

34 **Conflict of Interest**

35 L.Y.X. was employed by LiveMe, then a subsidiary of Cheetah Mobile
36 (NYSE:CMCM), as an in-house counsel intern from July to August 2019 in Beijing,
37 People’s Republic of China. L.Y.X. was not involved with the monetisation of video
38 games by Cheetah Mobile or its subsidiaries. L.Y.X. undertook a brief period of
39 voluntary work experience at Wiggin LLP (Solicitors Regulation Authority (SRA)
40 number: 420659) in London, England in August 2022. L.Y.X. has met with and
41 discussed policy, regulation, and enforcement with the Belgian Gaming Commission
42 [Belgische Kansspelcommissie] (June 2022), the Danish Competition and Consumer
43 Authority [Konkurrence- og Forbrugerstyrelsen] (August 2022) and the Department
44 for Digital, Culture, Media and Sport (DCMS) of the UK Government (August 2022).
45 L.Y.X. has been invited to provide advice to the DCMS on the technical working
46 group for loot boxes and the Video Games Research Framework. L.Y.X. was the
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65 1. Introduction

66 Paid loot boxes are products within video games that players buy to obtain
67 randomised rewards^[1,2]. Some loot boxes are ‘non-paid’ and can be obtained without
68 spending real-world money; however, the present study focuses on *paid* loot boxes.
69 Hereinafter, ‘loot boxes’ refers to *all* forms of randomised video game monetisation
70 methods, *i.e.*, any ‘in-game transactions with randomised elements’^[3]. Concerns have
71 been raised about loot boxes’ similarities with gambling and the risks that
72 consumers might overspend money and experience harm^[4–9]. Children and other
73 vulnerable consumers (*e.g.*, people experiencing problem gambling issues) might be
74 at particular risk of harm^[10,11]. Many countries are considering imposing legal
75 regulation and a few countries have already taken regulatory actions^[12–16]. However,
76 in most countries at present, paid loot boxes are specifically regulated only through
77 industry self-regulation^[17]. There are two prominent loot box self-regulatory
78 measures: probability disclosures and text-based warning labels attached to age
79 ratings.

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81 The Apple App Store, similar to many other hardware and software platforms^[18],
82 imposes the self-regulatory requirement that all games available on that platform
83 ‘offering “loot boxes” or other mechanisms that provide randomized virtual items
84 for purchase’^[19] must disclose the probabilities of obtaining those items to customers
85 prior to purchase. Xiao *et al.* assessed companies’ compliance with Apple’s self-
86 regulatory measure amongst the 100 highest-grossing iPhone games in the UK and
87 found that only 64% of games containing loot boxes disclosed probabilities. This
88 compliance rate was significantly lower than the 95.6% observed in Mainland China
89 where probability disclosures were (and continue to be) required by law^[20].

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91 The second self-regulatory measure is to prewarn players about the presence of loot
92 boxes. The Entertainment Software Rating Board (ESRB), established by the
93 Entertainment Software Association (ESA), reviews the content of video games and
94 provides age ratings depending on the inclusion of certain material, *e.g.*, the amount
95 and degree of violence and sexual content^[21]. The ESRB is adopted in North America.
96 PEGI (Pan-European Game Information) performs a similar function in Europe
97 generally^[22]. Recognising the concerns that have been raised about loot boxes, on 13
98 April 2020, the ESRB and PEGI announced that they will attach an additional text-
99 based warning to the age ratings of video games containing loot boxes^[23]. The ESRB

100 uses the 'In-Game Purchases (Includes Random Items)' 'interactive element'^[3], whilst
101 PEGI uses the 'In-game Purchases (Includes Paid Random Items)' 'content
102 descriptor'^[24]. These two largely identical labels are intended to cover, according to
103 the ESRB, 'all transactions with randomized elements.'^[3] The ESRB and PEGI both
104 consciously chose to specifically *not* use the term 'loot boxes' to 'avoid confusing
105 consumers'^[3], particularly parents who might not have sufficient knowledge about
106 video games or 'ludoliteracy.'

107

108 According to the ESRB, their label accounts for:

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110 '... loot boxes and all similar mechanics that offer random items in exchange
111 for real-world currency or in-game currency that can be purchased with real
112 money.'^[3]

113

114 According to PEGI, their label covers:

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116 '... all in-game offers to purchase digital goods or premiums where players
117 don't know exactly what they are getting prior to the purchase (e.g. loot
118 boxes, card packs, prize wheels).'^[24]

119

120 These definitions accord with the wide definition for 'loot boxes' adopted by the
121 present study. These labels were intended to 'provide the additional information if
122 the game features paid random items'^[24], such that '...consumers can make more
123 informed decisions when purchasing or downloading a game, instead of finding out
124 after the fact.'^[3] Notably, the presence of these labels, or rather the presence of loot
125 boxes, does not affect a game's age rating because neither the ESRB nor PEGI
126 recognises loot boxes as actual 'gambling' or 'simulated gambling'^[25,26]. These labels
127 can therefore attach to games containing loot boxes but are rated suitable for young
128 children (*i.e.*, ESRB's 'E' or 'Everyone' rating and PEGI's 'PEGI 3' rating)^[24]. This is
129 unlike how other content, such as depiction of 'realistic violence,' 'illegal drugs,
130 alcohol or tobacco' or 'simulated gambling,' would (in certain situations,
131 automatically^[27]) attract higher age ratings^[28,29]. Xiao has previously criticised the
132 labels for not providing sufficient information to truly help players and parents
133 make more informed purchase decisions^[23]. The labels fail to identify and explain
134 where and how the loot boxes in a specific game can be purchased and so players

135 and children cannot easily actively avoid engaging with the mechanics. The labels
136 also do *not* signify whether or not the relevant mechanic provides rewards that can
137 then be transferred to other players and ‘cashed-out’^[30] (*i.e.*, have real-world
138 monetary value), which is a relevant consideration for many gambling
139 regulators^[9,16,17]. The labels might be of some assistance by providing information at
140 the initial point of purchasing or downloading the game; however, once the player
141 has begun playing the game, the labels are no longer helpful. An improvement
142 might be to specifically describe the loot box mechanics to help players actively
143 avoid them and to provide a choice in the options menu to turn the ability to
144 purchase loot boxes on or off (potentially even with the default option set to ‘off’).
145 Through experimental studies, Garrett *et al.* have concluded that these labels fail to
146 adequately warn consumers about the potential risks involved with loot boxes and
147 therefore ‘fail to adequately inform consumer spending decisions’^[31].

148
149 The ESRB’s and PEGI’s wide definitions for ‘in-game transactions with randomised
150 elements’^[3] and what the present study refers to as ‘loot boxes’ are effectively
151 identical, despite trivial variations in the wording of the definitions and of the labels.
152 Therefore, the reasonable expectation is that a game containing loot boxes should be
153 labelled with the ‘In-Game Purchases (Includes Random Items)’ interactive element
154 after being rated by the ESRB in North America and with the ‘In-game Purchases
155 (Includes Paid Random Items)’ content descriptor after being rated by PEGI in
156 Europe. The ESRB and PEGI should be *consistent* when deciding whether a game
157 contains loot boxes. If one of them fails to label a game with the loot box warning
158 when the other has done so, then the former has highly likely inaccurately rated said
159 game’s loot box presence by failing to identify it. The only highly unlikely exception
160 being that a game potentially has separate North American and European versions
161 and only one of which contained loot boxes: such a situation has never been
162 popularly reported.

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164 Research Question 1: Are video games being consistently given the loot box self-
165 regulatory warning label by the ESRB and PEGI?

166
167 Hypothesis 1: All games that have been labelled with the ‘In-Game Purchases
168 (Includes Random Items)’ interactive element by the ESRB should also have been

169 labelled with the 'In-game Purchases (Includes Paid Random Items)' content
170 descriptor by PEGI and *vice versa*.

171

172 The ESRB and PEGI only play a direct role when rating physically published games
173 and are only *indirectly* involved in the rating of each individual digitally released
174 game. Both the ESRB and PEGI are 'participating rating authorities' of the IARC
175 (International Age Rating Coalition), which is a simplified system that allows game
176 companies to simultaneously obtain multiple age ratings for use in different
177 territories for digitally delivered games^[32]. After companies fill in a single
178 questionnaire about their games' content, the IARC will produce age ratings that
179 'also include content descriptors and interactive elements, identifying games and
180 apps that [*inter alia*] offer in-app / game purchases (*as well as those that are randomized*)'
181 (emphasis added).^[32] Specifically, the IARC uses the 'In-Game Purchases (Includes
182 Random Items)' interactive element, which is the ESRB's label and whose wording
183 differs slightly from that of the PEGI label. The IARC is not implemented on the
184 Apple App Store (which uses its own age rating system^[33]) but is adopted by the
185 Google Play Store and other major platforms^[32]. Depending on which national
186 version of the Google Play Store is visited, the appropriate age rating for that
187 territory is shown. For example, for the game *Guns of Glory* (FunPlus, 2017), the US
188 Google Play Store displays the ESRB rating of Everyone 10+
189 (<https://play.google.com/store/apps/details?id=com.diandian.gog&hl=en&gl=us>),
190 whilst the Danish Google Play Store displays the PEGI rating of 7
191 (<https://play.google.com/store/apps/details?id=com.diandian.gog&hl=en&gl=dk>)
192 . *Guns of Glory* has previously been identified as containing loot boxes in multiple
193 studies^[18,34,35]. Indeed, the IARC has attached the 'In-Game Purchases (Includes
194 Random Items)' label to the game on both the US and Danish Google Play Stores
195 alongside the respective ESRB and PEGI age ratings.

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197 Notably, the IARC explains that 'Interactive Elements are assigned *universally*,
198 providing notice about the ability to make in-game purchases (including
199 randomized ones)...' (emphasis added)^[36]. This contrasts with the IARC's
200 assignment of 'Age Rating and Content Descriptors,' which will differ by region^[36].
201 In other words, a game containing loot boxes can receive different age ratings in
202 different regions under the IARC system, but the loot box warning label, which is an
203 interactive element, should be attached to that game regardless of region. Universal

204 or global assignment of the label means that the IARC has effectively extended the
205 'jurisdictional' scope of the loot box self-regulatory warning label requirement to
206 countries beyond those covered by the ESRB and PEGI. For example, Germany,
207 despite being in Europe, does not use PEGI and instead adopts the alternative USK
208 (Unterhaltungssoftware Selbstkontrolle) to provide age ratings. Up until 31
209 December 2022, the USK does not assess the presence of loot boxes and does
210 not require the use of a label to signify their presence in relation to physical
211 games marketed in Germany^[37]. (On 14 December 2022, the USK announced that it
212 will begin to assess the presence of loot boxes and attach the 'In-Game-Käufe +
213 zufällige Objekte [In-game purchases + random items]' label accordingly to new
214 game submissions from 1 January 2023^[38].) Notably, as of 18-16 September-December
215 2022, the official USK webpage explaining the integration of the USK age ratings
216 within the IARC system has not been updated to explain that the IARC will now
217 additionally attach 'In-Game-Käufe (zufällige Objekte möglich) [In-Game Purchases
218 (Includes Random Items)]' to games containing loot boxes and, instead, the webpage
219 still only states that games allowing for additional in-game purchases will be
220 attached with the generic 'In-Game-Einkäufe [In-Game Purchases]'^[39]. However, the
221 USK is a 'participating rating authority' of the IARC^[32], and so, even before the USK
222 introduced its own loot box warning label, games containing loot boxes are were
223 being attached with 'In-Game-Käufe (zufällige Objekte möglich)' on the German
224 Google Play Store: for example, *Guns of Glory*
225 (<https://play.google.com/store/apps/details?id=com.diandian.gog&hl=de&gl=de>)
226 as of 18 September 2022.

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228 Draft laws in the US that have failed to pass^[40] tried to require games containing loot
229 boxes to 'prominently disclose to the consumer at the time of ... purchase a bright
230 red label that is easily legible and which reads: "Warning: contains in-game
231 purchases and gambling-like mechanisms which may be harmful or addictive"^[41,42].
232 Another Bill intending to require the following (arguably note entirely scientifically
233 inaccurate) loot box warning label within the US state of Illinois remains under
234 consideration:

235

236 'Attention Parents: A Loot Box System exists in this game that permits an
237 unlimited amount of REAL MONEY to be spent without any age restriction.
238 REAL MONEY is exchanged for random digital items. This process has been

239 linked to REAL LIFE GAMBLING ADDICTIONS in both children and adults.
240 Please regulate your own spending as well as your children's spending'^[43].

241

242 Other countries might be considering imposing similar information-based warning
243 labels to address the potential harms of loot boxes. Previous research has found that
244 other industries, such as alcohol^[44], tobacco^[45], and gambling^[46], have all taken
245 various corporate actions that likely reduced the effectiveness of product warnings.
246 Loot box probability disclosures are known to have been implemented sub-
247 optimally by video game companies: specifically, lacking prominence and being
248 difficult to access^[18,20]. Compliance with Belgium's 'ban' on loot boxes through
249 applying pre-existing gambling law has also been poor^[35].

250

251 When filling in the content rating questionnaire, Google warns that:
252 'Misrepresentation of your app's content may result in removal or suspension, so it
253 is important to provide accurate responses to the content rating questionnaire.' The
254 IARC also recognises that ratings can be changed through 'post-release
255 modification'^[47] and states that: 'IARC rating authorities [*inter alia*, the ESRB and
256 PEGI] monitor ratings assigned to games and apps to ensure accuracy. Corrections,
257 if needed, are implemented promptly by storefronts.' However, considering prior
258 research, reasonable doubt must be cast on the compliance rate with the self-
259 regulatory requirement of attaching loot box warning labels.

260

261 Rather than to assess the 100 presently highest-grossing Google Play Store games as
262 to whether they contain loot boxes (as previous studies have done^[18,20,34,35]) and then
263 to check whether they are displaying the label, it is more economical and efficient to
264 instead examine games previously known to contain loot boxes. If a game that was
265 known to contain loot boxes is displaying the label, then it is no longer necessary to
266 assess whether said game still contains loot boxes through gameplay, as this can be
267 reasonably assumed. Only those games previously known to contain loot boxes but
268 are not displaying the label need to be re-assessed through gameplay. This
269 expediency is desirable because it is hoped that the present study's results could be
270 published promptly and thereby contribute to the efforts of the UK Government's
271 Department for Digital, Culture, Media & Sport's technical working group that is
272 developing industry self-regulation for loot boxes with the aim of reducing harm^[48].
273 The sample selection (as detailed below) will be based on previously highest-

274 grossing games (many of which will likely still remain high-grossing and popular
275 games presently)^[18,20,34,35]. This therefore represents a sample of particular interest for
276 players, parents, policymakers, and the age rating organisations. However, some
277 limitations should be noted. Firstly, the compliance rate amongst this sample of
278 historically (and potentially presently) high-grossing games is not necessarily
279 representative of that of financially worse performing games (which might be less
280 scrutinised by players and other companies and therefore less likely to comply or,
281 contrastingly, might be performing worse financially because they have accurately
282 displayed the label) or the overall situation on the Google Play Store. Secondly, these
283 games were previously highlighted in published academic work as having contained
284 loot boxes^[18,20,34,35], and, therefore, their operating companies might have since
285 become more likely to comply (when compared to a newly published game that has
286 not yet gained any notoriety), as companies have reportedly complied with the
287 Belgian ‘ban’ on loot boxes only following the publication of Xiao and media
288 reporting thereof^[35,49] and four years after they were originally supposed to have
289 done so.

290

291 Research Question 2: Are video games previously known to be high-grossing and
292 contain loot boxes and presently containing loot boxes on the Google Play Store
293 accurately displaying the IARC ‘In-Game Purchases (Includes Random Items)’ label?
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295

296 Hypothesis 2: Video games previously known to be high-grossing and contain loot
297 boxes and presently containing loot boxes on the Google Play Store will accurately
298 display the IARC ‘In-Game Purchases (Includes Random Items)’ label.Hypothesis 2:
299 All titles in the present sample of video games previously known to contain loot
300 boxes, and which are presently available on the Google Play Store and continue to
301 contain loot boxes, will accurately display the IARC ‘In-Game Purchases (Includes
302 Random Items)’ label.

303

304 The present series of two studies will not seek to assess the efficacy of the loot box
305 self-regulatory labels on consumer behaviour^[see 31] and instead will seek to assess (i)
306 whether the ESRB and PEGI have *consistently* applied the loot box self-regulatory
307 warning label and (ii) whether companies have complied with this self-regulation by
308 *accurately* labelling games containing loot boxes with the relevant notice.

309

309 2. Method

310 2.1. Study 1

311 The ESRB provides a public search tool for identifying the age ratings, content
312 descriptors, and, importantly for Study 1, interactive elements, including the ‘In-
313 Game Purchases (Includes Random Items)’ label, for specific games^[50]. However, it is
314 not possible to use the search tool to specifically identify only games with the ‘In-
315 Game Purchases (Includes Random Items)’ label. Using the relevant filter for the
316 label unhelpfully brings up all games with ‘No Interactive Elements’ (the
317 overwhelming majority) and those with the relevant label. The ESRB also publishes
318 a list of all games that it has rated in reverse chronological order^[51]. By using the
319 ‘Refine Search’ function of the search tool and limiting the ‘Time Frame’ to ‘Past
320 Year’ (the longest period that could be chosen) and applying no other filters, a list of
321 all games that were rated in the year leading up to 21 September 2022 were extracted
322 through data scraping. This list consisted of 698 individual entries (a few games
323 appeared as multiple entries as different editions and platforms were sometimes
324 rated and listed separately). In total, 20 entries (2.9%) were labelled by the ESRB with
325 the ‘In-Game Purchases (Includes Random Items)’ interactive element. Two entries
326 were excluded for bearing the exact same name as another entry. A third entry was
327 excluded because although it bears an additional subtitle (*FIFA 22 Legacy Edition*), it
328 is the same game as another entry (*FIFA 22*) and appear to have likely been rated on
329 the same date. A list of 17 individual video game titles that were labelled by the
330 ESRB with the loot box self-regulatory warning in the year leading up to 21
331 September 2022 was thereby produced. Based on how many games appeared as
332 results when the Time Frame filter was set to ‘Past Year,’ it can be estimated
333 (appreciating that seasonable variability and COVID-19 impacts cannot be
334 accounted for) that the ESRB rated approximately 700 games per year historically.
335 This information can be used to infer that the ESRB rated approximately 992 games
336 in the 17 months between 13 April 2020 (the date on which the Labels were
337 announced and began to be assigned) and 21 September 2021 (the date after which
338 the list of games rated in the past year leading up to 21 September 2022 started). The
339 1,000 games that immediately precede the 698 entries that have already been
340 collected on the reverse chronological order list will be collated through data
341 scraping. The entries labelled by the ESRB with the ‘In-Game Purchases (Includes
342 Random Items)’ interactive element will be identified, and any entries bearing the
343 same or a substantially similar name will be excluded as above. These entries will be

344 combined with the 17 previously identified entries to form an approximately
345 complete list of games that have been labelled by the ESRB with the loot box self-
346 regulatory warning since 13 April 2020 (hereinafter, the 'ESRB List'). The ESRB List
347 will be generated thusly because it was deemed impractical to analyse all 31,636
348 individual historical entries (existing on 21 September 2022) and the ESRB provided
349 no information as to the exact date that a rating was given, besides allowing an
350 inference to be drawn through the Time Frame filter. Certain games are also
351 published months after a rating has been granted, so the release date of games also
352 cannot be used to determine the relevant rating date. It was deemed unwise and
353 potentially leading to a conflict of interest (and a change in compliance behaviour) to
354 contact the ESRB and ask for a complete list of games that it has labelled with the
355 warning, although this might be done following the publication of the present study.

356

357 PEGI similarly provides a search tool for identifying the age ratings and content
358 descriptors (including the 'In-game Purchases (Includes Paid Random Items)' label)
359 for specific games^[52]. Unlike the ESRB search tool, the PEGI search tool *can* be used
360 to produce a list of all games ever rated by PEGI that were given the 'In-game
361 Purchases' content descriptor, if the 'DESCIRPTOR' of 'In-Game Purchases' is
362 selected in the 'EXTENDED SEARCH' options^[53]. The 'In-game Purchases (Includes
363 Paid Random Items)' is treated as a subtype of the overarching 'In-game Purchases'
364 content descriptor, and therefore all games that have been given the loot box self-
365 regulatory warning are included in said list. On 21 September 2022, a list of 523
366 individual results of games that have ever been labelled by PEGI with the 'In-game
367 Purchases' content descriptor was produced. Again, a number of games appeared as
368 multiple entries as different editions and platforms were sometimes rated and listed
369 separately. In total, 125 results (23.9%) were ever labelled by PEGI with the 'In-game
370 Purchases (Includes Paid Random Items)' content descriptor. Entries were excluded
371 for bearing the same name as another entry (55 entries) and being the same game as
372 another entry despite minor changes to the title (*e.g.*, 'World of Tanks on PlayStation 4'
373 as compared to 'World of Tanks'; 6 entries). A list of all 64 individual video game
374 titles that have ever been labelled by PEGI with the loot box self-regulatory warning
375 was thereby produced (hereinafter, the 'PEGI List').

376

377 The following variable will be measured:

378

379 *Presence of the loot box self-regulatory warning label on the other system*

380 The games on the ESRB List will be entered into the PEGI search tool^[52] and *vice versa*
381 with the PEGI List and the ESRB search tool^[50]. Screenshots will be taken of the
382 relevant ratings, content descriptors, and /or interactive elements. If the
383 corresponding loot box self-regulatory label can be found for the game on the other
384 age rating system, then this game will be marked as 'consistent,' but if not, then
385 'inconsistent.' If a game appears on both the ESRB List and the PEGI List, then it will
386 be analysed only once. Some reasonable flexibility is allowed when searching for a
387 corresponding game if a game with the exact same title cannot be found. Any
388 deviation will be recorded. If a game cannot be found on the other system even after
389 allowing a reasonable amount of flexibility with the search term, then it will be
390 excluded from analysis.

391

392 The 'consistency rate' between the ESRB's and PEGI's usage of the loot box warning
393 self-regulation will be calculated as follows:

394

$$\frac{\text{Games that have been labeled with the loot box warning by both the ESRB and PEGI}}{\text{(All games on the ESRB and PEGI Lists - Any duplicate or excluded games)}}$$

396

397 Hypothesis 1 will be accepted if the consistency rate is $\geq 95\%$. Otherwise, Hypothesis
398 1 will be rejected. In terms of the interpretation of results, a consistency rate of $\geq 95\%$
399 will be viewed as the ESRB and PEGI having been sufficiently consistent. A
400 consistency rate of $\geq 80\%$ but $< 95\%$ will be deemed as the self-regulatory measure
401 not having been applied sufficiently consistently by the ESRB and PEGI, and thus
402 the rating processes require improvements to enhance cohesion. A consistency rate
403 of $< 80\%$ will be seen as the measure having been applied inconsistently, and thus
404 the rating processes being in need of significant improvements. These cut-offs and
405 corresponding potential interpretations were based on the author's own opinion on
406 what is a 'satisfactory' self-regulatory measure and what he deemed most
407 policymakers would agree with.

408

409 Study 1 achieves level 3 of bias control as recognised by PCI RR, as it was necessary
410 to attempt to collate the ESRB and PEGI Lists to affirm the study's practical
411 feasibility. I certify that I have 'not yet observed ANY part of the data/evidence,'^[54]
412 specifically, I have not searched for games on either List using the other rating
413 system's search tool.

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2.2. Study 2

The sample of 100 (or potentially fewer) games will be selected using the following steps:

1. The sample will be derived from the samples of four previous studies assessing loot box prevalence amongst mobile games in different countries, which examined 531 separate instances of video games and identified whether they contained loot boxes^[18,20,34,35].
2. Amongst those 531 games, 100 were originally studied in Chinese and not in English^[20]. Those 100 Chinese games were reviewed in 2021 to identify a subset of 31 games that were also then available in English, which were reassessed in a UK study^[18]. The present study is less interested with the compliance situation of games available only in Chinese and more concerned with the compliance situation in North America and Europe (*i.e.*, ‘Western’ countries) where the ESRB and PEGI self-regulate; therefore, those 100 Chinese games will not be reviewed again as the previously distilled list of 31 games that were available in both languages will be taken into account.
3. A list of 431 games combining the results of three previous studies will be collated^[18,20,34]. Any duplicates and any games assessed to have *not* previously contained loot boxes will be removed. Some reasonable flexibility as the game’s title is allowed when searching for and removing duplicate games (*e.g.*, changes to the subtitle to reflect a content update). Any deviation will be recorded. The remaining games will therefore form a list of non-duplicate games that were known to contain loot boxes.
4. It is known that two so-called ‘sand box’ games (specifically, *Roblox* (Roblox Corporation, 2006) and *Minecraft* (Mojang Studios, 2011)) will be included on that list. These two games contain a significant amount of third-party user-generated content, including loot boxes^[18,35]. This represents a particular compliance difficulty as these ‘platform’ games’ developers and publishers would need to ensure not only compliance by themselves but also compliance by many third parties creating content for these games^[49,55]. To ensure that both of these game will be assessed, they will be removed from the list and not form part of the sample. Their compliance situation will be separately

448 reported. If either game becomes unavailable for download and incapable of
449 being assessed, then this would be noted in lieu.

- 450 5. Therefore, the present study's sample will be a total of 100 random games
451 from the list of non-duplicate games that were known to contain loot boxes.
- 452 6. Alternatively, if that list contains fewer than 100 games, the entire list will
453 form the sample.
- 454 7. If any game in the sample will no longer be available for download from the
455 Google Play Store by the data collection period then it will be excluded from
456 the sample and replaced with another random game from the list. If that list
457 will contain fewer than 100 games or if no games will be left on that list to
458 replace the excluded game, then the study will proceed with the available
459 games even if the sample will be formed of fewer than 100 games.
- 460 8. The same exclusion and replacement (if possible) procedure will apply if
461 *Guns of Glory* is to be included. This game is specifically being excluded as it
462 has been used as an example to test and illustrate the present study's
463 methodology for the stage 1 registered report submission and its 'results'
464 have already been observed.

465

466 The following variables will be measured:

467

468 *Presence of the interactive element of 'In-Game Purchases (Includes Random Items)'*

469 The Google Play Store page of the relevant game will be reviewed to check whether
470 the IARC interactive element of 'In-Game Purchases (Includes Random Items)' has
471 been noted alongside the game's age rating. The US and Danish Google Play Stores
472 for each game will be checked to see whether the label has been attached to both the
473 ESRB and the PEGI ratings, respectively. A simple change of the parameter
474 'gl=[country code]' in the game's Google Play Store URL allows for the switching of
475 regions. The country code for the US is 'us,' whilst Denmark uses 'dk.' To illustrate
476 using the example of *Guns of Glory*, the US store can be visited through the following
477 URL:

478 <https://play.google.com/store/apps/details?id=com.diandian.gog&hl=en&gl=us>,

479 whilst the Danish store can be visited through:

480 <https://play.google.com/store/apps/details?id=com.diandian.gog&hl=en&gl=dk>.

481 A PDF printout of the relevant webpages (showing the URL visited) will be made.

482

483 *Presence of paid loot boxes (newly assessed)*

484 If the Google Play Store page of a game known to previously contain paid loot boxes
485 will not show the IARC interactive element of 'In-Game Purchases (Includes
486 Random Items)' alongside the game's age rating, then that game will be played for
487 up to an hour to identify whether paid loot boxes are still being implemented and
488 sold in that game. Any identified paid loot boxes will be screenshotted. If a paid loot
489 box cannot be identified within that timeframe, then the game will be coded as not
490 containing paid loot boxes.

491

492 To align with the methodology of prior studies^[18,20,35], a 'paid loot box' will be
493 defined as being either an Embedded-Isolated random reward mechanism (which
494 are video game mechanics that players must pay real-world money to activate and
495 which provide randomised rewards that do *not* possess direct real-world monetary
496 value) or an Embedded-Embedded random reward mechanism (whose activation
497 also must be paid for by players with real-world money but which *do* provide
498 randomised rewards that possess direct real-world monetary value), as defined by
499 Nielsen & Grabarczyk (2019)^[4].

500

501 In particular, it is emphasised that so-called 'social casino games' or 'simulated
502 casino games,' in which the player is able to spend real-world money to participate
503 in simulated traditional gambling activities (*i.e.*, 'games of chance' or 'mixed games
504 of chance and skill;' *e.g.*, slot machines, poker, and blackjack) and win or lose virtual
505 currency *randomly*^[35], will be counted as games containing 'loot boxes' for the
506 purposes of Hypothesis 2, despite some debate on that point within the academic
507 literature^[56,57]. This is because spending real-world money to participate in a social
508 casino game constitutes an in-game '[transaction] with randomized elements,' per
509 the ESRB's definition^[3]. The present study's definition of 'paid loot box' encompasses
510 both mechanics that are commonly known as 'loot boxes' and social casino games.
511 This accords with both the ESRB's and PEGI's definitions for mechanics that the loot
512 box warning labels are supposed to cover^{[3][24]}. However, the relevant compliance
513 rate (see below) amongst 'social casino games' (which will be identified using the
514 definition above) and non-'social casino games' will be additionally separately
515 reported to provide nuance.

516

517 Further, again aligning with the methodology of prior studies^[18,35], so-called ‘sand
518 box’ games, such as *Minecraft* or *Roblox*, that contain a significant amount of third-
519 party user-generated content will be assumed to contain paid loot boxes without the
520 need for such a mechanic to be specifically identified and screenshotted.

521

522 *Date and time of data collection*

523 The date and time, based on Central European Time (or Central European Summer
524 Time, depending on which will be used by Denmark at the data collection period),
525 on and at which the interactive element and paid loot boxes will be searched for, will
526 be recorded.

527

528 Inter-rater reliability through dual-coding will not be calculated because the
529 methodology has been repeatedly used and refined and is known to be reliable^[58].

530 The raw data and a full library of PDF printouts and screenshots showing, *inter alia*,
531 the relevant Google Play Store webpage sections and in-game loot box purchase
532 pages for each game will be made available via <[OSF deposit link]> for public
533 scrutiny.

534

535 The ‘compliance rate’ with the loot box warning self-regulation will be calculated as
536 follows:

537

$$538 \quad 1 - \frac{\text{Games newly assessed as containing loot boxes but not displaying the interactive element}}{\text{(All games previously known to previously contain loot boxes) - Games newly assessed as not containing loot boxes}}$$

539

540 Hypothesis 2 will be accepted if the compliance rate is $\geq 95\%$. Otherwise, Hypothesis
541 2 will be rejected. In terms of the interpretation of results, a compliance rate of $\geq 95\%$
542 will be viewed as the self-regulatory measure having been nearly perfectly complied
543 with and worthy of commendation. A compliance rate of $\geq 80\%$ but $< 95\%$ will be
544 deemed as the self-regulatory measure having been mostly complied with, although
545 improvements are needed. A compliance rate of $< 80\%$ will be seen as the measure
546 having *not* been adequately complied with and in need of significant improvements
547 to achieve its regulatory aim. Again, these cut-offs and corresponding potential
548 interpretations were based on the author’s own opinion on what is a ‘satisfactory’
549 self-regulatory measure and what he deemed most policymakers would agree with.

550

551 Study 2 achieves level 6 of bias control as recognised by PCI RR as the relevant data
552 do not yet exist.^[54]

553

554 The sample sizes for both studies are justified on the basis of resource constraints:
555 specifically, the researcher has limited time and is seeking to promptly complete the
556 study in time to assist in the government-supported, industry self-regulatory efforts
557 regarding loot boxes currently underway in the UK^[48].

558

559 In accordance with the *Danish Code of Conduct for Research Integrity*^[59], as adopted by
560 the IT University of Copenhagen, the present series of two studies will not require
561 research ethics assessment and approval because no human participants or personal
562 data will be involved and only publicly available information will be examined and
563 recorded.

564

565 **3. Results**

566 **tbd**

567

568 **4. Discussion**

569 **tbd**

570

571 **5. Conclusion**

572 **tbd**

573 **Positionality Statement**

574 In terms of the author's personal engagement with loot boxes, he plays video games
575 containing loot boxes, but he has never purchased any loot boxes with real-world
576 money.

577

578 **Data Availability Statement**

579 The raw data and a full library of PDF printouts and screenshots showing, *inter alia*,
580 the relevant Google Play Store webpage sections and in-game loot box purchase
581 pages for each game will be publicly available in the Open Science Framework at
582 [\[OSF LINK TO BE CREATED\]](#).

583

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591

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