The prevalence of loot boxes in mobile and desktop games

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Abstract

Loot boxes are items in video games that may be bought for real-world money but provide randomised rewards. When buying loot boxes, players stake real-world money on the chance outcome of a future event. Formal similarities between loot boxes and gambling have led to concerns that they may provide a 'gateway' to gambling. In particular, there are concerns that they may provide a gateway to gambling amongst children.

However the availability of loot boxes in general, and their availability to children in specific, is unclear. There is no data available to either academics or policymakers when it comes to assessing the prevalence of loot boxes, and how easy to access they are by children.

In this piece of research we undertook a systematic review of both the top mobile games on the Google Play store, and the top desktop games on the Steam store. We found that 54% of the top games on the Google Play store contained loot boxes; and 34% of the top games on the Steam store contained loot boxes. Worryingly, many loot boxes were in games that are available to children: 94% of mobile games that featured loot boxes were available in games that are deemed suitable for children aged 12+, amounting to at least 1.3 billion downloads of games that feature loot boxes. Similarly, 35% of desktop games that featured loot boxes were available to children aged 12+.

Given the prevalence of loot boxes, we suggest that ratings boards like PEGI and the ESRB consider adding 'loot box' content descriptors to games that feature this mechanism.

Introduction

What are loot boxes?

Loot boxes are items in video games that may be bought for real-world money, but which provide players with a randomised reward of uncertain value. For example, players of *Golf Clash* can pay real-world money to unlock in-game chests. These chests may contain a valuable club that improves a player's in-game performance. Or they may contain a club that is of little or no use to the player. When paying their money, players have no way of knowing exactly what they will receive in return for their investment.

Loot boxes and gambling

Both when opening a loot box and when using a slot machine, individuals risk money on the chance outcome of an uncertain future event. This similarity has led to concerns over links between loot boxes and gambling-related harm.

In (1), researchers measured the extent of loot box spending and the severity of problem gambling in a large sample of 7,422 gamers. They found that the more money gamers spent on loot boxes, the more severe their problem gambling was. This link between problem gambling and loot box spending appears robust

and has been subsequently replicated (2,3). It has also been seen in other populations, such as eSports spectators (4).

The reasons behind this link are unclear. In (5), Drummond and Sauer describe various key structural characteristics that are shared between loot boxes and traditional forms of gambling. They argue that these similarities mean that some loot boxes can be considered "psychologically akin" to gambling and may therefore affect gamers as if they were gambling.

As noted in (6), there are concerns that involvement in activities that are similar to gambling may act as a gateway to involvement in gambling proper, and hence the development of problem gambling. It may therefore be the case that loot box spending is linked to problem gambling because spending money on loot boxes literally causes problem gambling to develop.

However, conversely, it is important to note that problem gambling is characterised by excessive and uncontrolled engagement with gambling (7,8). If loot boxes really are psychologically akin to gambling, links between problem gambling and loot box spending may exist because excessive spending behaviour on gambling amongst problem gamblers transfers to spending on loot boxes(1).

The availability of loot boxes

As Blascynzki and Nower note, the "starting block"(9) of problem gambling is the availability of gambling activities. Indeed, empirical findings have repeatedly shown that increased access to gambling is linked to increases in the prevalence of problem gambling (10–12).There are concerns that technological innovations such as internet gambling will lead to increases in the availability of gambling activities, and hence also lead to increases in problem gambling(13).

Similar concerns may be proposed when it comes to the availability of loot boxes. However, surprisingly, the academic literature contains very little information about the prevalence of loot boxes. A report by the UK Gambling Commission has estimated that 31% of UK adolescents aged 11-16 have opened a loot box (19); apart from this, there is no other publicly available data which can inform researchers either directly or indirectly about the prevalence of loot boxes.

Loot boxes and children

It is especially important to understand the prevalence of loot boxes in games that are made available to children. Most countries have laws that prohibit children from gambling. However, there are currently no restrictions on which games may contain loot boxes. It is plausible that many games that are deemed suitable for children contain loot boxes. If this is the case, it may be cause for concern: Exposure to gambling in early childhood has been shown to predict problem gambling in later life (14,15).

The prevalence of 'cash out' loot boxes

In some (though not all) games, loot box contents carry real-world value. In these games, players can 'cash out' their winnings by selling their items to other players via digital marketplaces. For example, a player of *Counter-Strike: Global Offensive* may open a loot box and receive a rare *Huntsman* knife; or they may receive a more common *CZ75 Auto Twist* skin. The *Huntsman* knife mentioned

above currently fetches over $100 on the open market(16); the CZ*75 Auto Twist* is worth only 26 cents(17). In the Netherlands, loot boxes that allow players to cash out their winnings have been deemed so similar to gambling that they have been regulated as an illegal form of gambling(18).

Method

Design

A list was made of the top 100 highest-grossing Android games in the UK Google Play store, and the top 50 most-played PC games in the Steam store. This list is correct as of February 28th, 2019.

The following four variables were then measured for each of these games: (1) The **presence/absence of loot boxes,** (2) whether **loot boxes could be cashed out for real-world money,** (3) **the number of overall installs** that a game had**,** and (4) the **PEGI age rating** for that game

These variables were measured as follows:

Presence/absence of loot boxes was measured by having one researcher investigate each game in each list. Games were coded as containing loot boxes if they had in-game items or rewards that (a) could be bought for real world money and (b) had randomised contents of varying value. 'Social casino' games were coded as not containing loot boxes.

When possible, the presence of loot boxes was ascertained by watching videos of gamers playing, and buying, these items. When these videos were not available, or were not clear, the game itself was installed and played until it became apparent whether loot boxes were present. This was the case for all 150 games surveyed. The accuracy of the first researcher's classifications were then checked independently by a second researcher.

The number of overall installs was calculated for games in the Google Play store from the estimated number of installs provided by Google for each game. In each case, Google provided a lower bound estimate of the number of installs (e.g. '10,000,000+ installs'). This lower bound was used. Steam does not provide estimates of number of installs for games in the Steam store, nor does it provide any detail of what its best-selling games are. Therefore, a list of the most popular games on Steam was obtained from the aggregator *SteamSpy*, which attempts to approximate the popularity of Steam games. The lower bound estimate for installs was again used.

The PEGI age rating was obtained directly from each game's description on either the Steam store or the Google Play store. Only 5 games lacked an age rating. All 5 were on Steam.

Results

Overall, 54 out of 100 top mobile games contained loot boxes (54%). 17 out of 50 top desktop games contained loot boxes (34%).

The age-ratings of games featuring loot boxes are represented below as Table 1 as cumulative counts and frequencies, as are the cumulative number of downloads of games that feature loot boxes.

PEGI Rating	Number of games that feature loot boxes (Cumulative)			Number of installs / owners of games that feature loot boxes, in millions (Cumulative)		
	Mobile	Desktop	Total	Mobile	Desktop	Total
3+	14/100 (14%)	2/50 (4%)	16/150 (10%)	495	5.2	500.2
7+	31/100 (31%)	3/50 (6%)	34/150 (22%)	906.5	15.2	921.7
12+	51/100 (51%)	6/50 (12%)	57/150 (38%)	1,318	55.2	1,373.2
16+	54/100 (54%)	8/50 (16%)	62/150 (41%)	1,478	125.2	1,603.2
18+	54/100 (54%)	17/50 (34%)	71/150 (47%)	1,478	294.7	1,773.7
Unrated	54/100 (54%)	17/50 (34%)	71/150 (47%)	1,478	294.7	1,773.7

Out of the games that contained loot boxes, only 19% allowed players to 'cash out' loot box contents for real world money. This accounted for 565 million installs. The numbers of games featuring cash out, and the number of downloads of these games, are presented below as Table 2.

Type of loot box	Number of games			Number of installs / owners of games, in millions		
	Mobile	Desktop	Total	Mobile	Desktop	Total
Cash out	4/54 (7%)	10/17 (58%)	14/71 (19%)	310	255	565
No cash out	50/54 (92%)	7/17 (41%)	57/71 (80%)	1,168	39.7	1,332.7

Discussion

The availability of loot boxes

The above analysis reveals both the frequency with which loot boxes appear in video games. Overall, 54% of the sample of mobile games featured loot boxes, and 34% of the sample of desktop games. This high level of availability is mirrored by the large number of players that are exposed to loot boxes: In total,

we found more than 1.7 billion installs of games that contain this gambling-like feature. Almost a billion of these downloads were of games that were deemed suitable for children aged 7+. This figure is extremely conservative. It is almost certain that exposure to loot boxes is even more common than these figures suggest.

Loot boxes and children

The prevalence of loot boxes in games that are available to children are a cause for potential concern. Of the 54 mobile games that featured loot boxes, 51 were deemed suitable for children aged 12+, equivalent to 94% of mobile games that feature loot boxes. 31 of these 54 games were deemed suitable for those aged 7+.

Mobile devices are thought to be the "preferred media choice"(21) amongst young children. Furthermore, many parents are thought to approve video game spending agreements with their children (22). Because of the high prevalence of loot boxes in mobile games deemed appropriate for those aged 7+ and 12+, it seems likely that large numbers of children have had the opportunity to buy loot boxes. If loot box mechanics really are "psychologically akin to gambling", as suggested in (5), then they may well be opening the door to the development of problem gambling amongst these young gamers.

The picture of loot box availability is somewhat different when it came to desktop gaming. Desktop games revealed lower, but still substantial, levels of prevalence. They also showed higher age-ratings for games with loot boxes: 17 of the 50 most-played Steam games contain loot boxes (approximately 294 million installations). Of these, only 17% (3 of the 17) are PEGI rated as suitable for those aged 7+; however, 35% (6 of the 17) are still classified as suitable for those 12+.

The prevalence of cash out

Being able to cash out loot boxes for real-world money is a common concern amongst both academics and policymakers. Our results indicate that this feature may differ in its prevalence between mobile and desktop platforms: Only 4 mobile games featured loot boxes in which contents could ultimately be exchanged for real-world money. By contrast, most of the desktop games (10/17) that featured loot boxes allowed players to cash out their contents.

Conclusions

Given the prevalence of loot boxes across popular titles and the massive audiences for these titles, the opportunity to buy loot boxes may be a non-negligible risk factor for problem gambling. Further, given the age ratings associated with most of these titles, it seems likely that large numbers of children have the opportunity to buy loot boxes.

In Europe, many video games must come with PEGI (Pan European Game Information) age labels, and must also have clearly visible descriptors showing whether the game contains theoretically sensitive features like the depiction of sex or violence(23). Similarly, in the USA and Canada, "virtually all video games"(24) come with age ratings and content descriptors from the ESRB (Entertainment Software Rating Board).

Video game companies are currently not required to disclose to their customers that any game contains loot boxes prior to purchase. In the absence of suitable content descriptors, it seems extremely difficult for parents and guardians to be aware of the presence of loot boxes in games that children are playing. It therefore seems difficult for them to make an informed decision about the exposure of their children to this potential risk factor for problem gambling. We therefore argue that regulators and ratings boards like PEGI and the ESRB urgently consider adding content descriptors for loot boxes to games.

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