots that they he
386 observes were captured from a Belgian version of the game. Only by playing a
387 Belgian version of the game can the coder be confident that they he isare coding the
388 correct, national version of the game that was possibly amended to comply with the
389 law. Therefore, to avoid video streams and screenshots of non-Belgian versions of
390 the games from biasing the results, the coder spent up to an hour playing the video
391 game instead. If a paid loot box cannot be identified within that timeframe, then the
392 game was coded as not containing paid loot boxes.

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394 This design decision may cause the Belgian loot box prevalence rate that was found
395 by the present study to be lower than the true value. However, this is unavoidable
396 and justifiable. Firstly, the present study is more concerned with finding a non-zero
397 value rather than the true value: the presence of paid loot boxes in even one high-
398 grossing game severely challenges the effectiveness of the Belgian ban. Secondly, in
399 the most recent loot box prevalence research of Xiao *et al.* (2021), of the 77 games
400 amongst the 100 highest-grossing UK games that were found to contain loot boxes,
401 73 games' loot boxes were identified through gameplay (94.8%), whilst only 4

402 games' were determined through internet browsing (5.2%), so the potential bias
403 caused by coding games that must be coded through internet browsing as not
404 containing loot boxes would be very minor ^[5]. Thirdly, it was always potentially
405 possible for a game to have been thusly inaccurately coded as not containing paid
406 loot boxes even when it did because the coder could always have been unable to
407 identify such a mechanic even during the combined 40 minutes of gameplay and 2
408 hours of internet browsing. This was accepted as a justifiable inaccuracy because this
409 meant that a new player engaging with the game (whose experience the previous
410 literature attempted to replicate ^[3,5]) would highly likely have not encountered a paid
411 loot box either. Fourthly, this approach is also 'fairer' towards the video game
412 industry in the sense that if games whose paid loot box presence could not be
413 determined would instead be excluded from the sample and replaced with the next
414 highest-grossing game until a game whose loot boxes could be found is assessed,
415 then the loot box prevalence rate would be artificially inflated to be higher than the
416 true value.

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418 Further, if a so-called 'sand box' game, such as *Minecraft* ([Mojang, 2011](#)) or *Roblox*
419 ([Roblox Corporation, 2012](#)), that contains a significant amount of third-party user-
420 generated content is was included in the sample, then that game was assumed by the
421 coder to contain paid loot boxes without the need for the coder to identify and
422 screenshot such a mechanic (because choosing to base the coding on which specific
423 third-party content would be subjective). However, the game was deemed compliant
424 with the law and coded as not containing paid loot boxes if an official online post
425 can be found where the developer or publisher of that game specifically states that
426 user-generated content that is paid loot boxes should not be offered in Belgium,
427 similar, for example, to the guidelines requiring loot box probability disclosures that
428 Roblox Corporation published ^[74].

429

430 Finally, it is noted that the coder only accessed and screenshotted the loot box
431 purchase screen and the Apple App Store payment pop-up screen for the paid loot
432 box. The coder did not go through with the transaction by paying real-world money
433 in exchange for paid loot boxes and confirm that the sale would indeed process. This
434 is because doing so would be illegal under Belgian gambling law. Article 4(2) of the
435 Belgian Gambling Act of 7 May 1999 states that: 'It is prohibited for anyone to
436 participate in a game of chance ... when the person involved knows that it concerns

437 the operation of a game of chance or a gaming establishment which is not licensed in
438 accordance with this Act.' The coder, being an academic researcher of loot box
439 regulation, possessed the knowledge that the relevant video game company likely
440 did not have a gambling licence and therefore would arguably have been
441 committing a crime if they he completed the loot box purchasing transaction.

442 *Date and time of data collection*

443 The date and time, based on Central European Summer Time (or Central European
444 Time, depending on which was used by Belgium at the data collection period), on
445 and at which paid loot boxes were searched for was recorded.

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448 Two previous studies, whose methodology the present study is replicating,
449 calculated for inter-rater reliability by dual-coding 15% of the sample ^[3,5]. The
450 methodology has therefore been previously refined and been found to be reliable
451 (near-perfect or perfect agreement was achieved). Therefore, the present study did
452 not calculate for inter-rater reliability. The raw data and a full library of screenshots
453 showing, *inter alia*, the Apple App Store age rating and in-game loot box purchase
454 pages for each game will isbe available via
455 <https://doi.org/10.17605/OSF.IO/7KJS9> <[OSF deposit link]> for public scrutiny.

456
457 Hypothesis 1 will would have been accepted if zero, one, or two of the 100 highest-
458 grossing games that will bewas coded contained ed paid loot boxes.

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460 Hypothesis 2 will would have been accepted if zero, one, or two of the games, within
461 the 100 highest-grossing games that will wasbe coded, that received an Apple Age
462 Rating of 4+, 9+, or 12+ (*i.e.*, not 17+) contained ed paid loot boxes.

463
464 A Belgian loot box prevalence rate of 0% should be found amongst all games studied
465 and amongst those games studied that were deemed suitable for underage players.
466 However, considering that one previous loot box prevalence study identified an 1%
467 false positive rate through its data collection process ^[4], to provide for type 1 error
468 control, Hypotheses 1 and 2 will would have been accepted even if up to two
469 Belgian games studied are identified as containing paid loot boxes (*i.e.*, a prevalence
470 rate of up to 2% will would have been deemed as effective elimination of loot boxes
471 from the Belgian market). Considering that some video games might contain loot

472 boxes which are duly licensed by the Belgian Gaming Commission (whose
473 confirmation will be was sought by the present study, as explained below), any
474 games that are were so licensed will would have been excluded from the sample for
475 the purposes disconfirming Hypotheses 1 and 2.

476

477 Hypothesis 3 will be was tested using a binomial test (two-sided test, $p = .05$) to
478 identify whether the percentage of the 100 highest-grossing iPhone games
479 containing loot boxes in Belgium that will be was found by the present study will
480 be was significantly different from a hypothetical loot box prevalence rate of 65.0%,
481 which a Western country that has not restricted loot box sales is assumed to have.

482

483 The hypothetical 65.0% figure is derived from a holistic consideration of historical
484 loot box prevalence rates in other countries found by the prior literature. Zendle *et al.*
485 *(2020)* found the UK iPhone loot box prevalence rate amongst the 100 highest-
486 grossing games in February 2019 to be 59.0%^[4]; Rockloff *et al.* (2020) found the
487 Australia loot box prevalence rate amongst the 82 'best selling' games on various
488 platforms (*e.g.*, PC, console, and mobile) between August and October 2019 to be
489 62.0%^[2]; Xiao *et al.* (2021) found the Chinese iPhone loot box prevalence rate amongst
490 the 100 highest-grossing games in June 2020 to be 91.0%^[3]; and Xiao *et al.* (2021)
491 found the UK iPhone loot box prevalence rate amongst the 100 highest-grossing
492 games in June 2021 to be 77.0%^[5]. The comparatively high Chinese 91.0% prevalence
493 rate appears to be an outlier that has been influenced by Far East Asian cultural
494 factors that would not affect a hypothetical Western country that has not regulated
495 paid loot boxes; therefore, little reliance is placed on that datum. The Rockloff *et al.*
496 Australian 62.0% is derived from games on various consoles, whilst it is known that
497 games on mobile platforms (*e.g.*, the iPhone platform which the present study
498 assessed) tend to contain more loot boxes^[4]; therefore, the 62.0% value might not
499 reflect the contemporaneous Australian loot box prevalence rate amongst mobile
500 games specifically, which likely would have been higher. A comparison of Zendle *et*
501 *al.*'s 2019 UK data with Xiao *et al.*'s 2021 UK data suggest that the loot box
502 prevalence rate have increased due to a variety of reasons, including that the 2019
503 59.0% datum might have been an underestimation, due to certain paid loot box
504 implementations not having been recorded^[75]. Xiao *et al.*'s 2021 77.0% figure is the
505 closest comparator for the present study, in terms of data collection time; however,
506 in context, it is comparatively higher than other values previously observed in

507 Western countries. Accordingly, a hypothetical value of 65.0%, which is slightly
508 higher than the previously observed Zendle et al. UK 59.0% and Rockloff et al.
509 Australian 62.0% values (which were likely slight underestimations), but which is
510 lower than the comparatively high Xiao et al. UK 77.0% value, was used. This 65.0%
511 value errs on the side of caution and avoid potentially overestimating the reduction
512 effect of the Belgian ban, although unavoidably it is possible that the effect might
513 consequently be underestimated.

514

515 In the absence of any prior guidance on what effect size would constitute a ‘legally
516 meaningful’ and ‘socially beneficial’ regulatory measure, a smallest effect size of
517 interest of Hedges’ $g = -.15$ is proposed based on the potential usefulness of the
518 results to the end users ^[76]. The intended end users would be the policymakers in
519 other countries who might be considering taking the same regulatory action that
520 Belgium has already taken: importantly, besides the Belgian Gaming Commission
521 having issued its interpretation of Belgian gambling law and thereby threatened
522 criminal prosecution of non-compliant companies implementing paid loot boxes,
523 little else appears to have been done by the Belgian Gaming Commission in terms of
524 enforcement; therefore, thus far, the costs that have been incurred by Belgium in its
525 attempt to regulate loot boxes have been relatively low. Accordingly, realistic
526 policymakers seeking to expend a similarly low amount of resources to regulate loot
527 boxes would likely not expect a particularly high reduction to loot box prevalence in
528 Belgium (*e.g.*, for the loot box prevalence rate to be reduced by at least 50 percentage
529 points, *i.e.*, to 15.0% or lower). Nonetheless, these policymakers would likely still
530 expect some perceivable reduction (*e.g.*, for the loot box prevalence rate to be
531 reduced by at least 10 percentage points, *i.e.*, to 55.0% or lower) before being
532 persuaded to emulate the Belgian ban, considering that some regulatory costs have
533 been incurred by Belgium and that Belgian consumers have been given the
534 (potentially incorrect) impression that loot boxes have been effectively eliminated
535 from the market. Recognising that some policymakers might be more hesitant to
536 restrict players’ freedom to purchase loot boxes and video game companies’
537 commercial interests and therefore be more cautious when relying on the results
538 (*e.g.*, they might view a reduction of 10 percentage points or less as being
539 insufficiently persuasive), it is proposed, conservatively, that the vast majority of
540 policymakers would likely consider a reduction of at least 15 percentage points (*i.e.*,
541 for the loot box prevalence rate to be 50.0% or lower) as demonstrating the

542 effectiveness of Belgium's loot box ban (as implemented in its relatively low-cost
543 manner) and be persuaded to potentially emulate the Belgian regulatory actions in
544 their own countries. Accordingly, setting the Hedges' g at $-.15$, a priori power
545 analysis using G*Power has determined, given an α value of $.05$: the present sample
546 of 100 games would achieve $.86$ power in a two-sided test for finding a statistically
547 significant difference between the Belgian and the hypothetical 65.0% prevalence
548 rates (see Fig. A1)^[77].

549

550 As to interpretation, if the Belgian value is was significantly lower than 65.0%, then
551 Hypothesis 3 will would have been accepted and the present study will would have
552 concluded that it is *possible* that the Belgian 'ban' may have been effective at
553 reducing paid loot box prevalence in Belgium and that this measure could be
554 considered for adoption in other countries, although it must also be recognised that
555 national differences between Belgium and the previously assessed Western countries
556 (*i.e.*, the UK and Australia), and the passage of time between the data collection
557 points, may also have contributed to the results. The present study will would have
558 then recommended other countries' policymakers and regulators to consider
559 adopting a similar measure if they desire to reduce paid loot box prevalence rates in
560 their country: how strongly this recommendation will would have been put by the
561 present study in the Discussion section would have dependeds on the Belgian loot
562 box prevalence rate that will would have been identified (a reduction to below 50%
563 will would have been deemed as effective, whilst a reduction to below 25% will
564 would have been deemed as very effective). In contrast, if the Belgian value is
565 significantly higher than 65.0%, then Hypothesis 3 will would have been rejected
566 and the present study will would have concluded that the Belgian ban has been
567 ineffective, noting the same abovementioned limitations. The present study will
568 would have then cautioned against other countries' policymakers and regulators
569 from making the assumption that a loot box ban will necessarily be effective, and
570 concluded that the Belgian measure should not be adopted by other countries unless
571 effective enforcement can be guaranteed or some other improvements are made.
572 Further, reasoned criticism of the apparent lack of enforcement actions by the
573 Belgian Gaming Commission will would also have been made. However, if no
574 significant difference is found, then the present study will would have stated that no
575 sufficient evidence that the Belgian ban affected paid loot box prevalence in Belgium
576 has been found, thus Hypothesis 3 can be neither confirmed nor disconfirmed.

577 Alternative research methodologies for future studies ~~will~~ would have been
578 discussed.

579

580 For Hypothesis 4, firstly, the coder arrived in geographical and jurisdictional
581 Belgium with an iPhone pre-installed with UK versions of the following three
582 popular and high-grossing games (known to contain paid loot boxes in the UK) that
583 reflect operating companies from various regions of the world: *Hearthstone* by the US
584 company Blizzard Entertainment, *Brawl Stars* by the European, Finnish company
585 Supercell Oy, and *Genshin Impact* by the Chinese company miHoYo Co., Ltd.. The
586 sample size was limited to three highly popular games due to practical constraints
587 on research resources. These three popular games were chosen because they have
588 been widely published across the world (including in both the UK and China) and
589 have consistently performed well financially. Importantly, engagement with loot
590 boxes is a fundamental and arguably unavoidable and inalienable aspect of all three
591 games' gameplay and monetisation because the vast majority of in-game content
592 (e.g., playable characters) *requires* engagement with loot boxes to unlock (at least in
593 the UK version of the games). These three games also represent how companies from
594 three different regions of the world might have taken technological steps to comply
595 with Belgian law and prevent potential circumvention. In the unlikely event that any
596 of these three games becomes unavailable for download and online gameplay (e.g.,
597 removed from the Apple App Store), another popular game developed by a
598 company from the same region as the unavailable game; known to contain paid loot
599 boxes in the UK; and in which paid loot boxes represent a fundamental aspect of the
600 game's gameplay and monetisation would be chosen to replace that game. With the
601 Country/Region setting of the Apple ID initially set to the UK, the coder then
602 attempted to access the paid loot box purchase screen and the Apple App Store
603 payment pop-up screen and record their experience from within Belgium. Then, the
604 Country/Region setting of the Apple ID was changed from the UK to Belgium, and
605 the coding process was repeated. Thusly, the two potential possibilities of setting the
606 phone's geographic location to either Belgium or a non-Belgian country were tested.
607 Subsequently, the three games were deleted from the iPhone. Secondly, whilst
608 within geographical and jurisdictional Belgium, the coder changed the
609 Country/Region setting of the Apple ID to the UK and attempt to access the UK
610 Apple App Store to download the UK versions of those three games within Belgium.
611 Then, the coder attempted to access the loot box purchase paid loot box purchase

612 screen and the Apple App Store payment pop-up screen and record their experience
613 again. Therefore, two potential ways to circumvent the Belgian ban were tested:
614 firstly, by bringing non-Belgian version of the games into the country and using
615 them to purchase loot boxes, and, secondly, by downloading non-Belgian version of
616 the games from within Belgium and using them to purchase loot boxes. Hypothesis
617 4 will-would have been accepted, if loot box purchase is-was possible within one or
618 more of the games using any of the abovementioned methods. The interpretation
619 will-would have been that the law can be easily circumvented by dedicated players;
620 the Belgian Gaming Commission should therefore consider ways to force video
621 game companies to better enforce compliance with the law. However, if loot box
622 purchase is not possible within one or more of the games using any of the
623 abovementioned methods, then the interpretation is-would have been that the law
624 could not be circumvented in the simple ways that have been attempted, although
625 other potential circumventions remain untested and possible. The present study will
626 would have concluded that companies might have taken *some* technological
627 measures to prevent circumventions of the Belgian ban, although further evidence
628 would be required to confirm this (*e.g.*, contacting the relevant company to request
629 for confirmation of the compliance actions that have been taken).

630

631 In accordance with the *Danish Code of Conduct for Research Integrity*^[78], as adopted by
632 the IT University of Copenhagen, the present study did not require research ethics
633 assessment and approval because no human participants or personal data were
634 involved and only publicly available information was examined and recorded.

635

636 The Stage 1 Registered Report for the present study was granted in-principle
637 acceptance by Peer Community in Registered Reports on 7 April 2022 and is openly
638 available in the Open Science Framework at
639 <https://doi.org/10.17605/OSF.IO/5MXP6>.

640

641

642 **3. Results**

643 Statistical analysis was conducted using Stata, version 15.1.

644

645 **3.1. Confirmatory analysis**

646 **3.1.1. Paid loot box prevalence in Belgium and effectiveness of the ‘ban’**

647 Of the 100 highest-grossing Belgian iPhone games on 28 May 2021, 82 games
648 contained loot boxes (82.0%). Their Apple App Store age ratings are summarised in
649 Table 1.

650

651 **Table 1**

652 *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+	24	13	54.2%
9+	42	29	69.0%
12+	86	69	80.2%
17+	100	82	82.0%

653

654 Game 36 (*The Lord of the Rings: War* (NetEase, 2021)) could no longer be downloaded
655 by the time of data collection and was therefore replaced with the next highest-
656 grossing game, Game 101 (*Bingo Frenzy-Live Bingo Games* (Gluon Interactive, 2020)),
657 as preregistered. Further discussion of how the commencement of the present study
658 may have caused the removal of Game 36 is set out in Appendix 3. It is likely overly
659 presumptuous and self-important to suggest that the commencement of the present
660 study’s data collection may have caused Game 36’s removal from the Belgian Apple
661 App Store. However, for full disclosure and context, the stage 1 registered report for
662 the present study setting out the methodology was published on 7 April 2022, and
663 the author did publish various online content about this then upcoming study,
664 including publishing one Twitter post on 30 June 2022 implying that data collection
665 has begun^[29]. Game 36 appears to have been removed from the Belgian Apple App
666 Store between 31 May 2022 and 1 June 2022 as the game appeared on the highest-
667 grossing list on 31 May 2022 but did not do so on 1 June 2022. It is also curious that
668 the game has been removed *only* from the Belgium store and remained available
669 (and high-grossing) in all other countries checked, specifically, Denmark, France, the
670 Netherlands, the UK and the US, according to data.ai, as shown in Figure 1. NetEase,
671 the company operating Game 36, also operated another relatively popular game,

672 *Identity V*, that was not within the highest-grossing list studied. *Identity V* was
673 known to contain loot boxes in the UK and in the PRC but has not been removed
674 from any countries' Apple App Store as of 7 June 2022. Exploratory analysis
675 revealed that the Belgian version of *Identity V* continued to contain paid loot boxes in
676 Belgium.

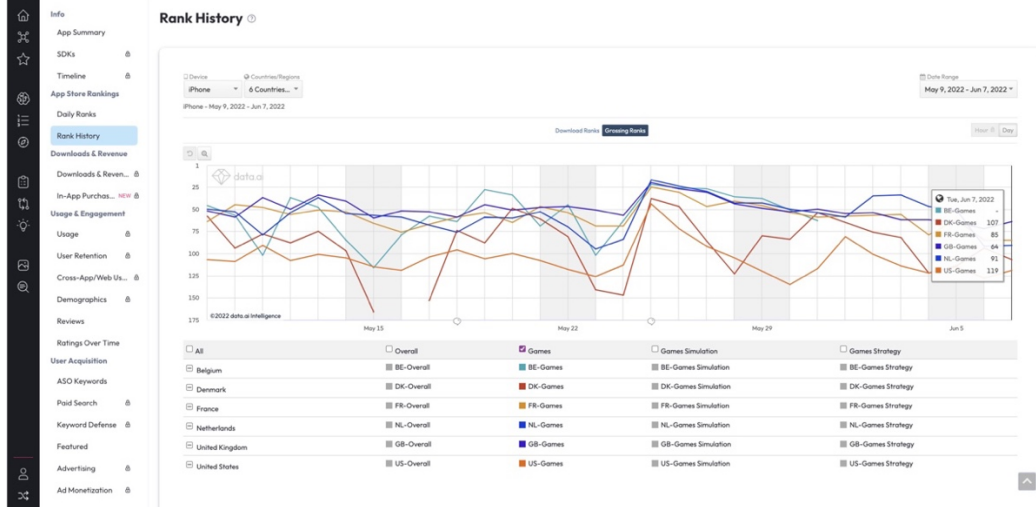
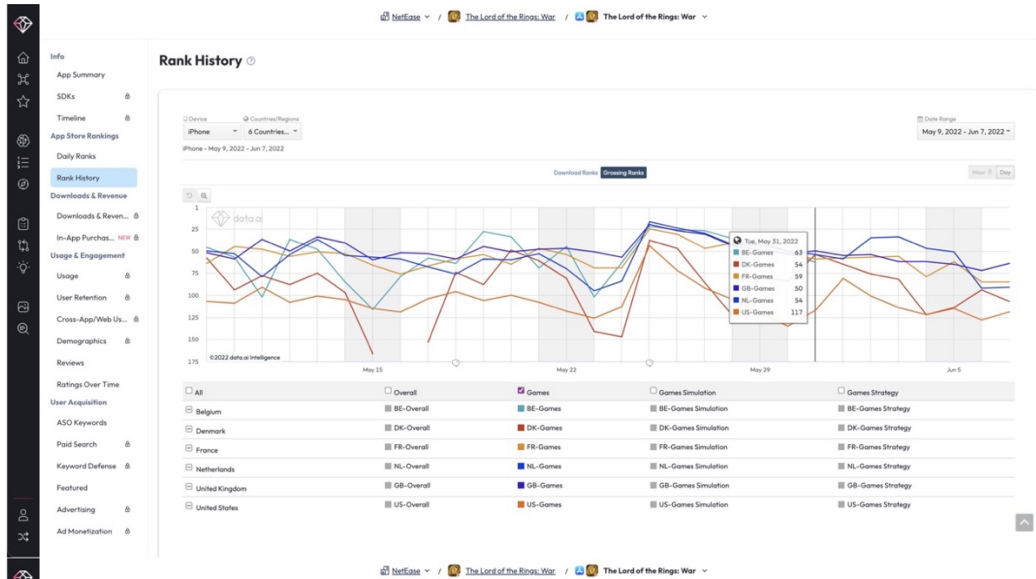


Figure 1. A series of screenshots of the grossing rank of Game 36 (*The Lord of the Rings: War*) in various countries demonstrating the removal date of said game from the Belgian Apple App Store

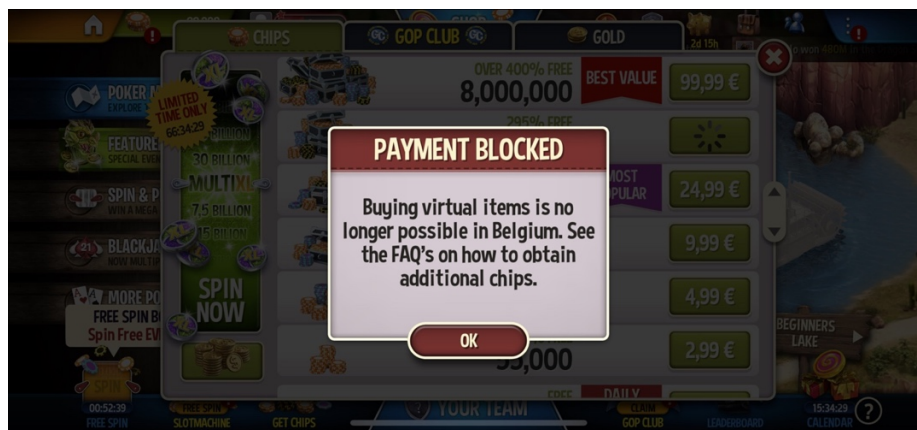
682 (between 31 May and 1 June 2022) and how said game was curiously not removed from the Apple
683 App Stores of Denmark, France, the Netherlands, the UK and the US. © 2022 data.ai.

684 Game 8 (*Roblox*) was duly coded as containing loot boxes as preregistered because,
685 although loot boxes were not encountered through gameplay, it is known that loot
686 boxes are implemented by third parties as user-generated content in this game and
687 the developer and publisher of Roblox did not explicitly require that such user-
688 generated loot boxes be blocked from purchase in Belgium.

689

690 Game 50 (*Governor of Poker 3 – Friends* ([Youda Games & Azerion, 2016](#)))) and Game
691 78 (*DRAGON BALL Z DOKKAN BATTLE* ([Akatsuki & Bandai Namco Entertainment,](#)
692 [2015](#))) implemented Isolated-Isolated random reward mechanisms, as defined by
693 Nielsen & Grabarczyk (2019), that provided randomised rewards, but the player did
694 not have to pay real-world money to engage with them. These mechanics would
695 have been capable of constituting a paid loot box (specifically, an Embedded-
696 Isolated random rewards mechanism); however, both games took technical
697 measures to prevent loot box purchase from within Belgium using real-world
698 money. Specifically, the coder was prevented from spending real-world money to
699 purchase the ‘premium’ virtual currency that would then be used to purchase loot
700 boxes. The Apple App Store payment pop-up screen was rendered inaccessible. In
701 Game 50, a pop-up window appeared indicating that ‘Buying virtual items is no
702 longer possible in Belgium,’ as shown in Figure 12. In Game 78, the in-game shop
703 simply did not display any premium currency as being purchasable without
704 providing any explanation, as shown in the left pane of Figure 23. These two games
705 were therefore compliant with Belgian law (due to the inability of the coder to
706 purchase loot boxes using real-world money) and accordingly coded as not
707 containing paid loot boxes. Exploratory analysis was conducted to attempt to
708 circumvent the technical measures implemented in both games, as detailed below.

709



710

711 **Figure 12. A pop-up window appeared to prevent any in-game purchase in Game 50 (*Governor of***
712 ***Poker 3 – Friends*) when this was attempted in geographical and jurisdictional Belgium without**
713 **attempting any circumvention. © 2022 Youda Games & Azerion.**

714 Hypothesis 1 was rejected because 82 (which is more than two) of the 100 highest-
715 grossing Belgian iPhone games contained paid loot boxes.

716

717 Hypothesis 2 was rejected because 69 (which is more than two) of the 86 highest-
718 grossing Belgian iPhone games that received an Apple Age Rating of 4+, 9+, or 12+
719 (*i.e., not 17+*) contained paid loot boxes.

720

721 In response to the author asking for the Belgian Gaming Commission to confirm
722 whether any of the games found to contain loot boxes were duly licensed in an email
723 dated 20 June 2022, the Commission stated in a meeting with the author on 24 June
724 2022 that this could be manually checked by the author and referred the author to
725 Using public resources provided by the Belgian Gaming Commission (specifically,
726 an exhaustive list of companies that are licensed to provide gambling services in
727 Belgium^[79]), Using that list, it was determined that none of the 82 games found to be
728 offering loot boxes for sale in Belgium (0.0%) were duly licensed. *Identity V*, the
729 game operated by the same company as the removed Game 36, was also not
730 licensed. Indeed, under the current gambling law regulatory regime in Belgium, the
731 Belgian Gaming Commission is not legally empowered to be able to approve and
732 license the provision of loot boxes or any randomised monetisation methods in
733 video games as gambling (given that these cannot fit under any recognised licence
734 categories), so no video game company can even apply for a licence, let alone
735 successfully obtain one. The Belgian Gaming Commission has confirmed this legal
736 point in the samea meeting with the author on 24 June 2022.

737

738 Hypothesis 3 was rejected using a binomial test (two-sided test, $p = .05$), which
739 revealed that the Belgian loot box prevalence rate of 82.0% was significantly higher
740 ($p < .001$) than the hypothetical 65.0% prevalence rate.

741

742 ~~In relation to Hypothesis 3, to err on the side of caution, a non-preregistered test was~~
743 ~~conducted to address the potential concern that the considerable prevalence of~~
744 ~~‘social casino games’ or ‘simulated casino games’ (which are video games in which~~
745 ~~‘players can spend real-world money to buy more stakes to continue participating in~~
746 ~~simulated gambling’^[75]) amongst the sample may have overly exaggerated the~~

747 prevalence of 'loot boxes' (widely defined) in Belgium. The Belgian Gaming
748 Commission does recognise the randomised monetisation methods in 'simulated
749 casino games' games as constituting 'gambling' (*i.e.*, there is *no* distinction between
750 the two concepts in Belgium in contrast to in most other countries where the two are
751 treated differently in law as 'simulated casino games' are not seen as gambling and
752 not recognised as legally constituting 'gambling' elsewhere). However, there is
753 debate within the academic literature as to whether 'simulated casino games'
754 should, by definition, be deemed as 'containing loot boxes' or an Embedded-Isolated
755 random reward mechanism^[75,81]. The coder deemed 15 of the 100 games to be
756 'simulated casino games' (15.0%). Amongst the other 85 non-'simulated casino
757 games,' 68 contained loot boxes (80.0%). A binomial test (two-sided test, $p = .05$)
758 revealed that the Belgian loot box prevalence rate amongst non-'simulated casino
759 games' of 80.0% was still significantly higher ($p = .003$) than the hypothetical 65.0%
760 prevalence rate.

762 **3.1.2. Potential circumvention of the ban**

763 Hypothesis 4 was accepted because all three preregistered potential circumventions
764 of the Belgian ban in the three examined games were successful. Pre-downloaded
765 UK versions of the games worked without any hindrance and allowed loot box
766 purchase within geographical and jurisdictional Belgium, regardless of the Apple
767 ID's Country/Region settings being set to the UK or Belgium. The coder was also
768 able to download the UK versions of the games from within Belgium and access the
769 in-game loot box purchase pages and Apple App Store payment pop-up screens.

770
771 One further potential circumvention was attempted successfully through
772 exploratory analysis. The three games that were preregistered to be examined all
773 continued to be available on the Belgian national Apple App Store. Some games (*e.g.*,
774 *Fire Emblem Heroes* (Nintendo, 2017) and *Animal Crossing: Pocket Camp* (Nintendo,
775 2017)) were known to have been removed from the Belgian store entirely. It was not
776 known whether such games could still be downloaded from within geographical
777 and jurisdictional Belgium by setting the Apple ID's Country/Region settings to a
778 country where those games remain available, *e.g.*, the UK. During the data collection
779 period, Blizzard Entertainment decided not to publish *Diablo Immortal* (Blizzard
780 Entertainment & NetEase, 2022) in Belgium and the Netherlands, citing 'the current
781 operating environment for games in those countries,'^[82] which can reasonably be

782 ~~inferred to mean these two countries' loot box regulation^[83].² The coder was indeed~~
783 ~~unable to find or download *Diablo Immortal* from the Belgian Apple App Store.~~
784 ~~However, the coder was able to do so by setting the Apple ID's Country/Region~~
785 ~~settings to the UK and downloading the game from the UK Apple App Store whilst~~
786 ~~within geographical and jurisdictional Belgium. The premium currency used to~~
787 ~~purchase the loot boxes implemented in *Diablo Immortal* was also purchasable using~~
788 ~~real-world money from within Belgium. This shows that any corporate actions to~~
789 ~~remove or not publish a certain game containing loot boxes in Belgium specifically~~
790 ~~can be easily circumvented if that game continues to be available on another~~
791 ~~country's Apple App Store.~~

792 **3.2. Exploratory analysis**

793 **3.2.1. Another game operated by the same operator as the removed Game 36**

794 NetEase, the company operating Game 36, also operated another relatively popular
795 game, *Identity V* (NetEase, 2018), that was not within the highest-grossing list
796 studied. *Identity V* was known to contain loot boxes in the UK and in the PRC but
797 has not been removed from any countries' Apple App Store as of 7 June 2022.
798 Exploratory analysis revealed that the Belgian version of *Identity V* continued to
799 contain paid loot boxes in Belgium.

801 **3.2.2. Excluding social casino games from the analysis for Hypothesis 3**

802 In relation to Hypothesis 3, to err on the side of caution, an exploratory test was
803 conducted to address the potential concern that the considerable prevalence of
804 'social casino games' or 'simulated casino games' (which are video games in which
805 'players can spend real-world money to buy more stakes to continue participating in
806 simulated gambling'^[75]) amongst the sample may have overly exaggerated the
807 prevalence of 'loot boxes' (widely defined) in Belgium. The Belgian Gaming
808 Commission does recognise the randomised monetisation methods in 'simulated
809 casino games' games as constituting 'gambling' (i.e., there is no distinction between
810 the two concepts in Belgium in contrast to in most other countries where the two are
811 treated differently in law as 'simulated casino games' are not seen as gambling and
812 not recognised as legally constituting 'gambling' elsewhere). However, there is
813 debate within the academic literature as to whether 'simulated casino games'
814 should, by definition, be deemed as 'containing loot boxes' or an Embedded-Isolated
815 random reward mechanism^[75,80]. The coder deemed 15 of the 100 games to be

² For the Dutch law position on loot boxes in video games, see Xiao & Declerck (2022)^[84].

816 'simulated casino games' (15.0%). This was defined as any games that allowed the
817 player to spend real-world money to participate in simulated traditional gambling
818 activities, i.e., 'games of chance' or 'mixed games of chance and skill,' such as slot
819 machines, poker, bingo, belote, and craps. Particular attention is drawn to Game 77
820 (UNO!TM (Mattel163, 2018)), which was coded as a social casino game because it
821 involved players competing against each other to win or lose premium virtual
822 currency (similarly to social casino games involving poker) whilst playing a
823 simulated version of the tabletop game UNO (1971, Robbins), which itself is a mixed
824 game of chance and skill that has reportedly been played physically as a form of
825 gambling^[81]. Amongst the other 85 non-'simulated casino games,' 68 contained loot
826 boxes (80.0%). A binomial test (two-sided test, $p = .05$) revealed that the Belgian loot
827 box prevalence rate amongst non-'simulated casino games' of 80.0% was still
828 significantly higher ($p = .003$) than the hypothetical 65.0% prevalence rate.
829

830 **3.2.3. Circumvention of the removal of games from the Belgian market**

831 One further potential circumvention was attempted successfully through
832 exploratory analysis. The three games that were preregistered to be examined all
833 continued to be available on the Belgian national Apple App Store. Some games (e.g.,
834 *Fire Emblem Heroes* (Nintendo, 2017) and *Animal Crossing: Pocket Camp* (Nintendo,
835 2017)) were known to have been removed from the Belgian store entirely. It was not
836 known whether such games could still be downloaded from within geographical
837 and jurisdictional Belgium by setting the Apple ID's Country/Region settings to a
838 country where those games remain available, e.g., the UK. During the data collection
839 period, Blizzard Entertainment decided not to publish *Diablo Immortal* (Blizzard
840 Entertainment & NetEase, 2022) in Belgium and the Netherlands, citing 'the current
841 operating environment for games in those countries,'^[82] which can reasonably be
842 inferred to mean these two countries' loot box regulation^[83].³ The coder was indeed
843 unable to find or download *Diablo Immortal* from the Belgian Apple App Store.
844 However, the coder was able to do so by setting the Apple ID's Country/Region
845 settings to the UK and downloading the game from the UK Apple App Store whilst
846 within geographical and jurisdictional Belgium. The premium currency used to
847 purchase the loot boxes implemented in *Diablo Immortal* was also purchasable using
848 real-world money from within Belgium. This shows that any corporate actions to
849 remove or not publish a certain game containing loot boxes in Belgium specifically

³ For the Dutch law position on loot boxes in video games, see Xiao & Declerck (2022)^[84].

850 can be easily circumvented if that game continues to be available on another
851 country's Apple App Store.

852

853 **3.2.43. Exploratory analysis: Games that actively prevented loot box purchase**

854 Of the 84 games that were potentially capable of selling loot boxes in exchange for
855 real-world money (the 82 games containing paid loot boxes plus Games 50 and 78),
856 only two games (2.4%) took technical measures to prevent loot box purchase with
857 fiat currency.

858

859 Game 50 prevented *all* in-game purchases: cosmetic items that were entirely
860 unrelated with any randomised monetisation methods were also not purchasable
861 with real-world money. Attempts to make *any* in-game purchases in Game 50 failed.
862 This state-of-affairs was illogical, because if all in-game purchases were blocked,
863 then this game could not therefore gross *any* money at all and so surely should not
864 be capable of being the 50th high-grossing game on the Belgian Apple App Store.

865 The present study could not determine what exact technical measures were taken to
866 block in-game purchase from within Belgium. However, two methods to circumvent
867 the technical measures were attempted to make an educated guess. Firstly, using a
868 VPN from within Belgium to spoof one's IP address to be non-Belgian, and secondly,
869 taking the Belgian version of the game outside of the country. Whilst within
870 geographical and jurisdictional Belgium, Proton VPN was used to change the
871 coder's IP address to Japan. Purchases for the premium currency were then
872 attempted on the same Belgian Apple ID and user account, and these were not
873 blocked (as the pop-up window shown in Figure 12 did not appear) and were
874 instead allowed to advance to the Apple App Store payment pop-up screen. Turning
875 off the VPN promptly made virtual items unpurchasable again. Secondly, the phone
876 containing the Belgian version of the game and with Belgian Apple App Store
877 settings was physically brought outside of geographical and jurisdictional Belgium.
878 When the coder was in Warsaw, Poland, in-game purchasing was possible similar to
879 when a VPN was turned on. Game 50 did not ask for, and did not have, permission
880 to access the coder's phone's geographical location. Therefore, it is likely that the
881 technical measure that has been taken was a simple IP address check to confirm
882 whether the player is within Belgium. This block on in-game purchase being easily
883 circumventable may partially explains why Game 50 still managed to gross money
884 through the Belgian Apple App Store, despite Belgian players being (in theory)

885 prevented from purchasing anything. The fact that Game 50 remains a high-grossing
886 game suggests that a considerable number of Belgian players are likely
887 circumventing this technical measure. ~~although also note that the technical measure~~
888 ~~did work to a certain degree^[85]. Figure 4 shows a number of reviews left by users on~~
889 ~~the Belgian Apple App Store for Game 50 that clearly indicates that at least some~~
890 ~~players were frustrated by the inability to purchase premium currencies in Belgium~~
891 ~~(and it seems that these players were unable to, or did not want to, circumvent the~~
892 ~~technical measure), as detailed below.~~ Regardless of its imperfect efficacy, Game 50
893 should still be commended for at least attempting to implement a technical block on
894 loot box purchase from within Belgium because it might have successfully prevented
895 some players from spending money: analysing user reviews of the game, which is
896 beyond the ambit of the present study, may shed further light on that point. Turning
897 on a Japanese VPN and being physically in Poland similarly allowed the coder to
898 purchase the premium currency required to buy loot boxes in Game 78, as shown in
899 the right pane of Figure 23.^[86]

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901

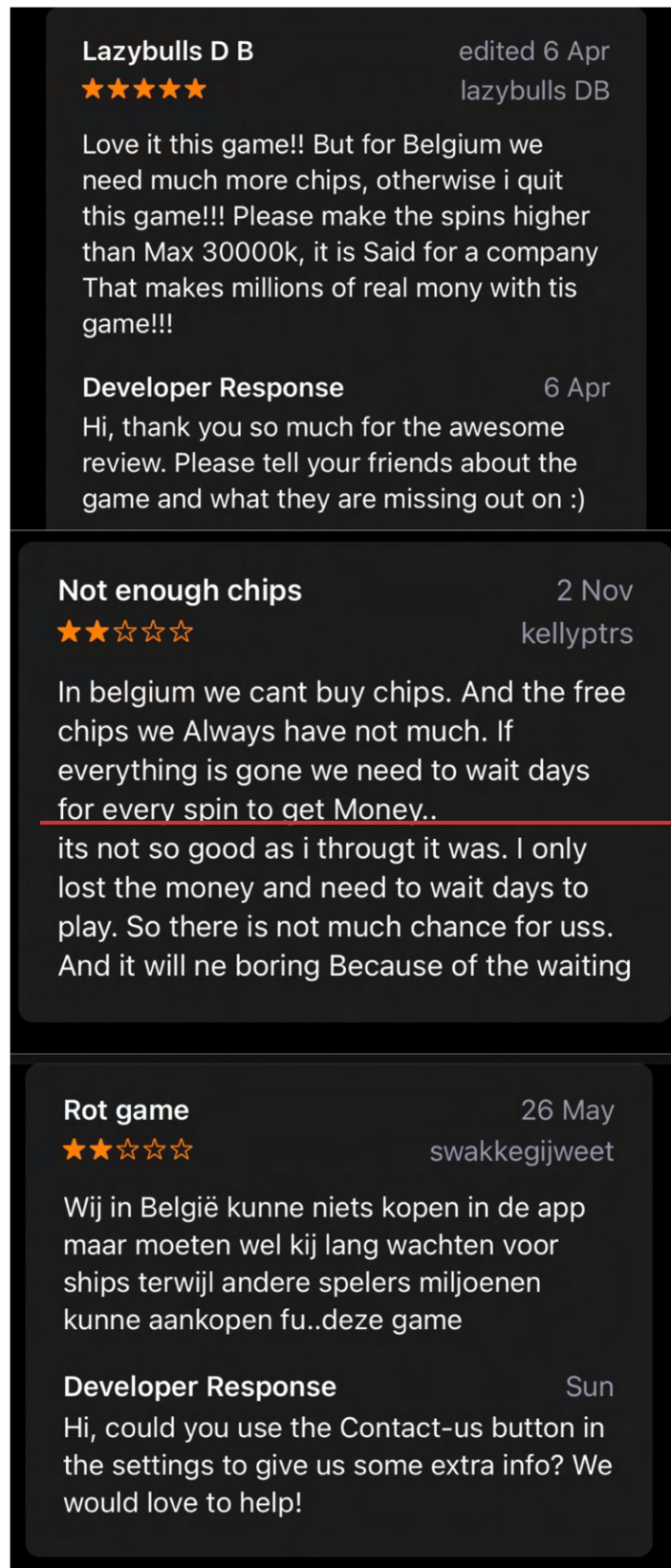
902 Immediately prior to the coder's physical departure from geographical and
903 jurisdictional Belgium on 2 July 2022, in-game purchasing was attempted again in
904 both Games 50 and 78 whilst at Brussels International Airport. For reasons
905 unknown, in-game purchase was possible in Game 50 temporarily without any
906 attempted circumventions (e.g., no VPN was switched on). The pop-up window
907 shown in Figure 12 did not appear, and the coder was able to access the Apple App
908 Store payment pop-up screen. Relevant screenshots are available at the data deposit
909 link. This again demonstrates that the technical measures taken might fail at times.
910 In-game purchasing was again rendered not possible in Game 50 when attempted 10
911 and 40 minutes after the initial successful attempt at Brussels International Airport.
912 In-game purchasing remained not possible in Game 78 when no circumvention was
913 attempted. Temporary failures of the technical measures, without the player
914 intentionally trying to circumvent them, represent another potential reason why
915 these two games have continued to nonetheless generate revenue from Belgium.

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Figure 23. 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. © 2022 Akatsuki Inc. & Bandai Namco Entertainment



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Figure 4. Reviews left by users on the Belgian Apple App Store for Game 50 (*Governor of Poker 3 – Friends*). The translation for the third review originally written in Flemish is as follows: ‘We in Belgium can’t buy anything in the app but we have to wait a long time for ships [*recte* chips; referring to the game’s premium currency] while other players can buy millions for this game’. © 2022 Apple & the relevant users and customer support agents, if applicable

933 **3.2.54. Exploratory analysis: Comparability with previous studies in other**
934 **countries**

935 Peer review comments of the present study's stage 1 registered report manuscript
936 suggested that context should be provided as to how comparable the present results
937 are to those of previous studies^[85]. The 100 highest-grossing iPhone games in the UK
938 on 28 May 2022 was compared with the Belgian list (including Game 36, which was,
939 however, excluded from the present study's sample): 701 games (701.0%) appeared
940 on both lists. Amongst the 50 highest-grossing games, the overlap of 42 games
941 (84.0%) was even more apparent. This demonstrates that there is a substantial degree
942 of similarity between the two countries' highest-grossing lists, and that the results
943 from these two countries are reasonably comparable, if done with some caution.
944 Additionally, the 50 highest-grossing list of Android games in Belgium on 21 June
945 2021 (Xiao et al. (2021)'s UK data collection date^[5]) and the list on 28 May 2022 were
946 compared: 35 games (70.0%) appeared on both lists. This further supports the direct
947 comparison of the UK results of Xiao *et al.* (2021) with that of the present study. Data
948 for the Android platform was used because the relevant historical iPhone data were
949 no longer accessible. Zendle *et al.* (2020) has previously found near identical loot box
950 prevalence rates on the Android and iPhone markets in 2019. For reference, 70% of
951 the 100 and 88.0% of the 50 highest-grossing games on the iPhone and Android
952 platforms in Belgium overlapped on 28 May 2022.

953
954
955 In relation to Hypothesis 3, to err on the side of caution, a non-preregistered test was
956 conducted to address the potential concern that the considerable prevalence of
957 'social casino games' or 'simulated casino games' (which are video games in which
958 'players can spend real-world money to buy more stakes to continue participating in
959 simulated gambling'^[75]) amongst the sample may have overly exaggerated the
960 prevalence of 'loot boxes' (widely defined) in Belgium. The Belgian Gaming
961 Commission does recognise the randomised monetisation methods in 'simulated
962 casino games' games as constituting 'gambling' (i.e., there is no distinction between
963 the two concepts in Belgium in contrast to in most other countries where the two are
964 treated differently in law as 'simulated casino games' are not seen as gambling and
965 not recognised as legally constituting 'gambling' elsewhere). However, there is
966 debate within the academic literature as to whether 'simulated casino games'
967 should, by definition, be deemed as 'containing loot boxes' or an Embedded-Isolated

968 random reward mechanism^[75,81]. The coder deemed 15 of the 100 games to be
969 'simulated casino games' (15.0%). Amongst the other 85 non-'simulated casino
970 games,' 68 contained loot boxes (80.0%). A binomial test (two-sided test, $p = .05$)
971 revealed that the Belgian loot box prevalence rate amongst non-'simulated casino
972 games' of 80.0% was still significantly higher ($p = .003$) than the hypothetical 65.0%
973 prevalence rate.

975 4. Discussion

976 4.1. No reduction to Belgian loot box prevalence

977 As of mid-2022, 82.0%, the vast majority, of the highest-grossing iPhone games in
978 Belgium continued to sell loot boxes for real-world money and seemingly continued
979 to heavily rely on such randomised mechanics to monetise and generate revenue.
980 For the avoidance of doubt, in each of these 82 games, players were able to either
981 directly spend real-world money, or indirectly spend premium currency that is
982 purchasable using real-world money, to engage in-with a randomised monetisation
983 method whose results are unknown at the point of purchase. The Belgian Gaming
984 Commission has confirmed that 'loot boxes' as defined by the present study's
985 Method section would legally be legally recognised as 'gambling' in Belgium
986 according to the Commission's interpretation in a meeting with the author on 24
987 June 2022.

988
989 The Belgian 'ban' on loot boxes, as instituted by the Belgian Gaming Commission
990 through the pronouncement of its interpretation of the law and its threat of criminal
991 prosecution of non-compliant companies in April 2018^[44], did not appear to have an
992 effect on the prevalence of paid loot boxes four years after the event. Certain well-
993 known companies have taken compliance actions by either removing the ability to
994 purchase loot boxes with real-world money from their games or removing their
995 games (that rely on loot boxes to generate revenue) from the Belgian market
996 entirely^[56-59]. As recently as June 2022, Blizzard Entertainment actively complied
997 with the ban by not publishing *Diablo Immortal* in Belgium^[82]. However, these widely
998 reported instances of compliance by well-known companies appear to be the
999 exceptions rather than the rule. Other companies have had four years to comply
1000 with the law and evidently have yet to do so.

1002 The mid-2022 Belgian loot box prevalence rate of 82.0% is numerically higher than
1003 the mid-2021 UK loot box prevalence rate of 77% (where no effective loot box
1004 regulation has been imposed or enforced)^[5]. However, this could simply be due to
1005 loot boxes becoming increasingly more prevalent due to the passage of time, which
1006 is a general trend that has previously been observed amongst UK iPhone games^[75].
1007 Therefore, no point is taken in relation to this higher value in Belgium. It should *not*
1008 be suggested that loot box prevalence has somehow become higher due to, or
1009 despite, the ban. The present study provides evidence that the Belgian ban does not
1010 appear to have effectively *reduced* loot box prevalence.

1011
1012 In short, the Belgian ‘ban,’ as implemented, has not been effective at reducing the
1013 broad availability of opportunities to purchase loot boxes. The high loot box
1014 prevalence rate on the Belgian [anum](#) Apple App Store [showsevinces](#) that loot boxes
1015 continue to be widely available and easily accessible to video game players,
1016 including children. Table 1 shows a trend that games are more likely to contain loot
1017 boxes as their age ratings increase; however, notably 54.2% of the games [rated](#)
1018 [deemed suitable for children aged 4+](#) (the lowest available age rating) still contained
1019 loot boxes. Importantly, although the ban may have caused some games containing
1020 loot boxes to be removed, those removed games’ positions on the highest-grossing
1021 list appear to have simply been replaced by non-compliant games from other
1022 companies that continue to contain loot boxes. This represents the first negative
1023 consequence of [these unenforced ‘ban.’](#) The (generally more well-known) companies
1024 that did comply with the law by removing or not publishing their games likely cared
1025 more about protecting their reputations and ensuring compliance with the law [than](#)
1026 [lesser-known companies](#). It would seem that the since ‘vacated’ positions on the
1027 highest-grossing list were then replaced with games from more unscrupulous (or at
1028 least less well-resourced) companies that either actively decided not to comply with
1029 the law or were unaware of their legal responsibilities to comply with the ban. It is
1030 not unreasonable to suggest that the since removed and unpublished games likely
1031 would have been more compliant with other legal requirements (*e.g.*, data protection
1032 law) and offered better consumer protection measures in relation to loot boxes than
1033 the non-compliant games currently do, for example, in terms of potentially making
1034 more prominent and accessible loot box probability disclosures^[3] and providing
1035 better customer service (*e.g.*, being more responsive to parents’ refund requests for
1036 unpermitted spending by children). Whether more established video game

1037 companies (*e.g.*, those that have international legal, compliance, and localisation
1038 teams and are more heavily scrutinised by players, policymakers, and the press)
1039 might generally offer better consumer protection than smaller companies should be
1040 assessed by future research.

1041
1042 -In summary, contrary to improving the consumer protection provided to Belgian
1043 players as intended, the 'ban' might have had the unintended, opposite effect of
1044 creating a more dangerous environment for players. The market has shifted towards
1045 higher risk illegal providers. Compliant companies are making less or no revenue:
1046 assuming that the amount of money spent by players on video games did not
1047 change following the ban, the non-compliant companies have dishonestly taken a
1048 share of that revenue away from compliant companies by implementing illegal loot
1049 boxes, when that revenue should have now gone to the compliant companies' non-
1050 loot box-related monetisation methods. Crime must not pay; the law should never
1051 put companies in a position whereby breaking the law becomes more profitable than
1052 following it.

1053
1054 Other variables, such as the operators' country of origin, might also affect whether a
1055 company is more or less likely to comply: for example, it is worth noting that Game
1056 50 (one of two games that took technical measures to prevent loot box purchase in
1057 Belgium) was developed and published by Youda Games and Azerion, both of
1058 which are based in Amsterdam, the Netherlands, a neighbouring country that shares
1059 close cultural and linguistic links with Belgium, and in which the potential illegality
1060 of loot boxes has been recently highlighted. These two Dutch companies might have
1061 more actively complied with the Belgian ban because they were more aware of the
1062 regulatory environment in Belgium. Note, however, that Game 78 (the other game
1063 that blocked loot box purchase in Belgium) was developed and published by
1064 Japanese companies, although the publisher, Bandai Namco Entertainment, is one of
1065 the largest multinational video game companies in the world in terms of revenue^[86]
1066 and therefore likely was well-resourced and had a knowledgeable compliance team.
1067 It is worth noting here that maybe some (or even many) of the companies found to
1068 still be selling loot boxes in Belgium did not maliciously and knowingly chose not to
1069 comply with the law but simply lacked sufficient local awareness and resources to
1070 be aware of the ban. Follow-up research on the individual companies as to their
1071 compliance decisions (or lack of whichthem) might prove fruitful at revealing what

1072 measures could be taken to ensure that they become better informed of, or better
1073 able to comply with, their legal responsibilities.

1074
1075 Finally, a previous study has also noted that the likelihood and effectiveness of the
1076 companies' compliance might also be affected by game 'genre' and the relative
1077 importance of loot boxes as a monetisation method when compared to other in-game
1078 microtransactions in a particular game (both financially and in relation to the 'core
1079 game loop'^[87] (*i.e.*, the essential sequence of actions that are repeated by the player
1080 over and over again to engage with the game))^[5]. Player communities might expect
1081 more from, and exert more pressure on, certain games. Game 50 is a simulated
1082 casino game in which using the purchased premium currency to engage with
1083 simulated gambling activities (*i.e.*, the 'loot boxes') forms the core game loop. (As an
1084 aside, besides the fact that Game 50 is still grossing a significant amount of money
1085 from Belgium despite the technical block, one reason why the game remains
1086 available in the market and was not removed despite technically not being able to
1087 generate any revenue from Belgium is that this game is a multiplayer game. The
1088 non-paying Belgian players do provide something of value to the company: these
1089 players' presence and participation allow other paying players in from other
1090 countries to compete against human players (rather than bots) and potentially have
1091 more 'fun.'). Game 78 is a so-called 'gacha' game in which loot boxes are the
1092 principal monetisation method and the player's gameplay progression revolves
1093 around engaging with the loot box mechanic^[88]. Loot box mechanics are
1094 fundamental to these two games' designs, which might explain why the companies
1095 operating these two games were more mindful about complying with the Belgian
1096 ban. However, note also that many of the non-compliant games identified by the
1097 present study would also fall broadly within the definition of a simulated casino
1098 game or a gacha game.

1099 1100 **4.2. A toothless 'ban' that is not really a 'ban' in practice**

1101 The Belgian 'ban' on loot boxes is not, at its essence, a true 'ban' of the product. The
1102 Belgian Gaming Commission did issue a report opining that loot boxes that require
1103 payment of real-world money to purchase constitute gambling and are illegal if
1104 offered without a gambling licence^[44]. However, that report was issued only on the
1105 basis of the in-depth examination of four then-popular video games^[44(p. 18)]. The
1106 Belgian Gaming Commission has not reportedly taken any further action in relation

1107 to loot boxes since then, which means that the Belgian courts haves not had the
1108 opportunity to confirm whether that interpretation is indeed valid. Contrast here
1109 with how the Dutch gambling regulator's previous interpretation of the law, which
1110 sought to outlaw certain implementations of loot boxes, has been applied in practice
1111 but has since been overruled by the Dutch court^[84]. The Dutch regulatory position on
1112 loot boxes is therefore certain. In contrast, the Belgian Gaming Commission's
1113 interpretation has neither been enforced nor challenged in court, which means that
1114 its correctness is uncertain, despite popular support by the academic legal
1115 literature^[10,11,38]. Besides merely pronouncing its interpretation of the law and
1116 threatening criminal prosecution of non-compliant companies^[89], the Belgian
1117 Gaming Commission has not attempted to *actively* enforce that interpretation in
1118 practice by actually criminally prosecuting non-compliant companies for
1119 implementing loot boxes or seeking to otherwise remove loot boxes from the
1120 national market. The Belgian Gaming Commission has only *passively* waited for
1121 companies to comply: a few did, but most did not. It is entirely unsurprising that
1122 merely stating that the sale of a product (in this case, loot boxes) is illegal under
1123 existing law, without also actively taking enforcement actions, did not lead to
1124 widespread compliance. Consider here, in contrast, how enforcement actions are
1125 actively taken by the police of many countries in relation to criminalised or
1126 otherwise controlled products and services, e.g., psychoactive drugs and weapons.
1127 Indeed, the Belgian Gaming Commission does take active enforcement actions
1128 against websites offering more traditional forms of illegal gambling (e.g., blackjack)
1129 by identifying them on a published list in addition to threatening a fine^[90,91]. Loot
1130 boxes, however, were not subjected to similar enforcement actions.

1132 **4.3. The positives: drawing attention to the issue and encouraging public debate** 1133 **and providing some protection**

1134 In terms of the benefits of the Belgian regulatory approach as it stands, the initial
1135 publication of the Belgian 'ban' on loot boxes by the Belgian Gaming Commission
1136 led to popular reporting and public discussion and debate of the loot box issue in
1137 Belgium and in other countries^[92], which were of benefit to the consumers of all
1138 countries by facilitating better awareness of this issue and the potential harms of loot
1139 boxes. Indeed, policymakers,^{[47(pp. 33, paras 92–93)][49(p. 111, para 427)]} regulators,^[93(p. 6)] the
1140 media,^[55] and some players^[see 94] in other countries often pointed to Belgium as a
1141 good example of taking proactive action to address loot box harms and argued for

1142 their own countries to emulate the Belgian approach. Undoubtedly, the Belgian ‘ban’
1143 has advanced the international debate on whether loot boxes should be regulated as
1144 gambling or otherwise, and this positive impact of the ‘ban’ should be duly
1145 recognised.

1146
1147 Further, it must be recognised that (i) loot boxes have been removed from Belgian
1148 versions of some popular games^[e.g., 56] and (ii) a number of other popular games have
1149 been removed from, or were not published in, the Belgian market^[e.g., 59,82,83]. Some
1150 Belgian players might therefore have been successfully prevented from being able to
1151 purchase loot boxes from these games and potential opportunities to be exposed to
1152 loot boxes generally (particularly in relation to children and young people) may
1153 have been reduced, despite other games containing loot boxes continuing to be
1154 available. However, ~~although~~ what percentage of Belgian players that represents is
1155 unknown and by how much (if any) average loot box spending has reduced remains
1156 the subjects of further research. Although referred to as a ‘ban,’ perhaps the
1157 complete elimination of the product from the Belgian market is not necessarily a goal
1158 that the measure must achieve for it to be deemed ‘successful.’ Even when
1159 imperfectly enforced, a ‘ban’ that potentially leads to reduced exposure to loot boxes
1160 and thereby provides better protection is still arguably ~~of~~ a benefit to many
1161 consumers.

1162

1163 **4.4. The negatives: a false sense of security**

1164 However, the manner in which the ‘ban’ was then subsequently enforced (or rather,
1165 not enforced at all) has a number of potential negative consequences that arguably
1166 render the ban worse than doing nothing at all. Firstly, by supposedly imposing a
1167 ‘ban,’ the Belgian Gaming Commission gave video game consumers (including
1168 children and parents of young players) the false impression that Belgian players are
1169 now safe from loot boxes because the mechanic has been deemed illegal under
1170 gambling law, ‘banned,’ and therefore eliminated from the Belgian market. In
1171 reality, loot boxes are evidently still widely available for purchase, and their
1172 potential harms have not been removed from the country and may have reduced
1173 only to a limited extent (which is due to the actions of the finite number of complaint
1174 companies), indeed, it seems that their potential harms have not even been reduced
1175 at all. This unfortunate state~~of~~ affairs is potentially harmful because consumers
1176 might have been lulled into a false sense of security because they might think that

1177 the loot box ‘problem’ has been completely resolved by the ‘ban’ imposed by the
1178 Belgian Gaming Commission. For example, a player choosing to be less careful with
1179 their in-game spending or a parent deciding not to educate their child about loot
1180 boxes because they have been falsely assured that there is no longer any risk of
1181 harm).

1182
1183 More concerningly, Belgian policymakers and the Belgian Gaming Commission
1184 itself might also have been under the same wrong impression that Belgian
1185 consumers are already adequately protected. For example, Belgian legislators might
1186 be less willing to update the country’s gambling law to specifically regulate loot
1187 boxes because they might deem the situation as having already been resolved. The
1188 Belgian Gaming Commission might also have not been more active with enforcing
1189 the law because it has not monitored whether its ‘ban’ has been effective, potentially
1190 because of the same incorrect assumption.

1191
1192 As an aside, this regulatory approach of merely pronouncing an interpretation of the
1193 law that recognises certain loot box implementations as illegal but then not actively
1194 enforcing that interpretation against non-compliant companies (and thereby
1195 potentially creating a false impression that the law has been duly enforced) is what
1196 the relevant gambling regulators have done in the UK and Denmark (and other
1197 countries) in relation to loot boxes that require real-world money to purchase and
1198 provide rewards that can be transferred to other players in exchange for real-world
1199 monetary value.^[95] This lack of enforcement actions is likely why certain games, *e.g.*,
1200 *Magic: The Gathering Online* (Wizards of the Coast, 2002), containing loot boxes that
1201 arguably infringe relevant gambling laws as interpreted by the national regulators
1202 remain available and have not been forcibly removed from those markets^[96].

1204 **4.5. Criminalisation: the ‘forbidden fruit effect’ and stigmatisation**

1205 Moving beyond how the ‘ban’ has been practically applied in Belgium, consideration
1206 should also be given to the negative consequences of this restrictive approach on a
1207 theoretical level, even if the ban is perfectly enforced. The very act of prohibiting a
1208 product potentially leads to a number of adverse effects. The so-called ‘forbidden
1209 fruit effect’ has been identified in relation to media content^[97,98], including video
1210 games specifically^[99]. Products that are prohibited becomes more appealing to young
1211 people precisely because they are deemed ‘forbidden.’ This might apply to loot

1212 boxes in the sense that some Belgian children might now be more interested in
1213 purchasing loot boxes because these products have been deemed ‘illegal’ or
1214 ‘banned.’ The same might even be true in relation to adults because no video game
1215 loot boxes have been duly licensed as regulated gambling by the Belgian Gaming
1216 Commission (as the regulator is not legally empowered to approve and license any
1217 randomised monetisation methods in video games, specifically) and therefore all
1218 video game loot boxes remain unlicensed and technically ‘illegal,’ even when
1219 engaged with only by adults.

1220

1221 Indeed, the criminalisation of the purchasing of loot boxes is problematic. It must be
1222 recalled that Article 4(2) of the Belgian Gambling Act of 7 May 1999 states that: ‘It is
1223 prohibited for anyone to participate in a game of chance ... when the person
1224 involved knows that it concerns the operation of a game of chance or a gaming
1225 establishment which is not licensed in accordance with this Act.’ In relation to
1226 unlicensed websites offering more traditional forms of illegal gambling, the Belgian
1227 Gaming Commission warns would-be punters that ‘Gambling on an illegal
1228 gambling site is even punishable by law! Players can be fined between €26 and
1229 €25,000 (multiplied by a multiplication factor) if they knowingly played on an illegal
1230 gambling site^[90].’ Most Belgian loot box purchasers can likely escape liability by
1231 arguing that they were not aware of the video game company not having been duly
1232 licensed to provide gambling services, and it would appear highly unlikely for any
1233 Belgian loot box purchaser to be criminally prosecuted simply for fairness reasons
1234 (due to the unclarity and uncertainty of the Belgian legal position on loot boxes,
1235 given that the law does not explicitly say that loot boxes constitute illegal gambling
1236 and that the Belgian Gaming Commission merely provided its, as yet unchallenged,
1237 interpretation of the law that has not been confirmed by the court).

1238

1239 However, given that any and all loot box purchasing is technically criminalised,
1240 players experiencing excessive loot box engagement and suffering harms from
1241 overspending might be less willing to seek help and treatment. This stigmatisation
1242 of loot box purchasing potentially increases the severity of the harms that at-risk
1243 players might ~~suffer experience. Finally, although this has yet been empirically~~
1244 ~~tested, loot boxes in video games potentially teach children about the potential~~
1245 ~~harms of engaging with gambling or gambling-like products (i.e., the risks of losing~~
1246 ~~money to random chance). Note here how collectible and trading card packs (which~~

1247 many children did engage with in the past number of decades) have generally been
1248 deemed as socially acceptable and not constituting gambling, in contrast to loot
1249 boxes^[100,101]. Not having been exposed to this ‘educational tool’ and arguably safer
1250 form of ‘gambling’ (due to it being rather difficult to truly lose large sums of money
1251 on loot boxes) during childhood development might mean that the video game
1252 player becomes more easily harmed by traditional gambling upon reaching the legal
1253 gambling age and suddenly have access to those regulated but nonetheless available
1254 products. How gambling behaviours will now potentially develop differently in
1255 Belgian young people and emerging adults especially, as compared to those of other
1256 countries, due to Belgium’s unique regulatory position, should be studied. Other
1257 potential disadvantages of an effectively enforced ban should be subject to future
1258 studies (e.g., the potential loss and unfair distribution of economic opportunities for
1259 companies and negative impacts on players’ gameplay experience, including
1260 rendering Belgian players uncompetitive particularly in relation to esports games
1261 that require loot box purchasing to gain gameplay advantages) should be subject to
1262 future studies.

1263

1264 **4.6. An overly restrictive approach is worse for both companies and players**

1265 From a public health perspective, a complete ban of the product or ‘eliminate choice’
1266 is the most restrictive regulatory intervention for addressing potential harms^[95].

1267 Compared to other less restrictive approaches, such as guiding better choices
1268 through incentives and disincentives or by changing the default option or simply
1269 providing information to better inform consumers, the only advantage of a ‘ban’ is
1270 that it should, in theory, provide the highest degree of consumer protection in the
1271 sense that all or nearly all risks of harm should have been removed. Unfortunately,
1272 in relation to the Belgian ‘ban,’ it has not achieved this intended perfect or near-
1273 perfect elimination of the risks of the product (which would have been the only
1274 advantage of this extreme regulatory approach as compared to other less restrictive
1275 options). There are many shortcomings to this most restrictive approach in relation
1276 to both video game companies and players.

1277 **4.6.1. Loss of revenue and inequitable distribution of revenue**

1278 Many companies’ primary (if not only) source of revenue, the loot box mechanics,
1279 has been completely restricted. It is reasonable to suggest that Game 50 is now
1280 making less money than it did prior to the ban because it imposed that technical
1281 measure to prevent player purchase from Belgium. The market might also shift

1282 towards higher risk illegal providers, which arguably appears to be occurring in
1283 Belgium when non-compliant companies' games replaced compliant companies'
1284 games on the highest-grossing list. The compliant companies' commercial interests
1285 have been unfairly curtailed: assuming that the amount of money spent by players
1286 on video games did not change following the ban, the non-compliant companies
1287 have dishonestly taken a share of that revenue away with their illegal loot boxes,
1288 when that revenue should have now gone to the compliant companies' non-loot box-
1289 related monetisation methods. Crime must not pay; the law should never put
1290 companies in a position whereby breaking the law becomes more profitable than
1291 following it.

1292

1293 **4.6.2. Fewer choices, less financially accessible, and worse gameplay experience**

1294 Players' consumer experience is also negatively impacted by the ban. In addition to
1295 generating revenue for companies, video game loot boxes also benefit players in the
1296 sense that the amount of financial investment into a game can be more
1297 personalised^[102]. In many games that rely on loot boxes to monetise, players can
1298 choose how much to spend and whether or not to spend any money at all. Many
1299 players are able to enjoy these games for free or for very little money because high-
1300 spending players are effectively financing those video games. The possibilities of
1301 enjoying these games cheaply or trying a wider variety of games before deciding
1302 which one to spend money on have been curtailed following the Belgian ban
1303 considering that some games that are highly popular in other countries have indeed
1304 been removed from Belgium. Had the ban worked perfectly, then the curtailment
1305 would have been even more severe. The gameplay experience of the individual
1306 games that have not been removed and remain available is also potentially
1307 negatively impacted, as demonstrated by the three reviews left by users for Game 50
1308 shown in Figure 4. It is evident from those reviews that at least some players are
1309 finding the gameplay experience to now be worse specifically due to the unique
1310 regulatory situation in Belgium causing them to be unable to purchase more
1311 premium currency, which would have allowed them to play the game more often
1312 and for longer periods of time (as the premium currency in this game is casino chips
1313 that are used to participate in simulated casino games).

1314

1315 It is true that the Belgian 'ban,' or rather the technical measure that Game 50 has
1316 taken to prevent the purchase of premium currency in Belgium, has effectively

1317 protected these players (who did not circumvent the measure) from overspending
1318 money on the loot box mechanics in this game. However, it is not known what
1319 percentage of these players would have actually overspent money on this game and
1320 suffered wider negative social consequences as a result. At least some players would
1321 have been able to spend money wisely and would not have overspent^[88]. For these
1322 players, their enjoyment of Game 50 has diminished, as the Apple App Store reviews
1323 in Figure 4 shows, because they were unable to spend small sums of money to
1324 enhance their gameplay experience. All Belgian players (unless they circumvent the
1325 technical measures that prevent them from purchasing loot boxes in Belgium) are
1326 forced to experience only the 'free-to-play' version of the game, which is often
1327 designed in these games employing this monetisation model to provide a
1328 comparatively poor experience (especially further into the game) in order to
1329 encourage purchase and to convert free-to-play players into paying players. The
1330 gameplay difficulty of many of these games is often also balanced around a player
1331 that would spend at least some money. It is therefore almost inevitable that Belgian
1332 players will have a worse gameplay experience in these games, unless the Belgian
1333 version of the games is specifically designed to provide a superior free-to-play
1334 experience (*e.g.*, by giving players more free loot boxes than in other countries);
1335 however, that is unlikely to happen because companies are not financially
1336 incentivised to improve the gameplay experience of non-paying players who can
1337 never convert into a paying player. Beyond Game 50, this discussion is difficult to
1338 have in a generalisable manner because loot boxes and other in-game purchases are
1339 implemented in widely varied ways in different games (*e.g.*, these games differ as to
1340 how central or peripheral the loot boxes are to the core game loop), and so the 'free-
1341 to-play' experience of some games might remain sufficiently enjoyable and
1342 satisfactory to many players. Individual players' judgement as to whether a given
1343 monetisation strategy (*e.g.*, loot boxes) is 'predatory' or 'just and reasonable' and
1344 whether they find a certain type of gameplay experience to be enjoyable is also
1345 subjective and varied^[103]. Player research should be conducted on Belgian players
1346 and parents of child players using qualitative methods, *e.g.*, open-ended interviews.

1347 **4.6.3. Belgian players are competitively disadvantaged: implications for eSports**
1348 The third review shown in Figure 4 suggesting that Belgian players and players from
1349 other countries are experiencing the game differently and how that might be unfair
1350 to Belgian players is also an interesting point that should be considered by future
1351 research. Particularly in relation to competitive esports games in which the

1352 purchasing of loot boxes provides undisputed gameplay advantages (e.g., obtaining
1353 stronger player-characters in *FIFA* games through ‘player packs’), Belgian players
1354 are arguably at an inherent disadvantage and can no longer compete on an equal
1355 footing with players from other countries^[104]. This may also lead to diversity and
1356 inclusion issues within the Belgian esports scene because more financially
1357 advantaged players might be able to afford going to a neighbouring country to play
1358 and purchase loot boxes, whilst more disadvantaged players cannot. One might
1359 even argue that loot boxes containing rewards that are capable of granting
1360 competitive advantages (a type of ‘pay-to-win’ mechanism or ‘monetized rivalries’
1361 per Zagal *et al.*^[105]) should not be allowed to be included in esports games as doing so
1362 renders the supposedly ‘sporting’ games no longer games of skill in which everyone
1363 has a fair chance to win, but monetarily-gated games that only players that have
1364 made significant financial investments can compete in with suffering major
1365 disadvantages. Therefore, this present unfairness that Belgian esports players
1366 experience could be resolved not only by allowing Belgian players to purchase loot
1367 boxes but also by disallowing players from other countries to purchase loot boxes or
1368 by disallowing the implementation of loot boxes that can grant competitive
1369 advantages in esports games *as a matter of principle*. Future research could more
1370 systematically examine the app reviews left by players on Belgium app stores to
1371 consider what players themselves think about Belgium’s uniquely restrictive
1372 regulatory position: how widely supported is a complete ‘ban,’ and would players
1373 change their opinions if they are informed that the ‘ban’ has been ineffective at
1374 reducing loot box prevalence? How the Belgian esports scene develops against the
1375 backdrop of the country’s loot box ban is also worthy of specific attention.

1376 1377 **4.67. How can the Belgian Gaming Commission do better?**

1378 Despite the aforementioned disadvantages of a loot box ban (both in terms of as it
1379 has been implemented in Belgium and, theoretically, if the ban was ‘successful’),
1380 Belgium might wish to double down on this restrictive approach (as it does
1381 presently appear to have popular support, although that might dissipate when the
1382 approach’s various disadvantages and the heavy financial costs of fully enforcing
1383 the law are brought to the electorate’s attention).

1384
1385 .Recognising that some companies might have failed to comply only due to not
1386 knowing about their responsibilities (rather than maliciously), it has to be

1387 questioned whether the Belgian Gaming Commission has promoted the fact that a
1388 loot box ban is in effect in the country sufficiently widely, especially to video game
1389 companies in distant countries, *e.g.*, China. A promotional campaign, where the
1390 Belgian Gaming Commission collaborates with major hardware and platform
1391 providers (*e.g.*, Nintendo, Microsoft, Sony, Apple, and Google), could attempt to
1392 highlight the ban prominently (*e.g.*, a pop-up warning as part of the process for
1393 submitting a game to the Apple App Store, if the company chooses Belgium as a
1394 national store where the game should be published). Apple, for example, already
1395 asks companies to self-declare how frequently some-certain content appears in a
1396 game in order to provide an Apple Age Rating. As part of that process, specifically
1397 in Belgium, Apple could ask the question of whether loot boxes are sold in a game. If
1398 the company responds positively, Apple should inform the company about
1399 Belgium's ban on loot boxes and reject the game from the submission process. Apple
1400 already requires loot box probability disclosures^[100], so evidently it is concerned by
1401 and willing to address the issue to some extent (albeit that Apple has seemingly not
1402 enforced its own self-regulation to ensure games do make probability disclosures^[5]).
1403

1404 Regardless, to achieve a better compliance rate, the Belgian Gaming Commission
1405 must then need to carry out its threat of criminal prosecution of non-compliant
1406 companies. Doing so would likely forcibly remove many loot boxes from the market.
1407 Note that actually enforcing the law here is likely to lead to a legal challenge of the
1408 Belgian Gaming Commission's interpretation of the law by one of the prosecuted
1409 companies. That legal challenge might be decided either way. The court might
1410 approve the Commission's position or reject it. If the former happens, then the
1411 Belgian Gaming Commission can continue to enforce its interpretation. However,
1412 even if the latter happens, this will resolve the current confusion as to what the
1413 Belgian regulatory position on loot boxes truly is. If existing Belgian law cannot be
1414 interpreted as outlawing all paid loot boxes, then the Belgian Gaming Commission
1415 cannot be allowed to purport to take enforcement actions *ultra vires* or beyond its
1416 powers and without legal authority. An amendment of gambling law by the
1417 legislature to criminalise paid loot boxes should then follow if the ban is to truly be
1418 imposed. Indeed, even if the ban can no longer be maintained, this would provide
1419 legal certainty and likely lead to the more compliant companies re-entering the
1420 market and thereby providing players with more game options and likely better

1421 consumer protection as compared to what is currently being offered by non-
1422 compliant companies.

1423

1424 The main problem with enforcing the law is, however, whether it would be practical
1425 or cost effective to do so. This undertaking requires significant financial resources,
1426 manpower, and technical expertise, which the Belgian Gaming Commission
1427 arguably does not sufficiently possess, particularly in relation to non-traditional
1428 forms of gambling like video game loot boxes. This is evident in the lack of
1429 enforcement actions despite obvious loot box contraventions being widely available
1430 and highly popular. The recovery of any costs incurred by the Commission's
1431 enforcement actions through fines is likely difficult in relation to international
1432 companies with little to no corporate presence in Belgium. Further, it does not seem
1433 realistic to expect the Belgian Gaming Commission to examine every single video
1434 game on every platform (and every subsequent update to those games) and then to
1435 criminally prosecute each non-compliant case. As of June 2022, there are already
1436 over 1,000,000 individual games on the Apple App Store alone^[101]. Note, however,
1437 that direct criminal prosecution of *all* illegal loot box implementations is only one
1438 (very costly) potential approach to enforcement. Less direct approaches, such as
1439 issuing correspondence addressed to individual companies prior to litigation
1440 requesting changes to game design and threatening prosecution might be sufficient
1441 at ensuring compliance and be more cost effective.

1442

1443 The regulator could perhaps work in closer collaboration with academic researchers:
1444 the present study's results have been shared with, and were indeed of great interest
1445 to, the Belgian Gaming Commission and was ironically funded by 'regulatory
1446 settlements applied for socially responsible purposes' received by the UK Gambling
1447 Commission. Enforcement could also potentially be 'crowdsourced' in the sense that
1448 players are provided with a channel to report non-compliant games, thus reducing
1449 the Commission's workload. What the Belgian Gaming Commission could
1450 alternatively consider is an *ex ante*, whitelist, *licensing* system, rather than an *ex post*,
1451 blacklist, *enforcement* system, similar to the regulatory approach taken by China in
1452 relation to the publication of video games. Instead of allowing any games to be
1453 published on these app stores or hardware platforms and then seeking to remove
1454 and prosecute non-compliant games *afterwards*, only games on a pre-approved list
1455 are allowed to be published in the first place. The relevant Chinese regulator, the

1456 National Press and Publication Administration (国家新闻出版署), therefore has the
1457 opportunity to review any video games, both domestic and international, before
1458 they are published and allowed potentially to potentially cause harm to
1459 players^[102,103]. Indeed, charging a fee for this pre-approval process and for
1460 maintaining a licence would allow the regulator to recoup the costs associated with
1461 reviewing the game and taking enforcement actions. Such a system would also
1462 provide opportunities to assess companies' compliance with other obligations (e.g.,
1463 whether probability disclosures were made).

1464
1465 Another manner by which the Belgian Gaming Commission could seek to enforce
1466 the law is to place the burden on ensuring compliance on platform providers, such
1467 as Apple, rather than going after individual video game companies. Apple, for
1468 example, is arguably facilitating the sale of illegal loot boxes by providing a platform
1469 for this to happen on a large scale. Indeed, loot box sales would not generally be
1470 possible through Apple's propriety iOS platforms, unless Apple allows it. Further,
1471 Apple generally receives a 30% commission on most in-app purchase made
1472 (although this is lower in some limited cases)^[104]. In Belgium, Apple is therefore
1473 profiting on the illegal sale of loot boxes whenever a purchase is made. This could
1474 arguably be recognised as Apple aiding and abetting the commission of a criminal
1475 offence and its receiving and handling of criminal proceeds, which may fall within
1476 the ambits of money laundering regulation. The Belgian Gaming Commission could
1477 consider enforcing the law against Apple (as an accessory to the crime, arguably), or
1478 if that is not yet legally possible, impose new laws to require Apple and other
1479 platform providers to ensure that only games without loot boxes can be published.
1480 There are even precedents on this point. When put under regulatory pressure, Apple
1481 removed all unlicensed and non-whitelisted games from China at the end of 2020:
1482 reportedly, only 0.5% of the top paid games were duly licensed and 'survived the
1483 purge'^[105]. Apple also specifically implements the national video game age rating
1484 system in Brazil, in addition to its own age rating^[106]. Evidently, Apple is capable of
1485 and willing to take national compliance actions when required.

1486
1487 Seeking to regulate more strictly or asking the platform providers to assist in
1488 regulating might work in most cases to prevent players from unknowingly
1489 encountering loot boxes and being potentially harmed (although it should be
1490 queried what percentage of these players could actually potentially be harmed and

1491 whether a vast majority of them can enjoy loot boxes ‘safely’^[107]). However, on other
1492 more open [hardware](#) platforms, such as PC and Android, an installation file that
1493 does not need to be downloaded from ‘official’ app stores and can be easily obtained
1494 by potential players through any online channels, such as an .apk (Android Package)
1495 file, could be used to play games. These games would be even more difficult to
1496 monitor and enforce against, as platform-based regulation would not be possible.

1497
1498 Therefore, besides identifying and prosecuting non-compliant companies still
1499 offering loot boxes in Belgium, consideration should also be given to the separate
1500 issue of how to deal with players that knowingly try to circumvent the ban. The
1501 [negative stigmatisation](#)-related, [negative](#) consequences of individually prosecuting
1502 players for purchasing loot boxes have already been addressed. Indeed, even if the
1503 Belgian national versions of the platforms, such as the Apple App Store, are
1504 hypothetically scrubbed clean of any games containing loot boxes, either through the
1505 Commission’s actions or the platforms’ actions, players who wish to do so would
1506 still be able to easily circumvent these technical measures using extremely basic and
1507 free methods (*e.g.*, changing the Apple App Store’s country setting to another
1508 country or activating a VPN), as the present study has shown. [For context, research
1509 on underage online pornography use has found that 46% of 16- and 17-year-olds use
1510 VPNs and similar age-verification circumvention tools](#)^[108]. When a Belgian player
1511 seeking to actively circumvent the ban has managed to download, play, and pay for
1512 loot boxes in a video game that the company has purposefully chosen not to publish
1513 in Belgium due to the country’s loot box ban, it cannot be said that the company or
1514 platform provider should still be deemed culpable in such cases, [provided that
1515 reasonably strong technical measures have been implemented to prevent such
1516 circumvention. Belgium should therefore consider requiring companies and
1517 platform providers to implement sufficiently difficult-to-circumvent technical
1518 measures.- Any regulation should also be cautious as to not mistakenly identify a
1519 player against whom the technical measures have failed without said player
1520 intending to attempt circumvention \(*e.g.*, the author’s experience at Brussels
1521 International Airport in relation to Game 50 detailed in the Method section\) as a
1522 player who has *intentionally* tried to circumvent the technical measures.](#)

1523
1524 Importantly, the most dedicated and highest-spending loot box purchasers, who are
1525 arguably most at risk of harm and therefore most in need of consumer protection,

1526 would likely ~~always~~ choose to circumvent any ‘ban.’ ~~If a player actively and~~
1527 ~~knowingly wants to purchase loot boxes, it does not seem practical or possible to~~
1528 ~~truly prevent them from doing so.~~ Therefore, it must be duly noted that any
1529 approach that seeks to forcibly remove loot boxes ~~is~~ may be unlikely to be of
1530 assistance to the most vulnerable players. This is similar to how technical bans of
1531 online gambling in many countries can be easily circumvented by dedicated
1532 gamblers and how an effective blanket ban is not feasible^[109]. Further research
1533 should consider the perspectives of high-spending Belgian players and, in particular,
1534 their views on circumvention and whether they have attempted to do thisso.
1535

1536 **4.8. Some reflections for the Belgian public and Belgian policymakers**

1537 The Belgian Gaming Commission instituted the ban through applying pre-existing
1538 gambling law that did not envisage technological developments, such as video game
1539 loot boxes. This means that, technically, the Belgian ‘ban’ on loot boxes was applied
1540 executively by the regulator (albeit based on duly passed legislation). Therefore, it
1541 cannot be said that the ban itself was truly approved through a democratic process.
1542 Neither the Belgian electorate nor their representatives specifically voted on this
1543 policy question. It is not known whether the ban has popular support, especially if
1544 the present evidence (*inter alia*, on the ineffectiveness of the ban as currently applied;
1545 the impossibility of completely banning loot boxes; and the benefits of this
1546 monetisation model for players) is made known. Importantly, Belgian policymakers
1547 should not consider the loot box issue as having been ‘solved’ and should not be
1548 dissuaded from updating existing gambling law to address current and developing
1549 issues. Indeed, other gambling-like products are being actively invented, including
1550 video game loot boxes that contain NFTs (non-fungible tokens) that can be freely
1551 bought and sold between players for real-world monetary value in *Gods Unchained*
1552 (Immutable, 2021)^[110] and virtual packs of NFTs that do not even relate to a video
1553 game, such as NBA Top Shot^[111]. Some consideration should also similarly be given
1554 to older gambling-like products that have seemingly escaped regulatory scrutiny
1555 despite literally contravening gambling law, *e.g.*, booster packs of randomised
1556 collectible and trading cards^[111,112]. The uneven manner by which loot boxes have
1557 been targeted with a ban and physical card packs (real-life loot boxes) have not been
1558 addressed at all is arguably discriminatory ive of against the video game industry^[107].
1559

1560 Indeed, the Belgian public should not assume that their consumer protection is now
1561 guaranteed: it is not. The Belgian consumers should continue to demand policy
1562 change in relation to loot boxes, other gambling-like products and gambling
1563 regulation in general, if they deem these appropriate and necessary. Finally, note
1564 that Belgian policymakers and consumers should consider the economic benefits of
1565 providing duly licensed video game loot boxes to adults (*e.g.*, tax revenue), given
1566 that duly licensed traditional gambling is permitted. Presently, Belgian gambling
1567 law does not allow loot boxes to be licensed at all; the Belgian Gaming Commission
1568 is not empowered to do sooffer such licenses. There is therefore a discrimination of
1569 against the video game industry as compared to the traditional gambling industry,
1570 which is allowed to provide products and services costing real-world money and
1571 involving ‘randomisation.’ If video game companies are willing and technologically
1572 able to provide verifiably ‘fair’—in the sense of being transparent and reliable, and
1573 not necessarily in the sense of ethical loot box design^[61,64,65]—loot boxes (and this
1574 does appear to be the case), then Belgium should consider legalising licensed loot
1575 boxes (at least for sale to adults) as long as traditional gambling remains lawful.

1576

1577 **4.9. Should other countries emulate Belgium’s ‘ban’ on loot boxes?**

1578 Many stakeholders^{[47(pp. 33, paras 92–93)][49(p. 111, para 427)][93(p. 6)][55][see 94]} have argued that other
1579 countries should also follow Belgium’s lead and ban loot boxes. However, doing so
1580 might not work as well as intended. Notably, as the present study has proven, the
1581 Belgian ‘ban’ on loot boxes has not been actively enforced. Another country
1582 emulating the Belgian regulatory position as it currently stands is unlikely to achieve
1583 a significantly better result. The present study cannot provide empirical evidence on
1584 whether an actively enforced ban could be effective at reducing loot box prevalence.
1585 However, any country considering also banning loot boxes should consider whether
1586 its gambling regulator (or relevant enforcer of the law) is capable of ensuring that
1587 the ban is actually ly enforced. Unless another country has a regulator that is
1588 much better resourced than the Belgian Gaming Commission, it also does not appear
1589 likely that a loot box ban would work in that country. Further, regardless of whether
1590 a ban works in that country, potential circumventions similarly cannot be
1591 realistically would be similarly difficult to prevented, and the negatives
1592 consequences of this restrictive approach and the economic benefits of legalising loot
1593 boxes detailed above must be duly considered (particularly in territories where
1594 traditional gambling is legal).

1595

1596 **4.9.1. What if loot boxes cannot realistically be ‘banned’?** Alternative harm-
1597 reduction approaches to a ‘ban’

1598 Given that a ban is costly to enforce; ~~does not seem to be~~ may notable to work
1599 effectively against the most dedicated and highest-spending players that who will
1600 likely circumvent it; and leads to a number of potential negative consequences for all
1601 stakeholders, other countries should consider adopting a lessnon-restrictive
1602 approach to loot box regulation^[107]. Loot boxes cannot easily be banned, and they are
1603 likely to remain an important aspect of video game monetisation for years to
1604 come^[112]. Citing the ‘significant limitations’ (including financial strains on the
1605 gambling regulator and the need to amend other laws) of a restrictive approach to
1606 loot box regulation^[113(paras 34–36)], the UK Government has, for example, decided against
1607 regulating loot boxes as gambling (and outlawing their sale to children) and is
1608 instead exploring a non-restrictive, industry self-regulatory approach (whose success
1609 remains to be assessed)^[113(paras 232, 241–243)]. Some stakeholders might find This
1610 inevitability mightthis to be unsatisfactory and difficult to accept, but one ought to
1611 consider how to regulate loot boxes in light of this. A public health approach to the
1612 issue allows for a whole range of other potential approaches of varying levels of
1613 restriction to be considered^[95]. The adoption of ‘ethical game design’ has been one
1614 suggested approach: specifically, (i) particularly harmful aspects of loot box design
1615 could be removed (as Japan has done in relation to the so-called ‘kompu gacha,’
1616 which required players to collect a complete set of loot box rewards to then obtain a
1617 further reward^[114(pp. 311–312)]) and (ii) other loot box designs that appear less likely to be
1618 harmful could be trialled (as some companies have done, albeit perhaps more for
1619 commercial reasons, rather than to provide better consumer protection)^[61,64,65].
1620 However, such an approach that seeks to mandate ethical game design by law or
1621 industry self-regulation still faces the same enforcement issues as attempting to
1622 implement a ban^[65]. Crowdsourcing (e.g., player activism) and obtaining support
1623 from academic researchers, as previously recommended to the Belgian Gaming
1624 Commission for enforcing the ban, might help.

1625

1626 Further or alternatively, recognising the enforcement limitations of any consumer
1627 protection measure, countries should consider dedicating resources to educational
1628 campaigns and other preventative programmes that would better inform consumers
1629 to be mindful of the potential harms of loot boxes, *e.g.*, classes in school (not only for

1630 ~~just~~ young people, but also for their parents and guardians) dedicated to enhancing
1631 'ludoliteracy' (or knowledge about video games). Previous experience from other
1632 industries providing potentially harmful products, *e.g.*, alcohol, tobacco, and
1633 traditional gambling, has suggested that these educational programmes might be at
1634 risk of being 'hijacked' by industry interests and thereby fail to promote an unbiased
1635 narrative, *e.g.*, normalising alcohol use^[115]. Therefore, when designing and
1636 implementing such programmes, countries ought to be mindful of potential industry
1637 influences and ensure that the relevant audience is not potentially misled. For
1638 example, how much and what kind of (potentially valuable) input the video game
1639 industry should be allowed to provide to such programmes should be carefully
1640 considered.

1641

1642 **4.10. Limitations**

1643 The present study interpreted 'loot boxes' broadly as including any in-game
1644 transaction involving randomised elements. For example, in relation to Game 100,
1645 League of Legends: Wild Rift (Riot Games, 2020), a loot box was positively identified
1646 because the player was able to spend real-world money to purchase a 'season
1647 pass,'^[116] which allowed the player to obtain additional rewards through
1648 gameplay^[117], and some of the rewards obtained through the paid season pass
1649 allowed to player to engage with a loot box mechanic. There is debate within the
1650 academic literature as to how broadly the term 'loot boxes' should be interpreted^{[75,cf}
1651 ^{80]. Had a more restrictive definition for 'loot boxes' been applied, a lower prevalence}
1652 rate would have been observed.

1653

1654 Inversely, sSimilarly to previous loot box prevalence studies adopting the same
1655 methodology, the present study might have observed a loot box prevalence rate that
1656 was lower than the true value because some games might have implemented loot
1657 boxes that could only be encountered after a significant length of gameplay, beyond
1658 the time limit (*i.e.*, one hour) that the present study's methodology allowed for. It is
1659 highly likely, for example, that Game 96, *DomiNations* (Nexon & Big Huge Games,
1660 2015), contained loot boxes (specifically, the Council Recruitment system) that were
1661 accessible only after a few dozen hours of gameplay given that suspected loot box
1662 probability disclosures were found in said game.

1663

1664 -In addition, as with previous loot box prevalence studies, the present study
1665 examined the highest-grossing video games and so the results might differ if the
1666 sample was selected randomly amongst all available iPhone games. On one hand, it
1667 is possible that the highest-grossing games are more likely to comply because they
1668 are the most popular and frequently scrutinised by players, fellow companies and
1669 the regulator. On the other hand, it is possible that more compliant games that
1670 removed loot boxes are now performing worse financially and not appearing in the
1671 highest-grossing list. The present results should be treated as a snapshot of the
1672 situation as it stands with the most popular games and not as a reflection of the
1673 whole situation on the Belgian Apple App Store.

1674
1675 -In addition, the present study and previous loot box prevalence studies [have](#)
1676 treated the country that the specific Apple App Store belongs to as reflecting the
1677 national situation. However, the present study has shown that it is easy to switch to
1678 a different country's store and also to spend money in a country different from the
1679 store's national identity (and still have the revenue count towards the national
1680 store's total revenue). Therefore, a due amount of caution must be exercised when
1681 interpreting the present results as perfectly reflecting the Belgian national situation
1682 because it is possible that many Belgian players are spending money in other
1683 countries' Apple App Store (*e.g.*, the Dutch or French Apple App Stores) and that
1684 Belgian players, when abroad, might also be contributing towards the Belgian Apple
1685 App Store's revenue even though they are in a different country. The national store
1686 cannot be used to determine the actual location of players but merely what
1687 Country/Region settings were used by the player at the relevant time. Finally, the
1688 present study examined only iPhone games. The situation on other [hardware](#)
1689 platforms might be different: the 'big three' home console providers (Nintendo,
1690 Microsoft, and Sony), as platform providers, likely exercise stricter control on the
1691 availability of loot boxes in the limited number of console games published in
1692 Belgium, as compared to Apple, which cannot realistically individually assess the
1693 more than 1,000,000 games available on its market.

1694 1695 **5. Conclusion**

1696 Many video game companies are 'breaking the ban' in Belgium (maliciously or
1697 unknowingly) by continuing to offer loot boxes for sale in exchange for real-world
1698 money. Players in Belgium are able to 'break the ban' by easily circumventing any

1699 technical measures put into place to prevent loot box purchase (e.g., IP address
1700 checks and removal of games from the Belgian national market). Belgian's loot box
1701 'ban' is 'breaking' because it has not been effective at reducing the prevalence of loot
1702 boxes in the country as the national gambling regulator has not actively enforced the
1703 law and merely passively waited for companies to comply. Finally, a blanket 'ban'
1704 approach to loot box regulation is may be inherently 'broken' as it has many
1705 disadvantages that arguably outweigh its one supposed advantage of providing
1706 better consumer protection. (complete protection from harm, which, as argued, is in
1707 fact impossible to achieve).

1708
1709 The Belgian ban on loot boxes is not working at present due to its poor
1710 implementation. With better enforcement, this approach could potentially be more
1711 effective and reduce loot box prevalence, thus enhancing consumer protection from
1712 potential harms. However, even if had the ban is been perfectly enforced
1713 domestically, it cannot likely would not have realistically blocked the some highly
1714 dedicated players, who are arguably most at risk of potential harms and in need of
1715 consumer protection, from easily circumventing the ban. One must ask the question:
1716 whom is the law targeting? If the target is those highly dedicated players, then the
1717 measure is evidently not working (and realistically cannot ever work) and only
1718 likely making the situation worse. If the target is the majority of 'average players'
1719 (assuming that they will not attempt to circumvent the ban), then one must consider
1720 whether those players benefit more from or suffer more disadvantages from this
1721 measure. What percentage of those 'average players' will actually overspend? Are
1722 those players truly in need of such a restrictive regulatory approach to 'protect' them
1723 when the majority will likely suffer little to no harm? Perhaps, the 'average players'
1724 derive more benefits from the loot box monetisation model than suffer harm from it.
1725 If that is the case, then a ban is not justified. Therefore, it would seem that a ban
1726 cannot be justified regardless of its target... Belgium should re-evaluate its current
1727 regulatory position: either enforce the law as promised or repeal this in-name-only
1728 'ban.' and pursue alternative regulatory options. Put simply, either 'buff'
1729 enforcement or 'nerf' the ban. Other countries are recommended to consider
1730 adopting other less restrictive approaches to loot box regulation that more effectively
1731 balances the potential harms and benefits of loot boxes.

1732
1733 6. Postscript

1734 For context, since the publication of the preprint version of the present study on 28
1735 July 2022, several media websites have reported the findings. A Flemish piece
1736 published in both *Het Nieuwsblad*^[118] and *Gazet van Antwerpen*^[119] on 13 August 2022
1737 included an official response from the Belgian Minister of Justice, Vincent Van
1738 Quickenborne. A relevant translated excerpt of that piece is provided below for
1739 context:

1740

1741 The Gaming Commission admits that there is a problem, but says it has too
1742 few resources. “It is not possible to control for all small-scale games of
1743 chance.” Furthermore, the [compliance checking procedure] was said to be
1744 too slow.

1745

1746 ...Van Quickenborne ... emphasizes that ... strict action [was taken] in the
1747 past... FIFA18 had to get on its knees and remove loot boxes. “But taking
1748 action against disguised games of chance such as these is not obvious. We
1749 want to better arm the Gaming Commission by reforming the law.” [...]

1750

1751 In addition, since publishing the preprint, in relation to Game 8, ‘a Roblox-led
1752 program to comply with laws in The Netherlands and Belgium,’ has reportedly
1753 caused the removal of user-generated content involving loot boxes from *Roblox* in
1754 *Belgium*^[120].

1755 **Data Availability Statement**

1756 The raw data, a full library of video game screenshots showing, *inter alia*, any
1757 identified loot boxes, and the data analysis script and output are openly available in
1758 the Open Science Framework at <https://doi.org/10.17605/OSF.IO/7KJS9>.

1759

1760 **Positionality Statement**

1761 When drafting and revising the stage 1 registered report and when conducting
1762 fieldwork in Belgium, the autho was open to the idea that a ‘ban’ approach to loot
1763 box regulation might potentially be effective and worth pursuing, although he was
1764 slightly sceptical. However, after the results have been analysed and the
1765 disadvantages of a ‘ban’ were considered and after meeting with the Belgian
1766 Gaming Commission to discuss the (im)practicalities of enforcing a ban, in drafting
1767 and revising the stage 2 registered report, he wrote with the perspective that a ‘ban’
1768 approach to loot box regulation is unlikely to be worth pursuing economically. As he
1769 subsequently wrote in a guest post on GamesIndustry.biz on 20 September 2022: ‘As
1770 to exactly how loot boxes should be regulated more broadly, I personally advocate
1771 for a more middle-ground approach to loot box regulation. Doing nothing fails to
1772 adequately recognise and address the potential harms, but banning the mechanic is
1773 likely going too far and removing the economic benefits of loot boxes (for both
1774 companies and players)’^[121]. In terms of the author’s personal engagement with loot
1775 boxes, he plays video games containing loot boxes but he has never purchased any
1776 loot boxes with real-world money.

1777

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1800

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1809

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1856 **References**

- 1857 1. Xiao, L. Y., Henderson, L. L., Nielsen, R. K. L., Grabarczyk, P., & Newall, P. W. S.
1858 (2021). Loot Boxes, Gambling-Like Mechanics in Video Games. In N. Lee
1859 (Ed.), *Encyclopedia of Computer Graphics and Games*. Springer.
1860 https://doi.org/10.1007/978-3-319-08234-9_459-1
- 1861 2. Rockloff, M., Russell, A. M., Greer, N. M., Lole, L. R., Hing, N., & Browne, M.
1862 (2020). *Loot Boxes: Are they grooming youth for gambling?* Central Queensland
1863 University. <https://doi.org/10.25946/5ef151ac1ce6f>
- 1864 3. Xiao, L. Y., Henderson, L. L., Yang, Y., & Newall, P. W. S. (2021). Gaming the
1865 system: Suboptimal compliance with loot box probability disclosure
1866 regulations in China. *Behavioural Public Policy, Advance Online Publication*, 1–
1867 27. <https://doi.org/10.1017/bpp.2021.23>
- 1868 4. Zendle, D., Meyer, R., Cairns, P., Waters, S., & Ballou, N. (2020). The prevalence of
1869 loot boxes in mobile and desktop games. *Addiction*, 115(9), 1768–1772.
1870 <https://doi.org/10.1111/add.14973>
- 1871 5. Xiao, L. Y., Henderson, L. L., & Newall, P. (2021). *What are the odds? Lower*
1872 *compliance with Western loot box probability disclosure industry self-regulation than*
1873 *Chinese legal regulation*. OSF Preprints.
1874 <https://doi.org/10.31219/osf.io/g5wd9>
- 1875 6. Drummond, A., & Sauer, J. D. (2018). Video Game Loot Boxes Are Psychologically
1876 Akin to Gambling. *Nature Human Behaviour*, 2(8), 530–532.
1877 <https://doi.org/10.1038/s41562-018-0360-1>
- 1878 7. Nielsen, R. K. L., & Grabarczyk, P. (2019). Are Loot Boxes Gambling? Random
1879 Reward Mechanisms in Video Games. *Transactions of the Digital Games*
1880 *Research Association*, 4(3), 171–207. <https://doi.org/10.26503/todigra.v4i3.104>
- 1881 8. Xiao, L. Y. (2021). Conceptualising the Loot Box Transaction as a Gamble Between
1882 the Purchasing Player and the Video Game Company. *International Journal of*
1883 *Mental Health and Addiction*, 19(6), 2355–2357.
1884 <https://doi.org/10.1007/s11469-020-00328-7>
- 1885 9. King, D. L., & Delfabbro, P. H. (2018). Predatory Monetization Schemes in Video
1886 Games (e.g. ‘Loot Boxes’) and Internet Gaming Disorder. *Addiction*, 113(11),
1887 1967–1969. <https://doi.org/10.1111/add.14286>
- 1888 10. Xiao, L. Y. (2022). Which Implementations of Loot Boxes Constitute Gambling? A
1889 UK Legal Perspective on the Potential Harms of Random Reward

- 1890 Mechanisms. *International Journal of Mental Health and Addiction*, 20(1), 437–
1891 454. <https://doi.org/10.1007/s11469-020-00372-3>
- 1892 11. Xiao, L. Y. (2021). Regulating Loot Boxes as Gambling? Towards a Combined
1893 Legal and Self-Regulatory Consumer Protection Approach. *Interactive*
1894 *Entertainment Law Review*, 4(1), 27–47. <https://doi.org/10.4337/ielr.2021.01.02>
- 1895 12. DeCamp, W. (2020). Loot Boxes and Gambling: Similarities and Dissimilarities in
1896 Risk and Protective Factors. *Journal of Gambling Studies, Advance online*
1897 *publication*. <https://doi.org/10.1007/s10899-020-09957-y>
- 1898 13. Larche, C. J., Chini, K., Lee, C., Dixon, M. J., & Fernandes, M. (2021). Rare Loot
1899 Box Rewards Trigger Larger Arousal and Reward Responses, and Greater
1900 Urge to Open More Loot Boxes. *Journal of Gambling Studies*, 37, 141–163.
1901 <https://doi.org/10.1007/s10899-019-09913-5>
- 1902 14. Garea, S. S., Drummond, A., Sauer, J. D., Hall, L. C., & Williams, M. N. (2021).
1903 Meta-analysis of the relationship between problem gambling, excessive
1904 gaming and loot box spending. *International Gambling Studies*, 21(3), 460–479.
1905 <https://doi.org/10.1080/14459795.2021.1914705>
- 1906 15. Spicer, S. G., Nicklin, L. L., Uther, M., Lloyd, J., Lloyd, H., & Close, J. (2021). Loot
1907 boxes, problem gambling and problem video gaming: A systematic review
1908 and meta-synthesis. *New Media & Society*, 14614448211027176.
1909 <https://doi.org/10.1177/14614448211027175>
- 1910 16. Drummond, A., Sauer, J. D., Ferguson, C. J., & Hall, L. C. (2020). The relationship
1911 between problem gambling, excessive gaming, psychological distress and
1912 spending on loot boxes in Aotearoa New Zealand, Australia, and the United
1913 States—A cross-national survey. *PLOS ONE*, 15(3), e0230378.
1914 <https://doi.org/10.1371/journal.pone.0230378>
- 1915 17. Zendle, D., & Cairns, P. (2019). Loot boxes are again linked to problem gambling:
1916 Results of a replication study. *PLOS ONE*, 14(3), e0213194.
1917 <https://doi.org/10.1371/journal.pone.0213194>
- 1918 18. Brooks, G. A., & Clark, L. (2019). Associations between loot box use, problematic
1919 gaming and gambling, and gambling-related cognitions. *Addictive Behaviors*,
1920 96, 26–34. <https://doi.org/10.1016/j.addbeh.2019.04.009>
- 1921 19. Zendle, D. (2019). *Gambling-like video game practices: A cross-sectional study of links*
1922 *with problem gambling and disordered gaming*. PsyArXiv.
1923 <https://doi.org/10.31234/osf.io/fh3vx>

- 1924 20. Wardle, H., & Zendle, D. (2021). Loot Boxes, Gambling, and Problem Gambling
1925 Among Young People: Results from a Cross-Sectional Online Survey.
1926 *Cyberpsychology, Behavior, and Social Networking*, 24(4), 267–274.
1927 <https://doi.org/10.1089/cyber.2020.0299>
- 1928 21. González-Cabrera, J., Basterra-González, A., Montiel, I., Calvete, E., Pontes, H.
1929 M., & Machimbarrena, J. M. (2021). Loot boxes in Spanish adolescents and
1930 young adults: Relationship with internet gaming disorder and online
1931 gambling disorder. *Computers in Human Behavior*, 107012.
1932 <https://doi.org/10.1016/j.chb.2021.107012>
- 1933 22. von Meduna, M., Steinmetz, F., Ante, L., Reynolds, J., & Fiedler, I. (2020). Loot
1934 boxes are gambling-like elements in video games with harmful potential:
1935 Results from a large-scale population survey. *Technology in Society*, 63, 101395.
1936 <https://doi.org/10.1016/j.techsoc.2020.101395>
- 1937 23. Kristiansen, S., & Severin, M. C. (2019). Loot box engagement and problem
1938 gambling among adolescent gamers: Findings from a national survey.
1939 *Addictive Behaviors*, 103, 106254.
1940 <https://doi.org/10.1016/j.addbeh.2019.106254>
- 1941 24. Rockloff, M., Russell, A. M. T., Greer, N., Lole, L., Hing, N., & Browne, M. (2021).
1942 Young people who purchase loot boxes are more likely to have gambling
1943 problems: An online survey of adolescents and young adults living in NSW
1944 Australia. *Journal of Behavioral Addictions, Advance Online Publication*.
1945 <https://doi.org/10.1556/2006.2021.00007>
- 1946 25. Hall, L. C., Drummond, A., Sauer, J. D., & Ferguson, C. J. (2021). Effects of self-
1947 isolation and quarantine on loot box spending and excessive gaming—Results
1948 of a natural experiment. *PeerJ*, 9, e10705. <https://doi.org/10.7717/peerj.10705>
- 1949 26. Macey, J., & Hamari, J. (2019). eSports, Skins and Loot Boxes: Participants,
1950 Practices and Problematic Behaviour Associated With Emergent Forms of
1951 Gambling. *New Media & Society*, 21(1), 20–41.
1952 <https://doi.org/10.1177/1461444818786216>
- 1953 27. Zendle, D. (2019). Problem gamblers spend less money when loot boxes are
1954 removed from a game: A before and after study of Heroes of the Storm. *PeerJ*,
1955 7, e7700. <https://doi.org/10.7717/peerj.7700>
- 1956 28. Zendle, D., Cairns, P., Barnett, H., & McCall, C. (2019). Paying for loot boxes is
1957 linked to problem gambling, regardless of specific features like cash-out and

- 1958 pay-to-win. *Computers in Human Behavior*, 102, 181–191.
- 1959 <https://doi.org/10.1016/j.chb.2019.07.003>
- 1960 29. Zendle, D., Meyer, R., & Over, H. (2019). Adolescents and loot boxes: Links with
1961 problem gambling and motivations for purchase. *Royal Society Open Science*, 6,
1962 190049. <https://doi.org/10.1098/rsos.190049>
- 1963 30. Zendle, D., & Cairns, P. (2018). Video game loot boxes are linked to problem
1964 gambling: Results of a large-scale survey. *PLOS ONE*, 13(11), e0206767.
1965 <https://doi.org/10.1371/journal.pone.0206767>
- 1966 31. Li, W., Mills, D., & Nower, L. (2019). The Relationship of Loot Box Purchases to
1967 Problem Video Gaming and Problem Gambling. *Addictive Behaviors*, 97, 27–34.
1968 <https://doi.org/10.1016/j.addbeh.2019.05.016>
- 1969 32. Close, J., Spicer, S. G., Nicklin, L. L., Uther, M., Lloyd, J., & Lloyd, H. (2021).
1970 Secondary analysis of loot box data: Are high-spending “whales” wealthy
1971 gamers or problem gamblers? *Addictive Behaviors*, 117, 106851.
1972 <https://doi.org/10.1016/j.addbeh.2021.106851>
- 1973 33. Moshirnia, A. (2018). Precious and Worthless: A Comparative Perspective on
1974 Loot Boxes and Gambling. *Minnesota Journal of Law, Science & Technology*,
1975 20(1), 77–114.
- 1976 34. Schwiddessen, S., & Karius, P. (2018). Watch Your Loot Boxes! – Recent
1977 Developments and Legal Assessment in Selected Key Jurisdictions From a
1978 Gambling Law Perspective. *Interactive Entertainment Law Review*, 1(1), 17–43.
1979 <https://doi.org/10.4337/ielr.2018.01.02>
- 1980 35. Castillo, D. J. (2019). Unpacking the Loot Box: How Gaming’s Latest
1981 Monetization System Flirts with Traditional Gambling Methods. *Santa Clara*
1982 *Law Review*, 59(1), 165–202.
- 1983 36. Hong, E. (2019). Loot Boxes: Gambling for the Next Generation. *Western State Law*
1984 *Review*, 46(1), 61–84.
- 1985 37. Liu, K. (2019). A Global Analysis into Loot Boxes: Is It ‘Virtually’ Gambling?
1986 *Washington International Law Journal*, 28(3), 763–800.
- 1987 38. Cerulli-Harms, A., Münsch, M., Thorun, C., Michaelsen, F., & Hausemer, P.
1988 (2020). *Loot boxes in online games and their effect on consumers, in particular young*
1989 *consumers* (PE 652.727). Policy Department for Economic, Scientific and
1990 Quality of Life Policies (EU).
1991 <https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652727/IP>
1992 [OL_STU\(2020\)652727_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652727/IP_OL_STU(2020)652727_EN.pdf)

- 1993 39. Harvey, D. J. (2021). Should loot boxes be considered gambling or can Self-
 1994 Regulation and Corporate Social Responsibility solve the loot box issue? A
 1995 review of current UK law and international legislation. *Interactive*
 1996 *Entertainment Law Review*, 4(1), 48–62. <https://doi.org/10.4337/ielr.2021.01.03>
- 1997 40. Honer, P. (2021). Limiting the loot box: Overview and difficulties of a common
 1998 EU response. *Interactive Entertainment Law Review*, 4(1), 63–83.
 1999 <https://doi.org/10.4337/ielr.2021.01.04>
- 2000 41. Spillemyndigheden [Danish Gambling Authority]. (2017, November 29).
 2001 *Statement about loot boxes / loot crates*.
 2002 [https://www.spillemyndigheden.dk/en/news/statement-about-loot-boxes-](https://www.spillemyndigheden.dk/en/news/statement-about-loot-boxes-loot-crates)
 2003 [loot-crates](https://www.spillemyndigheden.dk/en/news/statement-about-loot-boxes-loot-crates)
- 2004 42. UK Gambling Commission. (2017). *Virtual Currencies, eSports and Social Gaming –*
 2005 *Position Paper*.
 2006 [https://web.archive.org/web/20210111075348/http://www.gamblingcomm](https://web.archive.org/web/20210111075348/http://www.gamblingcommission.gov.uk/PDF/Virtual-currencies-eSports-and-social-casino-gaming.pdf)
 2007 [ission.gov.uk/PDF/Virtual-currencies-eSports-and-social-casino-gaming.pdf](https://web.archive.org/web/20210111075348/http://www.gamblingcommission.gov.uk/PDF/Virtual-currencies-eSports-and-social-casino-gaming.pdf)
- 2008 43. Autorité de regulation des jeux en ligne (ARJEL) [Regulatory Authority for
 2009 Online Games (France)]. (2018). *Rapport d'activité 2017-2018 [Activity Report*
 2010 *2017-2018]*.
 2011 [https://web.archive.org/web/20200414184944/http://www.arjel.fr/IMG/p](https://web.archive.org/web/20200414184944/http://www.arjel.fr/IMG/pdf/rapport-activite-2017.pdf)
 2012 [df/rapport-activite-2017.pdf](https://web.archive.org/web/20200414184944/http://www.arjel.fr/IMG/pdf/rapport-activite-2017.pdf)
- 2013 44. Belgische Kansspelcommissie [Belgian Gaming Commission]. (2018).
 2014 *Onderzoeksrapport loot boxen [Research Report on Loot Boxes]*.
 2015 [https://web.archive.org/web/20200414184710/https://www.gamingcommi](https://web.archive.org/web/20200414184710/https://www.gamingcommissie.be/opencms/export/sites/default/jhkswb_nl/documents/onderzoeksrapport-loot-boxen-final-publicatie.pdf)
 2016 [ssion.be/opencms/export/sites/default/jhkswb_nl/documents/onderzoek](https://web.archive.org/web/20200414184710/https://www.gamingcommissie.be/opencms/export/sites/default/jhkswb_nl/documents/onderzoeksrapport-loot-boxen-final-publicatie.pdf)
 2017 [srapport-loot-boxen-final-publicatie.pdf](https://web.archive.org/web/20200414184710/https://www.gamingcommissie.be/opencms/export/sites/default/jhkswb_nl/documents/onderzoeksrapport-loot-boxen-final-publicatie.pdf)
- 2018 45. Kansspelautoriteit [The Netherlands Gambling Authority]. (2018). *Onderzoek naar*
 2019 *loot boxes: Een buit of een last? [Study into Loot Boxes: A Treasure or a Burden?]*.
 2020 [https://web.archive.org/web/20190503232356/https://kansspelautoriteit.nl](https://web.archive.org/web/20190503232356/https://kansspelautoriteit.nl/publish/library/6/onderzoek_naar_loot_boxes_-_een_buit_of_eeen_last_-_nl.pdf)
 2021 [/publish/library/6/onderzoek_naar_loot_boxes_-_een_buit_of_eeen_last_-](https://web.archive.org/web/20190503232356/https://kansspelautoriteit.nl/publish/library/6/onderzoek_naar_loot_boxes_-_een_buit_of_eeen_last_-_nl.pdf)
 2022 [_nl.pdf](https://web.archive.org/web/20190503232356/https://kansspelautoriteit.nl/publish/library/6/onderzoek_naar_loot_boxes_-_een_buit_of_eeen_last_-_nl.pdf)
- 2023 46. Parliament of the Commonwealth of Australia Senate Environment and
 2024 Communications References Committee. (2018). *Gaming Micro-Transactions for*
 2025 *Chance-based Items*.
 2026 [https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Env](https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Gamingmicro-transactions/Report)
 2027 [ironment_and_Communications/Gamingmicro-transactions/Report](https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Gamingmicro-transactions/Report)

- 2028 47. Digital, Culture, Media and Sport Committee of the House of Commons (UK).
2029 (2019). *Immersive and Addictive Technologies: Fifteenth Report of Session 2017–19*
2030 (HC 1846).
2031 <https://web.archive.org/web/20210609191037/https://publications.parliament.uk/pa/cm201719/cmselect/cmcmumeds/1846/1846.pdf>
- 2033 48. Federal Trade Commission (US). (2019, August 7). *Inside the Game: Unlocking the*
2034 *Consumer Issues Surrounding Loot Boxes*. Public Workshop, Washington, DC,
2035 US. [www.ftc.gov/news-events/events-calendar/inside-game-unlocking-](http://www.ftc.gov/news-events/events-calendar/inside-game-unlocking-consumer-issues-surrounding-loot-boxes)
2036 [consumer-issues-surrounding-loot-boxes](http://www.ftc.gov/news-events/events-calendar/inside-game-unlocking-consumer-issues-surrounding-loot-boxes)
- 2037 49. Select Committee on the Social and Economic Impact of the Gambling Industry
2038 of the House of Lords (UK). (2020). *Report of Session 2019–21: Gambling Harm—*
2039 *Time for Action* (HL Paper 79).
2040 <https://web.archive.org/web/20200702195336/https://publications.parliament.uk/pa/ld5801/ldselect/ldgamb/79/79.pdf>
- 2042 50. Parliament of the Commonwealth of Australia House of Representatives
2043 Standing Committee on Social Policy and Legal Affairs. (2020). *Protecting the*
2044 *age of innocence: Report of the inquiry into age verification for online wagering and*
2045 *online pornography*.
2046 [https://www.aph.gov.au/Parliamentary_Business/Committees/House/Soci](https://www.aph.gov.au/Parliamentary_Business/Committees/House/Social_Policy_and_Legal_Affairs/Onlineageverification/Report)
2047 [al_Policy_and_Legal_Affairs/Onlineageverification/Report](https://www.aph.gov.au/Parliamentary_Business/Committees/House/Social_Policy_and_Legal_Affairs/Onlineageverification/Report)
- 2048 51. *Electronic Arts Inc & Electronic Arts Swiss Sàrl v Kansspelautoriteit* (2020) *Rechtbank*
2049 *Den Haag [District Court of The Hague]*. (2020, October 15).
2050 [https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RBDHA:202](https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RBDHA:2020:10428)
2051 [0:10428](https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RBDHA:2020:10428)
- 2052 52. Kansspelautoriteit [The Netherlands Gambling Authority]. (2020, October 29).
2053 *Imposition of an order subject to a penalty on Electronic Arts for FIFA video game*.
2054 [https://web.archive.org/web/20201127222346/https://kansspelautoriteit.nl](https://web.archive.org/web/20201127222346/https://kansspelautoriteit.nl/nieuws/nieuwsberichten/2020/oktober/imposition-an-order/)
2055 [/nieuws/nieuwsberichten/2020/oktober/imposition-an-order/](https://web.archive.org/web/20201127222346/https://kansspelautoriteit.nl/nieuws/nieuwsberichten/2020/oktober/imposition-an-order/)
- 2056 53. Hood, V. (2017, October 20). What the UK can learn from the Far East’s battle
2057 with loot boxes. *Eurogamer*. [https://www.eurogamer.net/articles/2017-10-19-](https://www.eurogamer.net/articles/2017-10-19-what-the-uk-can-learn-from-the-far-east-s-battle-with-loot-boxes)
2058 [what-the-uk-can-learn-from-the-far-east-s-battle-with-loot-boxes](https://www.eurogamer.net/articles/2017-10-19-what-the-uk-can-learn-from-the-far-east-s-battle-with-loot-boxes)
- 2059 54. Isle of Man Gambling Supervision Commission. (2017, January 4). *Guidance for*
2060 *Online Gambling (Amendments) Regulations 2016*.
2061 [https://www.gov.im/media/1355106/guidance-for-online-gambling-](https://www.gov.im/media/1355106/guidance-for-online-gambling-amendments-regulations-2016.pdf)
2062 [amendments-regulations-2016.pdf](https://www.gov.im/media/1355106/guidance-for-online-gambling-amendments-regulations-2016.pdf)

- 2063 55. BBC. (2019, September 12). Gaming loot boxes: What happened when Belgium
2064 banned them? *BBC News*. <https://www.bbc.com/news/newsbeat-49674333>
- 2065 56. 2K Games. (2018). *Statement Belgium*. 2K Games Official Website.
2066 <https://www.2k.com/myteaminfo/be/>
- 2067 57. Blizzard Entertainment. (2018, August 27). *Paid Loot Boxes and Loot Chests Disabled*
2068 *for Players in Belgium*. Official Overwatch Forums.
2069 [https://eu.forums.blizzard.com/en/overwatch/t/paid-loot-boxes-and-loot-](https://eu.forums.blizzard.com/en/overwatch/t/paid-loot-boxes-and-loot-chests-disabled-for-players-in-belgium/8139)
2070 [chests-disabled-for-players-in-belgium/8139](https://eu.forums.blizzard.com/en/overwatch/t/paid-loot-boxes-and-loot-chests-disabled-for-players-in-belgium/8139)
- 2071 58. Electronic Arts. (2019, January 29). *FIFA Points in Belgium*. Electronic Arts Official
2072 Website. <https://www.ea.com/en-ca/news/fifa-points-belgium>
- 2073 59. Nintendo. (2019, May 21). *Belangrijke informatie voor gebruikers in België [Important*
2074 *Information for Users in Belgium]*. Nintendo Belgium.
2075 [https://www.nintendo.be/nl/Nieuws/2019/mei/Belangrijke-informatie-](https://www.nintendo.be/nl/Nieuws/2019/mei/Belangrijke-informatie-voor-gebruikers-in-Belgie-1561911.html)
2076 [voor-gebruikers-in-Belgie-1561911.html](https://www.nintendo.be/nl/Nieuws/2019/mei/Belangrijke-informatie-voor-gebruikers-in-Belgie-1561911.html)
- 2077 60. Xiao, L. Y. (2022). Reserve Your Judgment on “Draconian” Chinese Video
2078 Gaming Restrictions on Children. *Journal of Behavioral Addictions*, 11(2), 249–
2079 255. <https://doi.org/10.1556/2006.2022.00022>
- 2080 61. Xiao, L. Y., & Newall, P. W. S. (2022). Probability disclosures are not enough:
2081 Reducing loot box reward complexity as a part of ethical video game design.
2082 *Journal of Gambling Issues, Advance online publication*.
2083 <https://doi.org/10.4309/LDOM8890>
- 2084 62. Drummond, A., Sauer, J. D., & Hall, L. C. (2019). Loot Box Limit-setting: A
2085 Potential Policy to Protect Video Game Users With Gambling Problems?
2086 *Addiction*, 114(5), 935–936. <https://doi.org/10.1111/add.14583>
- 2087 63. King, D. L., & Delfabbro, P. H. (2019). Loot Box Limit-setting is Not Sufficient on
2088 Its Own to Prevent Players From Overspending: A Reply to Drummond,
2089 Sauer & Hall. *Addiction*, 114(7), 1324–1325.
2090 <https://doi.org/10.1111/add.14628>
- 2091 64. King, D. L., & Delfabbro, P. H. (2019). Video Game Monetization (e.g., ‘Loot
2092 Boxes’): A Blueprint for Practical Social Responsibility Measures. *International*
2093 *Journal of Mental Health and Addiction*, 17(1), 166–179.
2094 <https://doi.org/10.1007/s11469-018-0009-3>
- 2095 65. Xiao, L. Y., & Henderson, L. L. (2021). Towards an Ethical Game Design Solution
2096 to Loot Boxes: A Commentary on King and Delfabbro. *International Journal of*

- 2097 *Mental Health and Addiction*, 19(1), 177–192. [https://doi.org/10.1007/s11469-](https://doi.org/10.1007/s11469-019-00164-4)
2098 019-00164-4
- 2109 66. Department for Digital, Culture, Media & Sport (UK). (2020). *Loot Boxes in Video*
2100 *Games: Call for Evidence*.
2101 [https://assets.publishing.service.gov.uk/government/uploads/system/uplo](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/920393/Loot_Box_Call_for_Evidence_Document_.pdf)
2102 [ads/attachment_data/file/920393/Loot_Box_Call_for_Evidence_Document_.](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/920393/Loot_Box_Call_for_Evidence_Document_.pdf)
2103 pdf
- 2104 67. Xiao, L. Y. (2022). Drafting Video Game Loot Box Regulation for Dummies: A
2105 Chinese Lesson. *Information & Communications Technology Law*, 31(3), 343–381.
2106 <https://doi.org/10.1080/13600834.2022.2088062>
- 2107 68. Rousseau, J. (2021, July 12). *Australian legislator to propose loot box law*.
2108 GamesIndustry.Biz. [https://www.gamesindustry.biz/articles/2021-07-12-](https://www.gamesindustry.biz/articles/2021-07-12-australia-proposes-loot-box-law)
2109 [australia-proposes-loot-box-law](https://www.gamesindustry.biz/articles/2021-07-12-australia-proposes-loot-box-law)
- 2110 69. Economic Affairs Division of the Cabinet Office (Isle of Man). (2017, March). *2016*
2111 *Isle of Man Census Report GD 2017/004*.
2112 <https://www.gov.im/media/1355784/2016-isle-of-man-census-report.pdf>
- 2113 70. Belgian Federal Government. (2021, June 16). *Structure of the Population*. STATBEL
2114 Belgium In Figures.
2115 <https://statbel.fgov.be/en/themes/population/structure-population>
- 2116 71. Afdeling Bestuursrechtspraak Raad van State [Administrative Jurisdiction
2117 Division of the Council of State (The Netherlands)]. (2022, March 9). *Uitspraak*
2118 *[Ruling] 202005769/1/A3, ECLI:NL:RVS:2022:690 (9 March 2022)*. Raad van
2119 State; Raad van State.
2120 <https://www.raadvanstate.nl/uitspraken/@130150/202005769-1-a3>
- 2121 72. 2K Games. (2018). *Statement Netherlands*. 2K Games Official Website.
2122 <https://www.2k.com/myteaminfo/nl/>
- 2123 73. Chapple, C. (2021, June). *The Top 100 Mobile Games Accounted For 64% of U.S.*
2124 *Player Spending in 2020*. Sensor Tower.
2125 <https://sensortower.com/blog/mobile-game-revenue-share-analysis-2021>
- 2126 74. Roblox Corporation. (2019, July 9). *Guidelines around users paying for random*
2127 *virtual items*.
2128 [https://web.archive.org/web/20210713091731/https://devforum.roblox.co](https://web.archive.org/web/20210713091731/https://devforum.roblox.com/t/guidelines-around-users-paying-for-random-virtual-items/307189)
2129 [m/t/guidelines-around-users-paying-for-random-virtual-items/307189](https://web.archive.org/web/20210713091731/https://devforum.roblox.com/t/guidelines-around-users-paying-for-random-virtual-items/307189)
- 2130 75. Xiao, L. Y., Henderson, L. L., & Newall, P. W. S. (2022). Loot boxes are more
2131 prevalent in United Kingdom video games than previously considered:

- 2132 Updating Zendle et al. (2020). *Addiction*, 117(9), 2553–2555.
2133 <https://doi.org/10.1111/add.15829>
- 2134 76. Dienes, Z. (2021). Obtaining Evidence for No Effect. *Collabra: Psychology*, 7(1),
2135 28202. <https://doi.org/10.1525/collabra.28202>
- 2136 77. Buchner, A., Erdfelder, E., Faul, F., & Lang, A.-G. (2020). *Universität Düsseldorf:*
2137 *G*Power*. [https://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-](https://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-psychologie-und-arbeitspsychologie/gpower)
2138 [psychologie-und-arbeitspsychologie/gpower](https://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-psychologie-und-arbeitspsychologie/gpower)
- 2139 78. Ministry of Higher Education and Science (Denmark). (2014). *Danish Code of*
2140 *Conduct for Research Integrity*. [https://ufm.dk/en/publications/2014/the-](https://ufm.dk/en/publications/2014/the-danish-code-of-conduct-for-research-integrity)
2141 [danish-code-of-conduct-for-research-integrity](https://ufm.dk/en/publications/2014/the-danish-code-of-conduct-for-research-integrity)
- 2142 79. Belgische Kansspelcommissie [Belgian Gaming Commission]. (2022). *Licences*.
2143 Belgische Kansspelcommissie [Belgian Gaming Commission] Website.
2144 <https://www.gamingcommission.be/en/operators/licences>
- 2145 80. Zendle, D., Cairns, P., Meyer, R., Waters, S., & Ballou, N. (2022). If everything is a
2146 loot box, nothing is: Response to Xiao et al. *Addiction*, 117(9), 2555–2556.
2147 <https://doi.org/10.1111/add.15976>
- 2148 81. Awtaney, S. (2012, October 7). Nagpur youth indulging in Uno gambling. *The*
2149 *Times of India*. [https://timesofindia.indiatimes.com/life-](https://timesofindia.indiatimes.com/life-style/relationships/parenting/nagpur-youth-indulging-in-uno-gambling/articleshow/16699014.cms)
2150 [style/relationships/parenting/nagpur-youth-indulging-in-uno-](https://timesofindia.indiatimes.com/life-style/relationships/parenting/nagpur-youth-indulging-in-uno-gambling/articleshow/16699014.cms)
2151 [gambling/articleshow/16699014.cms](https://timesofindia.indiatimes.com/life-style/relationships/parenting/nagpur-youth-indulging-in-uno-gambling/articleshow/16699014.cms)
- 2152 82. Phillips, T. (2022, May 31). *Lootbox laws reportedly block Diablo Immortal launches*.
2153 Eurogamer. [https://www.eurogamer.net/lootbox-laws-reportedly-block-](https://www.eurogamer.net/lootbox-laws-reportedly-block-diablo-immortal-launches)
2154 [diablo-immortal-launches](https://www.eurogamer.net/lootbox-laws-reportedly-block-diablo-immortal-launches)
- 2155 83. Partis, D. (2022, May 30). *Diablo Immortal reportedly won't launch in two countries*
2156 *due to loot box legislation*. GamesIndustry.Biz.
2157 [https://www.gamesindustry.biz/articles/2022-05-30-diablo-immortal-wont-](https://www.gamesindustry.biz/articles/2022-05-30-diablo-immortal-wont-launch-in-two-countries-due-to-loot-box-legislation)
2158 [launch-in-two-countries-due-to-loot-box-legislation](https://www.gamesindustry.biz/articles/2022-05-30-diablo-immortal-wont-launch-in-two-countries-due-to-loot-box-legislation)
- 2159 84. Xiao, L. Y., & Declerck, P. (2022). Video game loot boxes are NOT gambling
2160 under Dutch gambling regulation? Shifting the goalpost in Electronic Arts v
2161 Kansspelautoriteit. In *OSF Preprints*. <https://doi.org/10.31219/osf.io/pz24d>
- 2162 85. Karhulahti, V.-M., Moshirnia, A., Macey, J., & Chin, J. M. (2022). Has the “ban” of
2163 loot boxes eliminated them from Belgian mobile games? *Peer Community in*
2164 *Registered Reports*, 1. <https://rr.peercommunityin.org/articles/rec?id=168>
- 2165 86. Newzoo. (2022). Top 25 Public Companies by Game Revenues. *Newzoo*.
2166 <https://newzoo.com/insights/rankings/top-25-companies-game-revenues>

- 2167 87. Sicart, M. (2015, June). *Loops and Metagames: Understanding Game Design*
2168 *Structures*. FDG 2015, 10th International Conference on the Foundations of
2169 Digital Games, Pacific Grove, California.
2170 www.fdg2015.org/papers/fdg2015_paper_22.pdf
- 2171 88. Woods, O. (2022). The Economy of Time, the Rationalisation of Resources:
2172 Discipline, Desire and Deferred Value in the Playing of Gacha Games. *Games*
2173 *and Culture*, 15554120221077728. <https://doi.org/10.1177/15554120221077728>
- 2174 89. Belgische Kansspelcommissie [Belgian Gaming Commission]. (2018). *Belgian*
2175 *Gaming Commission rules after analysis: "Paying loot boxes are games of chance"*.
2176 Belgische Kansspelcommissie [Belgian Gaming Commission] Website.
2177 [https://web.archive.org/web/20190919105557/https://www.gamingcommi](https://web.archive.org/web/20190919105557/https://www.gamingcommission.be/opencms/opencms/jhksweb_en/gamingcommission/news/news_0061.html)
2178 [ssion.be/opencms/opencms/jhksweb_en/gamingcommission/news/news_](https://web.archive.org/web/20190919105557/https://www.gamingcommission.be/opencms/opencms/jhksweb_en/gamingcommission/news/news_0061.html)
2179 [0061.html](https://web.archive.org/web/20190919105557/https://www.gamingcommission.be/opencms/opencms/jhksweb_en/gamingcommission/news/news_0061.html)
- 2180 90. Belgische Kansspelcommissie [Belgian Gaming Commission]. (2022). *Illegal games*
2181 *of chance*. Belgische Kansspelcommissie [Belgian Gaming Commission]
2182 Website. [https://www.gamingcommission.be/en/gaming-](https://www.gamingcommission.be/en/gaming-commission/illegal-games-of-chance)
2183 [commission/illegal-games-of-chance](https://www.gamingcommission.be/en/gaming-commission/illegal-games-of-chance)
- 2184 91. Belgische Kansspelcommissie [Belgian Gaming Commission]. (2022, June 15). *List*
2185 *of illegal gambling sites*. Belgische Kansspelcommissie [Belgian Gaming
2186 Commission] Website. [https://www.gamingcommission.be/en/gaming-](https://www.gamingcommission.be/en/gaming-commission/illegal-games-of-chance/list-of-illegal-gambling-sites)
2187 [commission/illegal-games-of-chance/list-of-illegal-gambling-sites](https://www.gamingcommission.be/en/gaming-commission/illegal-games-of-chance/list-of-illegal-gambling-sites)
- 2188 92. Video game loot boxes declared illegal under Belgium gambling laws. (2018,
2189 April 26). *BBC News*. <https://www.bbc.com/news/technology-43906306>
- 2190 93. Ministerio de Consumo [Ministry of Consumer Affairs] (Spain). (2021, February
2191 18). *Proceso participativo sobre la futura regulación de los mecanismos aleatorios de*
2192 *recompensa en videojuegos (cajas botín) [Consultation on the future regulation of*
2193 *random reward mechanisms in video games (loot boxes)]*.
2194 [https://www.ordenacionjuego.es/sites/ordenacionjuego.es/files/noticias/2](https://www.ordenacionjuego.es/sites/ordenacionjuego.es/files/noticias/20210218_proceso_participativo_futura_regulacion_videojuegos_cajas_botin.pdf)
2195 [0210218_proceso_participativo_futura_regulacion_videojuegos_cajas_botin.p](https://www.ordenacionjuego.es/sites/ordenacionjuego.es/files/noticias/20210218_proceso_participativo_futura_regulacion_videojuegos_cajas_botin.pdf)
2196 [df](https://www.ordenacionjuego.es/sites/ordenacionjuego.es/files/noticias/20210218_proceso_participativo_futura_regulacion_videojuegos_cajas_botin.pdf)
- 2197 94. Macey, J., & Bujić, M. (2022). The Talk of the Town: Community Perspectives on
2198 Loot Boxes. In M. Ruotsalainen, M. Törhönen, & V.-M. Karhulahti (Eds.),
2199 *Modes of Esports Engagement in Overwatch* (pp. 199–223). Springer International
2200 Publishing. https://doi.org/10.1007/978-3-030-82767-0_11

- 2201 95. Xiao, L. Y., Henderson, L. L., Nielsen, R. K. L., & Newall, P. W. S. (2022).
2202 Regulating gambling-like video game loot boxes: A public health framework
2203 comparing industry self-regulation, existing national legal approaches, and
2204 other potential approaches. In *Current Addiction Reports* (Vol. 9, Issue 3, pp.
2205 163–178). <https://doi.org/10.1007/s40429-022-00424-9>
- 2206 96. Xiao, L. Y. (2022). Loot boxes. In P. Grabarczyk, E. Aarseth, I. K. H. Jørgensen, M.
2207 S. Debus, M. Vozaru, N. P. Houe, R. K. L. Nielsen, & F. Bakkerud (Eds.),
2208 *Encyclopedia of Ludic Terms*. IT University of Copenhagen.
2209 <https://eolt.org/articles/loot-boxes>
- 2210 97. Bushman, B. J., & Stack, A. D. (1996). Forbidden fruit versus tainted fruit: Effects
2211 of warning labels on attraction to television violence. *Journal of Experimental*
2212 *Psychology: Applied*, 2(3), 207–226. <https://doi.org/10.1037/1076-898X.2.3.207>
- 2213 98. Gosselt, J. F., De Jong, M. D. T., & Van Hoof, J. J. (2012). Effects of Media Ratings
2214 on Children and Adolescents: A Litmus Test of the Forbidden Fruit Effect.
2215 *Journal of Communication*, 62(6), 1084–1101. <https://doi.org/10.1111/j.1460->
2216 [2466.2011.01597.x](https://doi.org/10.1111/j.1460-2466.2011.01597.x)
- 2217 99. Bijvank, M. N., Konijn, E. A., Bushman, B. J., & Roelofsma, P. H. M. P. (2009). Age
2218 and Violent-Content Labels Make Video Games Forbidden Fruits for Youth.
2219 *Pediatrics*, 123(3), 870–876. <https://doi.org/10.1542/peds.2008-0601>
- 2220 100. Apple. (2021, June 7). *App Store Review Guidelines*. Apple Developer.
2221 <https://developer.apple.com/app-store/review/guidelines/>
- 2222 101. PocketGamer.biz. (2022). *Count of Active Applications in the App Store*.
2223 PocketGamer.Biz. [https://www.pocketgamer.biz/metrics/app-store/app-](https://www.pocketgamer.biz/metrics/app-store/app-count/)
2224 [count/](https://www.pocketgamer.biz/metrics/app-store/app-count/)
- 2225 102. 国家新闻出版署 [National Press and Publication Administration (PRC)]. (2022,
2226 June 7). 2022 年 6 月份国产网络游戏审批信息 [Approval Information for
2227 Domestic Online Games for June 2022].
2228 <https://www.nppa.gov.cn/nppa/contents/320/104244.shtml>
- 2229 103. 国家新闻出版署 [National Press and Publication Administration (PRC)]. (2021,
2230 June 28). 2021 年进口网络游戏审批信息 [Approval Information for Imported
2231 Online Games for 2021].
2232 <https://www.nppa.gov.cn/nppa/contents/318/75658.shtml>

- 2233 104. Campbell, I. C., & Alexander, J. (2021, August 24). *A guide to platform fees*. The
2234 Verge. <https://www.theverge.com/21445923/platform-fees-apps-games->
2235 [business-marketplace-apple-google](https://www.theverge.com/21445923/platform-fees-apps-games-business-marketplace-apple-google)
- 2236 105. Li, P. (2020, December 31). Apple removes 39,000 game apps from China store
2237 to meet deadline. *Reuters*. [https://www.reuters.com/article/us-apple-china-](https://www.reuters.com/article/us-apple-china-games-idUKKBN2950P1)
2238 [games-idUKKBN2950P1](https://www.reuters.com/article/us-apple-china-games-idUKKBN2950P1)
- 2239 106. Apple. (2019, November 4). *Changes to Local Age Ratings in Brazil*. Apple
2240 Developer. <https://developer.apple.com/news/?id=11042019b>
- 2241 107. Xiao, L. Y. (2022). *Loot boxes are good (or at least not that bad)...? Arguing against a*
2242 *ban*. OSF Preprints. <https://doi.org/10.31219/osf.io/eztvd>
- 2243 108. Thurman, N., & Obster, F. (2021). The regulation of internet pornography: What
2244 a survey of under-18s tells us about the necessity for and potential efficacy of
2245 emerging legislative approaches. *Policy & Internet*, 13(3), 415–432.
2246 <https://doi.org/10.1002/poi3.250>
- 2247 109. Parke, A., & Griffiths, M. (2004). Why Internet Gambling Prohibition Will
2248 Ultimately Fail. *Gaming Law Review*, 8(5), 295–299.
2249 <https://doi.org/10.1089/glr.2004.8.295>
- 2250 110. Immutable. (2021). *What is Gods Unchained?* Gods Unchained.
2251 <https://support.godsunchained.com/hc/en-us/articles/1500006166961->
2252 [What-is-Gods-Unchained-](https://support.godsunchained.com/hc/en-us/articles/1500006166961-What-is-Gods-Unchained-)
- 2253 111. Xiao, L. Y. (2022). Blind Boxes: Opening Our Eyes to the Challenging Regulation
2254 of Gambling-Like Products and Gambification and Unexplained Regulatory
2255 Inaction. In *Gaming Law Review* (Vol. 26, Issue 5, pp. 255–268).
2256 <https://doi.org/10.31219/osf.io/c6epr>
- 2257 112. Zendle, D., Walasek, L., Cairns, P., Meyer, R., & Drummond, A. (2021). Links
2258 between problem gambling and spending on booster packs in collectible card
2259 games: A conceptual replication of research on loot boxes. *PLOS ONE*, 16(4),
2260 e0247855. <https://doi.org/10.1371/journal.pone.0247855>
- 2261 113. Department for Digital, Culture, Media & Sport (UK). (2022, July 17).
2262 *Government response to the call for evidence on loot boxes in video games*. GOV.UK.
2263 [https://www.gov.uk/government/consultations/loot-boxes-in-video-](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)
2264 [games-call-for-evidence/outcome/government-response-to-the-call-for-](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)
2265 [evidence-on-loot-boxes-in-video-games](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)

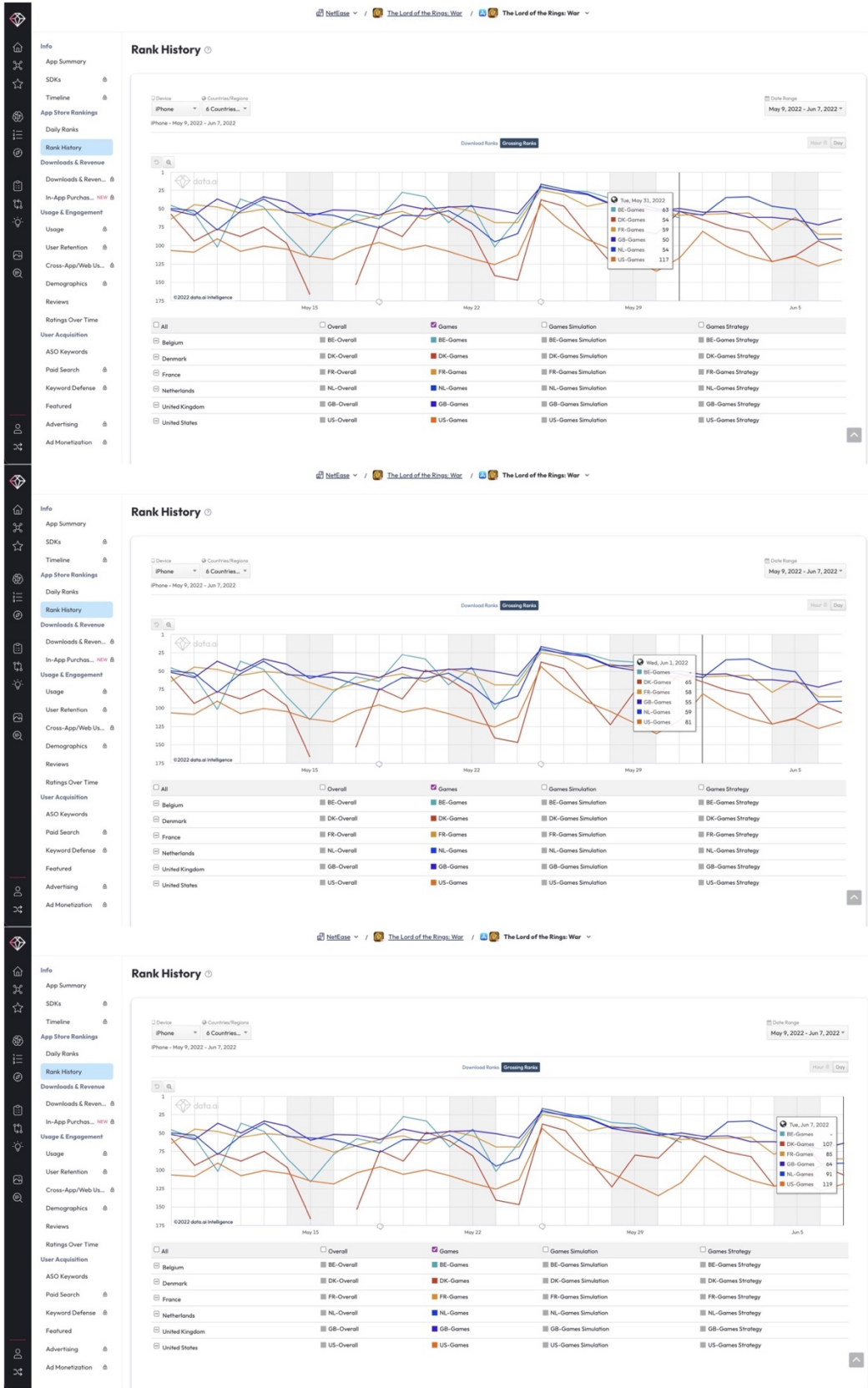
- 2266 114. Derrington, S., Star, S., & Kelly, S. J. (2021). The Case for Uniform Loot Box
2267 Regulation: A New Classification Typology and Reform Agenda. *Journal of*
2268 *Gambling Issues*, 46, Article 0. <https://doi.org/10.4309/jgi.2021.46.15>
- 2269 115. Schalkwyk, M. C. I. van, Petticrew, M., Maani, N., Hawkins, B., Bonell, C.,
2270 Katikireddi, S. V., & Knai, C. (2022). Distilling the curriculum: An analysis of
2271 alcohol industry-funded school-based youth education programmes. *PLOS*
2272 *ONE*, 17(1), e0259560. <https://doi.org/10.1371/journal.pone.0259560>
- 2273 116. Joseph, D. (2021). Battle pass capitalism. *Journal of Consumer Culture*, 21(1), 68–
2274 83. <https://doi.org/10.1177/1469540521993930>
- 2275 117. Laserface. (2022, September 30). *Wild Pass*. Wild Rift Beta Support.
2276 [https://support-wildrift.riotgames.com/hc/en-us/articles/1500004482902-](https://support-wildrift.riotgames.com/hc/en-us/articles/1500004482902-Wild-Pass)
2277 *Wild-Pass*
- 2278 118. Ramboer, T. (2022, August 13). *Ze zetten kinderen aan tot gokken, maar worden*
2279 *zomaar verkocht: 8 op 10 games verkopen nog steeds 'lootboxes'*. Het Nieuwsblad.
2280 https://www.nieuwsblad.be/cnt/dmf20220812_97460883
- 2281 119. Ramboer, T. (2022, August 13). *Ze zetten kinderen aan tot gokken, maar worden*
2282 *zomaar verkocht: 8 op 10 games verkopen nog steeds 'lootboxes'* [They encourage
2283 children to gamble, but are simply sold: 8 out of 10 games still sell 'loot boxes'].
2284 *Gazet van Antwerpen*. https://www.gva.be/cnt/dmf20220813_09388283
- 2285 120. Carter, J. (2022, September 15). *Roblox game Adopt Me ends Netherlands service due*
2286 *to loot boxes*. Game Developer. [https://www.gamedeveloper.com/pc/-i-](https://www.gamedeveloper.com/pc/-i-roblox-i-game-i-adopt-me-i-ends-netherlands-service-due-to-loot-boxes)
2287 *roblox-i-game-i-adopt-me-i-ends-netherlands-service-due-to-loot-boxes*
- 2288 121. Xiao, L. Y. (2022, September 20). *How should the UK video game industry self-*
2289 *regulate loot boxes?* GamesIndustry.Biz.
2290 [https://www.gamesindustry.biz/how-should-the-uk-video-game-industry-](https://www.gamesindustry.biz/how-should-the-uk-video-game-industry-self-regulate-loot-boxes)
2291 *self-regulate-loot-boxes*
- 2292 122. Xiao, L. Y. (2022, May 30). *Just arrived in Leuven to assess the Belgian loot box*
2293 *prevalence rate...* [Tweet]. Twitter.
2294 <https://twitter.com/LeonXiaoY/status/1531268839375351808>
2295
2296



2298
 2299 Fig. A1: A priori power analysis for Hypothesis 3 using G*Power, given an α value
 2300 of .05 and assuming an effect size of Hedges' $g = -.15$. A sample size of 100 games
 2301 achieves .86 power.
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2303 Appendix 3: Discussion of the Removal of Game 36

2304 The commencement of the present study's data collection may have caused Game
2305 36's removal from the Belgian Apple App Store. For full disclosure and context, the
2306 stage 1 registered report for the present study setting out the methodology was
2307 published on 7 April 2022, and the author did publish various online content about
2308 this then upcoming study, including publishing one Twitter post on 30 June 2022
2309 implying that data collection has begun^[122]. Game 36 appears to have been removed
2310 from the Belgian Apple App Store between 31 May 2022 and 1 June 2022 as the game
2311 appeared on the highest-grossing list on 31 May 2022 but did not do so on 1 June
2312 2022. It is also curious that the game has been removed *only* from the Belgian store
2313 and remained available (and high-grossing) in all other countries checked,
2314 specifically, Denmark, France, the Netherlands, the UK, and the US, according to
2315 data.ai, as shown in Figure S1.



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Figure S1. 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

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(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. © 2022 data.ai.