Accuracy of Consumer Identification of Characteristics, Visual Representations and Purchase Receipts of Loot Boxes

A thesis presented in partial fulfilment of the

requirements for the degree of

Master of Arts

in

Psychology

at Massey University, Palmerston North, Manawatū,

New Zealand.

Matt Hall

2023

Abstract

Loot boxes are virtual containers in video games, that provide players with randomized rewards. Concerns exist about the similarities between loot boxes and conventional gambling (Drummond & Sauer, 2018). Supporting this, there is a robust meta-analytic relationship between loot box spending and problem gambling symptomatology (Garea et al., 2021). Although the regulatory response varies between jurisdictions, it often remains up to consumers to regulate their own, and their children's engagement with loot boxes. For consumers to effectively achieve this, at minimum they must be able to identify loot boxes. The present research investigated the accuracy of consumers in identifying characteristics, visual representations, and purchase receipts of loot boxes. We employed a cross-sectional between subjects quasi-experimental research design. Participants were members of natural groups (e.g., parents/guardians, non-parents/non-guardians, video gamer/non-video gamers). Participants were asked to identify basic facts about, pictures of, and receipts generated by, loot boxes. Our results suggests that parents/guardians and non-gamers perform poorer at identifying loot boxes than non-parents/non-guardians and gamers respectively across these three measures. Our results suggest that parents/guardians and non-gamers may be less likely to be able to make informed loot box purchasing decisions compared to non-parents/non-guardians and gamers respectively. Our findings are the first to provide objective insight into the relative performance of consumers' ability to identify and thus regulate loot box purchases.

Acknowledgements

Firstly, I thank Dr. Aaron Drummond. From the onset of our communication, you provided unwavering support and leadership. I can say with certainty that without your input, this project, and my educational progression wouldn't have continued. The intertwining of your scientific astuteness and ability to teach and lead, leave much to be admired. The supervision from Dr. Drummond and Dr. Sauer has been received with much appreciation. You both created a challenging and enriching environment, in which I looked forward. It's been great sharing knowledge, skills, laughs and a mutual dislike of the post-modern direction of video games, what an enjoyable and memorable year. A special thanks to Lauren who provided much needed guidance with Qualtrics, you helped ensure the survey creation was a stressless experience.

Joseph, Laura, Courtney. Your friendship is a massive supportive factor, what a journey huh. I've expressed my gratitude enough in real life so you shouldn't expect a heartthrob piece here as well. But seriously, thanks. I owe you one or two or whatever.

A big thanks to my family. To my older Brothers Todd and Brad, who although may be weaker physically, make up for in always being there when it counts. Thanks for listening to and debating psychological topics throughout the years, I appreciate you both. To my Dad Dean, who has been alongside me every step, and in every direction, I have chosen to go, Thanks Dad. To my Mum Jane, your empathy and kindness of heart is with us always.

To my friends not named specifically, and some separated by distance. It's awesome catching up after extended time periods and our vibe still withstanding. Going into my Master's Thesis, I had heard from many to expect high levels of stress and likely mental breakdowns. Thanks to those mentioned and some not, those expectations were not actualized.

Table of Contents

List of Figures

List of Tables

Chapter 1: Introduction

Video games are a common past time for many individuals, and consequently they are big business. According to the Digital New Zealand report by Brand et al. (2017) 98% of New Zealand homes with children have computer games, and 53% of households have five or more screens (computer screens, gaming consoles, phones, tablets etc.). Brand et al. (2017) that 67% of New Zealanders play video games, with an average daily playtime of 85 minutes. Furthermore, the report showed that youth make up the largest proportions of gamers in New Zealand, with 90% of those aged 5-15 year and 79% of those aged 15-24 year identifying as gamers (Brand et al., 2017). The Aotearoa New Zealand video game industry created a total of $548 million in revenue in 2018, with $405 million of this coming from digital sales. Comparatively, the global game industry in 2021 has an estimated worth of $180.3 billion (Wijman, 2021). The changing nature of video games has resulted in new and emerging monetization methods to improve the profitability of video games.

The video games industry has grown in recent years in terms of both the number of consumers engaging with the medium as well as the amount of revenue generated by the industry. The increase in consumer participation and engagement has occurred alongside an evolution of business models by game publishers, ostensibly to increase profitability (Davidovici-Nora, 2014). For example, business models of game publishers now commonly include free-to-play games which include optional purchases, micro-transactions (small one-off transactions to purchase a small piece of digital content), reoccurring payment subscriptions, and loot boxes (randomized packs of digital content often purchasable for real world money; Liu, 2019) This thesis investigates consumer understanding of micro-transactions in video games.

Micro-transactions

In the last decade micro-transactions have become increasingly common in video games (Zendle et al., 2020). Micro-transactions are in-game purchases that vary between games. Micro-transactions serve a wide range of purposes, such as delivering new post-launch levels and characters in the form of downloadable content, skins (visual customization of in-game characters and items), fictitious currency to purchase in-game items, power-ups and other items which yield competitive advantages, and random chance-based rewards (e.g., loot boxes; Liu, 2019). These differing types of micro-transactions vary in their influence on the player's gameplay, socialization, the psychological mechanisms they employ and their potential psychological impact. Despite this, the overarching aim of micro-transactions is to provide increased revenue (Davidovici-Nora, 2014; Drummond et al., 2020). Micro-transactions can generate large profits, with loot boxes alone generating $15 billion in revenue in 2020 (Wijam, 2021). The micro-transaction is often complex and opaque. For instance, fictitious in-game currency is often available to be purchased for real world money, which is only redeemable within the game in which it is purchased. Liu (2019) explains that, in turn, this currency allows for the purchasing of further in-game content, such as skins and loot boxes. For example, a Fortnight player can purchase an in-game currency ("V-Bucks") for real world money, then purchase an in-game skin to change their online in-game appearance (Fortnite, 2017). One form of micro-transaction which has been subject to criticism in recent years is loot boxes.

Loot Boxes

Loot boxes are digital containers available in some video games that grant various virtual rewards upon opening which are often purchasable for real world money (Drummond, 2018). When a consumer purchases and opens a loot box, they receive a chance-based selection of at least one reward (skins, items, characters, or competitive edges). Rewards vary on a spectrum of rarity

between some rewards being common, and others being exceedingly rare. Critically, a player receives an item on the basis of chance, and does not know what item they will receive at the time of purchase (Drummond & Sauer, 2018). For example, the official odds disclosure statement for a FIFA Ultimate Team (2019) gold player pack states a player is guaranteed to receive at least one gold 75 (rating) card (playable character) per pack. However, these odds diminish for higher rated players, with players having; 20% chance of receiving an 82 or higher card and a 4.5% chance of receiving an 84 or higher players (EA, 2021). In some cases, the probabilities of receiving the highest rarity items could be less than 1% (EA, 2021).

Loot boxes have raised concern from researchers, policy makers, consumers, and parents in recent years due to their striking similarities to conventional forms of gambling (Drummond & Sauer 2018; Drummond et al., 2020). Loot boxes deliver rewards on a variable ratio-schedule (Larche et al., 2021), which is a behavioral reinforcement mechanism frequently employed in conventional gambling (Drummond & Sauer, 2018). Variable ratio schedules of reinforcement occur when a behavior is rewarded after a random number of responses. Research has shown that variable ratio reinforcement encourages fast-learned patterns of behaviour, persistent reoccurring behaviours in hope of a rewarding outcome, and behavioural patterns which are often difficult to unlearn or extinguish (Rachlin, 1990). In addition to variable ratio reinforcement schedules, loot boxes also frequently include the gambler's fallacy, and near miss mechanisms which appear to encourage further purchases (King & Delfabbro, 2018).

Some regulatory changes have been implemented in response to the concerns about loot boxes. Belgium and the Netherlands have banned loot boxes while China and Japan implemented legislation requiring publishers to disclose reward odds (Xiao, 2021; Xiao et al., 2021). Notwithstanding, most countries have not implemented regulatory changes, opting instead for the

implementation for consumer awareness measures. As discussed by Derrington et al. (2021) it is reasonable that adults should be free to engage in gambling and gambling related-activities, however, concerns remain about the engagement of children and adolescents purchasing loot boxes (Parentzone UK, 2019; Rockloff et al., 2020). One such study found 32% of adolescent playing video games containing loot boxes have made purchases, with a median monthly expenditure of $50 AUD (Rockloff et al., 2020). In addition, research by Parentzone UK (2019) found that 40% of children aged 10-16 had paid to open a loot box. The findings of Parentzone UK (2019) and Drummond (2020) suggest that many children are participating in activities that are psychologically and legally akin to conventional forms of gambling (Drummond, 2020).

The controversial similarities between loot boxes and conventional gambling have prompted a growing body of evidence about the similarities between loot boxes and conventional gambling. Research suggests that there is a robust association between problem gambling symptomatology and loot box spending (Garea et al., 2021; Zendle & Cairns, 2019). Although findings do not definitively indicate that engagement with loot boxes causes problem gambling symptomatology, they at minimum imply that individuals with problem gambling symptoms spend more on loot boxes, suggesting that a vulnerable population of problem gamblers might be prone to overspending on the mechanism. Furthermore, recent longitudinal evidence suggests that loot boxes may indeed act as a gateway to future gambling behaviours (Brooks & Clark, 2022). This is concerning as through loot boxes, adolescent and youth with problem gambling symptomatology have simple and legal access to gambling like-mechanisms. Despite debate about the extent of harm from loot boxes, Derrington et al. (2021) suggests they pose psychological and financial risks, specifically to younger populations. In addition, parents should be fully informed and sufficiently educated on the associated risks of their children purchasing loot boxes while being

equipped with the knowledge on how to enact regulation (see also Drummond & Sauer, 2018, 2020; King & Delfabbro, 2018).

Regulation and Parental Influence

As discussed earlier, most countries have not implemented any forms of loot box regulation. This leaves the responsibility of consumer regulation on the individual, and more importantly the responsibility for ensuring that underage players are engaging responsibly with the product currently rests largely upon parents. Presently, there is limited research exploring parental understanding of micro-transaction and loot boxes. Gong and Rodda (2020) investigated parental techniques for limiting loot box consumption and found that environmental restructuring, persuasion, and education were the most used techniques. However, this research lacked discussion and evidence regarding the success of these techniques, or whether parents could accurately identify loot boxes in order to successfully implement such techniques. The lack of research investigating parental awareness of loot boxes means that it is presently uncertain whether parental interventions are likely to be effective, and creates difficulty in developing further educational resources to support parents in this endeavor. The Australian Institute of Family studies (2019) stated that the lack of understanding of loot boxes among individuals not versed in gaming culture have made regulatory practices often difficult and unclear, and additionally, there is a need for continued education for parents about risks and impacts associated with video games (Jatkar & Jenkinson, 2019). This thesis will therefore focus upon whether parents and consumers are able to accurately identify the presence of loot boxes and loot box transactions to ensure that they are able to make informed decisions about their engagement with the mechanism for themselves and their children.

Chapter 2: Literature Review

This chapter reviews the literature surrounding micro-transactions, loot boxes, and the associated areas of concern. The purpose of this literature review is to examine the similarities between loot boxes and conventional gambling while considering the wider consumer implications of this form of micro-transactions.

Micro-transactions

As described earlier, micro-transactions are small purchases (often less than $2.50) made by players for extra content in video games (e.g., skins, loot boxes, etc). Literature of micro-transactions and specifically loot boxes has grown coinciding with public concern about these mechanisms.

Zendle et al. (2020) highlight the prevalence of loot boxes and cosmetic micro-transactions in contemporary video games. Zendle et al. (2020) examined four hundred and sixty-three of the most played *Steam* (a mainstream video game distribution service) desktop PC video games from 2010-2019. The results showed a large increase in the proportion of games which contained loot boxes (5.3% in 2010 to 71.92% in 2019) and cosmetic (skins) micro-transactions (8.3% in 2010 to 85.89% in 2019) over the 9-year period. Similarly, an environmental scan of bestselling games amongst Australians in 2019 identified that loot boxes were available in 66% of the most frequently played games in Australia (Rockloff et al., 2020). Furthermore, in the top 100 highest grossing iPhone games in Belgium and China 82% and 91% respectively had loot boxes available (Xiao, 2022 & Xiao et al., 2021). Taken together, these studies suggest that loot boxes are frequently available in video games internationally. The increased availability of loot boxes highlights the importance of consumer awareness about the presence of these mechanisms in video

games to ensure that parents and players can make informed decisions about what content is appropriate for themselves and their children.

Parentzone UK (2019) surveyed children aged 10-16 years about their loot box and micro-transaction engagement. Results from a sample of 1,001 participants showed that 91% said loot boxes were available in games they played and that 40% of participants had paid to open one. Similarly, The Interactive Software Federation of Europe (ISFOE) (2021) found that 40% of parents indicated that their children had spent money to obtain in-game purchases on cosmetic items, and 20% indicated that their child had purchased in-game items with unknown rewards, such as loot boxes (ISFOE, 2021). One limitation of this research is that it relies upon parents to accurately identify loot boxes in video games, and presently it is unclear how well parents may be able to achieve this goal. Nonetheless, the results suggest a nontrivial portion of children may be engaging with loot boxes and other forms of micro-transactions.

Similarly, Rockloff et al. (2022) explored the potential for exposure to loot boxes for adolescents aged 12-17. They found that almost all participants had played video games with loot boxes, and 32% had paid to open one in the last 12 months. Furthermore, approximately 70% of both adolescents and adults had opened a loot box at least once (Rockloff et al., 2022). These findings also concord with research by Li et al. (2019) showing that 44.2% of gamers had paid to open a loot box in the past year. Taken together, these studies establish that relatively similarly proportions of children, adolescents and adults appear to participate in purchasing and opening loot boxes.

At an aggregate level, consumer engagement with loot boxes has increased a large amount over the past decade (Zendle et al., 2020), which in turn is associated with the generation of increased digital sales for game publishers. For instance, Electronic Arts (EA) is a large public

video game publisher and in the 2021 financial year EA generated $5.63 billion including $1.62 billion from Fifa Ultimate Team (FUT) and related game modes (FUT generated 29% of EA games revenue for the 2021 FY) (EA annual report, 2021). FUT players are strongly motivated to purchase FUT loot boxes (called Player Packs) to acquire a team of players that can compete in online play (Lemmens, 2022). It is difficult to gain industry wide figures on loot box revenue, mainly due to the fact that companies tend to keep these data closely guarded (Lemmens, 2022). However, at an aggregate level, estimates indicate that loot boxes generated $15 billion (USD) in revenue from all video games in 2020 with an estimated trajectory of $25 billion (USD) by 2022 (Juniper research, 2018).

Motivations For Purchase of Micro-transactions and Loot Boxes

Why do players purchase loot boxes? Hamari et al. (2017) investigated players motivations and reasons for purchasing micro-transactions. Players reported that unobstructed gameplay, social interaction, competition, economic rationales, indulging children, and unlocking content, were the main reasons for these kinds of purchases (Hamari et al., 2017). Similarly, King et al. (2020) investigated 428 adult *Fortnite* players to determine associations of in-game purchasing behaviors. They found micro-transaction purchasing was predicted by social influences; namely, frequency of spending by participants' close friends who also spend money on *Fortnite*, greater accessibility to *Fortnite* across platforms, and being a higher level in game. The authors state that different in-game monetization schemes may vary in their potential risks to consumers (King et al., 2020).

While *Fortnite* only contains cosmetic micro-transactions (i.e., cosmetics that alter the aesthetics but not gameplay), other games contain functional rewards instead of, or as well as, these cosmetic micro-transactional purchases. Zendle et al. (2019) found that motivations for consumer purchasing of loot boxes appeared to be more specific than other micro-transactions;

these ranged from getting an excited feeling, profiting, in-game competitive advantages and fitting in socially. Furthermore, the research shows that consumer motivations for purchasing micro-transactions differ from the motivations for opening loot boxes, and instead appear to be similar to the typical reasons people participate in conventional forms of gambling (Zendle et al., 2019). These studies establish there are multiple rationales for purchasing micro-transactions and loot boxes, however, loot boxes have an additional component of gambling-like mechanisms which are not present in other micro-transactions.

Similarities Between Loot Boxes and Conventional Gambling

Research has established the extent to which loot boxes are psychologically analogous to conventional forms of gambling (Drummond & Sauer, 2018). Drummond and Sauer (2018) found that gambling and loot box systems are psychologically akin. Twenty two video games containing loot boxes were compared to Griffiths' (2018, cited in Drummond & Sauer, 2018) criteria for gambling which are designed to distinguish gambling from other forms of risk-taking activity. Specifically, Griffiths defined five key characteristics for gambling activities:

1) The exchange of money or goods;
2) The outcome is unknown;
3) Chance (partly or wholly) determines the outcome;
4) The activity is optional;
5) Winners gain at the expense of losers (Griffith, 2018).

Results showed that approximately 45% of games reviewed containing loot boxes met all five of these psychological definitions of gambling activities (Drummond & Sauer, 2018). This suggests that at a psychological level, loot boxes are analogous to conventional forms of gambling.

Further, although the psychological and legal criteria for gambling often differ between jurisdictions, some commonality exists between the legal criteria for gambling. For gambling to occur, in most jurisdictions, one requires three key criteria to be met – consideration (cost of participation), chance (outcomes are delivered based on chance), and prize (participants win something of value) (Drummond et al., 2020) Drummond et al. (2020) found that paid loot boxes appear to meet each of these criteria, further intensifying the concerns about their inclusion in games rated as appropriate for underage players.

In accordance with the observed structural and psychological similarities between loot boxes and conventional gambling, researchers have identified robust relationships between loot box purchasing and problem gambling symptomatology (Zendle & Cairns, 2018). Zendle and Cairns (2018) conducted a large-scale survey on 7,422 gamers. Results showed the amount gamers spent on loot boxes correlated with the severity of their problem gambling symptoms. This correlation was stronger than the relationship between problem gambling symptomatology and buying other in-game items. These results add a layer of practical support for Drummond and Sauer's (2018) psychological similarities between loot boxes and conventional gambling. Zendle and Cairns (2019) later replicated their earlier study to further strengthen findings of a relationship between problem gambling symptomatology and loot box spending.

In another investigation of the links between gambling and loot box spending, Brooks and Clark (2019) investigated the relationships between gaming involvement, engagement with loot boxes and their associations with disordered gambling and gambling-related cognitions. The results suggested that further to surface level similarities between loot boxes and conventional gambling, loot box purchasing correlated with gambling beliefs and problematic gambling behavior in adult gamers. Similarly, Li et al. (2019) found that loot box purchasing was associated

with both problem video gaming and problem gambling severity. These associations were shown to operate indirectly through increased video gaming and online gambling engagement, which in turn leads to elevated psychological distress (Li et al., 2019).

Building on these studies, Drummond et al. (2020) conducted research exploring the relationship between problem gambling, excessive gaming, psychological distress, and spending on loot boxes. The authors assessed problem gambling, problem gaming symptomatology, and the amount spent on loot boxes in Aotearoa, Australia, and the United States. Concordant with past research, participants with greater problem gambling symptomatology spend more on loot boxes than individuals with lower problem gambling symptomatology. Results also suggested an association between problem gambling and excessive gaming symptoms (Drummond et al., 2020). In addition, Zendle et al. (2020) found the link between paying for loot boxes and problem gambling is only weakly affected by specific loot box features (Showing near-misses, ability to cash out, etc.) Irrespective of the specific features of loot boxes, in instances where players pay real-world money for loot boxes, the players purchase is linked to problem gambling (Zendle et al., 2020). Expanding the research to the adolescent population. Ide et al. (2021) found adolescent loot box purchasing is linked with problem online gaming. These findings complement those of Drummond et al. (2020), indicating that the association between loot box purchasing and problem gaming is present in adolescents (Ide et al., 2021).

A meta-analysis by Garea et al. (2021) revealed the relationship between problem gambling symptomatology and loot box spending to be robust. The findings showed a robust significant small to moderate positive correlation between loot box spending and gambling symptomatology and excessive gaming across 22 studies. Presently it remains unclear whether loot box spending is causing problem gambling symptoms or whether individuals with problem gambling symptoms

are more likely to purchase loot boxes. Either possibility is concerning, suggesting that, at a minimum, vulnerable players with problem gambling symptoms are spending more on the mechanism than players without such symptoms (Garea et al., 2021).

Motivational Similarities Between Purchasing Loot Boxes and Engaging in Conventional Gambling

To explore the issue of similarities between loot box purchasing and conventional gambling, Hodge et al. (2022) examined players' experiences with loot boxes in parallel with gambling. The author's thematic analysis identified three consistent player attitudes toward loot boxes: Random chance effects (That the odds are stacked against the player), attitudes toward loot box content (Perceptions of low real-life value and in-game advantages) and implementation of loot boxes (Developers focused on money). The results suggested that players perceive loot boxes both directly and indirectly as related to gambling (Hodge et al., 2022). Player perceived loot box as a game of chance in which the probability of receiving a high-tier reward is low, and therefore, unlikely to occur without substantial spending. In addition, players perceived loot boxes as implemented by developers to increase revenue through marketing superficially rewarding content. The authors suggest that new definitions of gambling should be introduced to encompass new technological advancements (Hodge et al., 2022).

Importantly, predictors of loot box purchasing mirror predictors of gambling participation (von Meduna et al., 2020). Research by von Meduna et al. (2020) explored associations of gambling-like elements in video games. The results supported previous research by showing associations between problem gambling symptoms and loot box purchasing, however, additionally found that a lower level of education was associated with greater loot box purchasing. This finding shares commonalities with conventional gambling, in which lower education is typically

associated with greater gambling participation (Hing et al., 2016). Further examining the predictors of loot box spending, Close et al. (2022) measured the association between loot box engagement, socioeconomic and gambling correlates. The research showed that 45.97% of loot box purchasers also gambled, compared to 29.13% of non-loot box purchasers. Further to this, Close et al. (2022) found that loot box engagement was significantly more likely to be engaged with by younger players, male players, those with non-university educational attainment education status, and those players who were unemployed; these demographic associations mirror those common to addictive behaviors, problematic behaviors, and disordered gambling behaviors (Close et al., 2022).

Adolescent engagement appears to be one particularly concerning issue with regard to loot box purchasing. Zendle et al. (2019) investigated links between older adolescents, loot boxes with problem gambling and motivations for purchase. Results suggested that the link between problem gambling symptoms and loot box spending was much stronger for adolescents than for adults. In addition, and mirroring the later results of Close et al. (2020) the authors found that many of the reasons adolescents engaged in loot box purchasing behavior mirrored common motivations for engagement in conventional gambling. The authors state that loot boxes likely either cause problem gambling among adolescents, allow game companies to profit from adolescent with gambling problems, or potentially both (Zendle et al., 2019).

In one of the few other studies to investigate younger players, Hing et al. (2022) examined the links between loot box purchasing and problem gambling amongst adolescents. The results suggest that loot box purchasing in the past month was significantly related to gambling problems, even after controlling for monetary gambling, age and gender. The authors found recent loot box purchasing was associated with greater odds of also being a problem gambler of between 3.7 to 6.0 times, and being an at-risk gambler by 2.8 to 4.3 times. The results indicate that loot boxes

disproportionately attract adolescents experiencing gambling problems, adding to the financial stress already caused by gambling. The authors state further support for motivations for purchasing loot boxes mirror the motivations seen in traditional gambling (Hing et al., 2022). Further, they appear to allow game publishers to profit from gambling like mechanisms on individuals who cannot legally gamble. The authors, therefore, recommend regulatory changes; consumer protection measures, youth and parental education, and age restrictions on loot box games are needed to protect young people (Hing et al., 2022).

Loot Box Regulation

McCaffrey (2019) discusses the current controversy surrounding the regulation of loot boxes and randomized rewards. Consumers and legislators are pushing for the regulation of loot boxes and randomized mechanisms, deeming them as unfair, predatory, and as often akin to conventional gambling (McCaffrey, 2019). Regulators have focused on two specific issues with loot boxes: gambling and consumer exploitation. If loot boxes meet the criteria of gambling, then gambling regulations should be applied to them (McCaffrey, 2019). Regulations such as age restrictions, advertising restrictions, and odds disclosure requirements. On the other hand, consumer exploitation has proven difficult to determine, at this point research cannot state that loot boxes cause problem gambling, gambling symptomatology or function as a separate outlet for gambling like behaviors (Zendle & Cairns, 2018, 2019). This lack of definitive evidence linking loot box purchasing to causing problem gambling has hindered regulatory progression across most jurisdictions (McCaffrey, 2019).

As an alternative, one form of non-binding regulation enacted in many countries is to increase the availability of consumer information to aid in decision making for themselves and their children. The Entertainment Software Rating Board (ESBR) and Pan-European Game

Information (PEGI) both play major roles in supporting parental decision making. These organizations prescribe age ratings and other content descriptors for video games. In 2021, changes were implemented by PEGI and ESBR to label video games as containing loot boxes and randomized items.

Gong and Rodda (2020) explored other forms of individual and parental techniques for limiting loot box purchasing. The results from a thematic analysis identified eleven behavioral change techniques and 47 strategies for self-regulation of loot box purchasing. A further eight behavioral change techniques and 38 strategies were identified that could be utilized by parents to limit children's purchasing of loot boxes. The authors found that the most common behavioral change technique used by parents to regulate their child's look box purchasing were 'Environmental Restructuring' (Used 36% of the time) which controls the child's capability to purchase loot boxes. 'Environmental Restructuring' largely consisted of removing access to loot boxes (e.g., by removing console or computer), uninstalling games containing loot boxes, or when available using settings to hide loot boxes. The second most common behavioral change technique used by parents was found to be a 'Persuasion and education' (used 16.4% of the time) approach, which informs the child about loot box mechanisms and discusses the value of money with a goal of providing educational information about loot boxes and consequences of games of chance (Gong & Rodda, 2020).

In related research, Dong et al. (2020) surveyed parents with children who play video games, analyzing parents self-reported perceptions of video games if labelled with "loot boxes" opposed to "in-game purchases". A qualitative analysis of the results found that parents appeared to be less likely to buy or let their child play a game labelled as "containing loot boxes". Results also found that parents claim to be largely opposed to their children buying both loot boxes and

in-game purchases. Parent responses explicitly compared loot boxes with gambling or viewed the purchasing of loot boxes as a waste of money. The authors' preliminary evidence for 'Loot boxes' labels may lower parent's agreement on letting their child buy or play games in comparison with 'In-game Purchase' labels. The results indicate that loot boxes are more negatively perceived than in-game purchases by parents. In addition, the authors stated many participants did not know what a loot box was, and therefore evaluating the appropriateness of each label was difficult (Dong et al., 2020). Supporting this, Garrett et al. (2023) found that the ESRB and PEGI labels do not appear to be well understood by consumers. The Entertainment Software Rating Board (ESRB) implementing loot box labels is an important regulatory step, however, the labels may not be, at present, functioning wholly as intended.

Previous studies have explored aspects relating to parents and loot boxes; parental perspectives on purchasing loot box labeled video games (Dong et al., 2020) and techniques for limiting children's loot box consumption (Gong & Rodda, 2020). These studies provide some preliminary insight into parental perspectives and reduction techniques. However, these studies overlook a key issue related to loot boxes in video games. Specifically, at present, there is poor understanding of how many parents know what a loot box is. The success of game labeling and consumer-led reduction techniques requires at a minimum that parents know and understand what a loot box is, and how to identify one to successfully limit their purchase and use.

The current lack of parental awareness has been highlighted by multiple news articles in which children have reportedly spent significant amounts of money on loot boxes without their parents knowledge. In one such example, $7,625.88 (USD) was spent by a teenager on in-game fictitious currency (Schwartz, 2016), this fictitious currency was spent on player packs in an attempt to receive an exceedingly rare player before parents became aware of the spending

(Schwartz, 2016). In another example, a child reportedly spent £550 while trying to acquire a rare random reward, with the parents only realizing this when their card was later declined (Cunliffe, 2019). Many gaming consoles and platforms save credit card details by default, for instance a credit card used to purchase a video game from a digital storefront is often automatically saved for the ease of future purchases. While convenient, this setting may create opportunity for children to purchase further content without re-entry of the credit card details. Purchases of loot boxes and other in-game content generate a receipt that are sent to the email associated with the purchasing account. Therefore, many parents first knowledge of loot boxes purchased in this way may be a receipt from a transaction their child has made. It is therefore important that parents/guardians can successfully identify loot box receipts to quickly enact regulation strategies.

Aim

The research on loot boxes is relatively new; however, a large proportion of the current research has explored the potential for harm in association with purchasing loot boxes. The body of research investigating the relationship between harm and loot box consumption may not be definitive yet, however, it does indicate a clear association between loot box purchasing and psychopathology such as problem gambling symptomatology (Garea et al., 2021). Until definitive evidence can influence regulatory change toward consumer harm minimisation, there is a need to investigate consumer awareness of the mechanisms of loot boxes. The success of techniques that limit loot box purchasing and parental advisory labels is highly reliant on consumer understanding and awareness. As a first step, consumers must be able to accurately identify the characteristics, visual presentation, and purchase receipts of loot boxes before they can successfully implement self-regulatory strategy.

The aim of the present study is therefore to explore the accuracy of parents/guardians, non-parents/non-guardians, gamers, and non-gamers, in identifying the characteristics of loot boxes, images of loot boxes and loot box receipts. The current study theorized that greater engagement and familiarity with video games would be associated with better understanding of loot boxes. That is, it was anticipated that individuals who were gamers themselves would be better able to identify loot boxes than non-gamers. Similarly, parents/guardians of children (whom often have a paucity of time to engage in and learn about leisure activities such as video games; Galinsky, Bond & Friedman, 1996) were expected to be poorer in their understanding of loot boxes than non-parents/non-guardians. The current study therefore hypothesized differences in consumer identification of loot boxes. Specifically, it was hypothesized that:

***H1*:** Parents and guardians will have lower discriminability in a ROC curve analysis than non-parents and non-guardians on a basic loot box knowledge test[1].

***H2*:** Parents and guardians will be less accurate in their identification of loot boxes than non-parents and non-guardians when presented with images of loot boxes, as evidenced by significantly lower discriminability scores in a ROC curve analysis.

***H3*:** Parents and guardians will be less accurate in their identification of loot box receipts than non-parents and non-guardians when presented with images of loot box receipts and non-loot box receipts, as evidenced by significantly lower discriminability scores.

[1] [1] Note that the pre-registration for this study indicated that Area Under Curve in ROC analyses would be undertaken. This was beyond the scope of the present Masters thesis, but will be undertaken for any resulting publication. In most cases measures of discriminability (*d'*) yield very similar results to Area under the Curve analyses (See Wixted & Mickes, 2018).

***H4*:** Non-video gamers will have lower accuracy, and discriminability in a ROC curve analysis than gamers on a basic loot box knowledge test.

***H5*:** Non-video gamers will be less accurate in their identification of loot boxes than video gamers when presented with images of loot boxes, as evidenced by significantly lower discriminability scores.

***H6*:** Non-video gamers will be less accurate in their identification of loot box receipts than video gamers when presented with images of loot box receipts, as evidenced by significantly lower discriminability scores.

***H7*:** Guardianship status will interact with video gamer status such that gamers without children will have the highest discriminability scores.

Chapter 3: Method

Ethics

Participation in the study was voluntary, all participants provided informed consent to participate in the study, and participants could withdraw at any stage without providing a reason. This research was evaluated by peer review under the low-risk notification procedure for Massey University's Ethics Committee, and consequently judged to be low risk (Notification Number 4000025974).

Pre-Registration

Our hypothesis, sampling plan, stopping rule, exclusion criteria, measures and statistical models were pre-registered with OSF. The following link contains the complete pre-registration: https://osf.io/5sud2/?view_only=1db377cfadbd43dd8854df28b98aa57a

Design

This research employed a cross-sectional between subjects quasi-experimental design. Participations were members of natural groups (e.g., parents/guardians, non-parents/non-guardians, video gamer/non-video gamers), and completed a series of questions about loot boxes which were factually true or false in nature. This allowed the different groups' performance on loot box questions, identification of loot boxes, and loot box receipts, to be objectively compared.

Participants

A G* Power analysis indicated that 196 participants would be sufficient to detect a moderate effect (Cohen's $f = 0.25$) at 80% power and $p = < .05$ for our main effects. Given that the proportion of gamers to non-gamers or the proportion of parents/guardians to non-parents/guardians who will respond to the survey was not initially known, it was pre-registered that this study would collect 600 participants to comfortably exceed the minimum suggested prerequisite from G* Power and ensure we have adequate power to examine differences between

groups. Participants under the age of 18 years were not eligible to take part in the study. Participants that did not provide informed consent ceased continuation of the survey. Participants that responded “true” to the attention check question which was embedded within the survey “I have suffered a fatal heart attack”, were excluded as mischievous/inattentive responders. This attention check resulted in two exclusions. Participants who answered less than 75% of the survey were also excluded, this resulted in no further exclusions, the final sample size was 595 participants.

Participants’ demographic distribution consisted of 62 (10.3%) Australian, 30 (5.0%) from Aotearoa New Zealand and 504 (84.4%) US residents. Participant gender distribution consisted of 278 (46.6%) Male, 302 (50.7%) Female, 13 (2.2%) non-Binary, 1 (0.2%) Prefer not to say, and 2 participants who indicated (0.3%) Other. Participant guardianship and gamer status were reduced into parents/guardians that were non-gamers (n= 31), parents/guardians that were gamers (n= 181), non-parent/guardians that were non-gamers (n= 45), and non-Parents that were non-gamers (n= 338). One participant did not report their parental status and was not included in the analyses. The mean age of participants was 33.68 (SD = 11.6). Three participants failed to indicate their age.

Measures

Guardianship status

Guardianship status was measured with a single question: “Are you a parent or a guardian of children?” with response options “Yes/No”. We chose to dichotomously categorize individuals into two groups rather than distinguish between parents and guardians – participants who are parents or guardians (i.e., they answer yes), and participants who are not parents or guardians (i.e., they answer no).

Gamer status

Gamer status was measured with a single question: “How often do you play video games?” with response options “Never, Monthly, Weekly, Most days, Daily”. We dichotomously reduced this variable into two groups – participants who do not play video games (i.e., they answer never), and participants who play video games at least once a month (i.e., all answers other than never).

Dependent measures

The dependent measures consisted of Discriminability (*d*') and Area Under Curve (AUC) scores on general loot box knowledge test, identification of loot boxes and identification of loot box receipts. For all measures, discriminability (*d*'), was calculated as *d*' = z (hit rate) – z (false alarm rate). A flattening constant of 0.5 was applied in the computation of d' scores to allow for the calculation of *d*' if participants got zero answers correct (which would otherwise result in *d*' being unable to be calculated) Higher discriminability scores indicated greater performance on this task. Area Under Curve (AUC) was computed using the geometric method described in Green and Swets (1966).

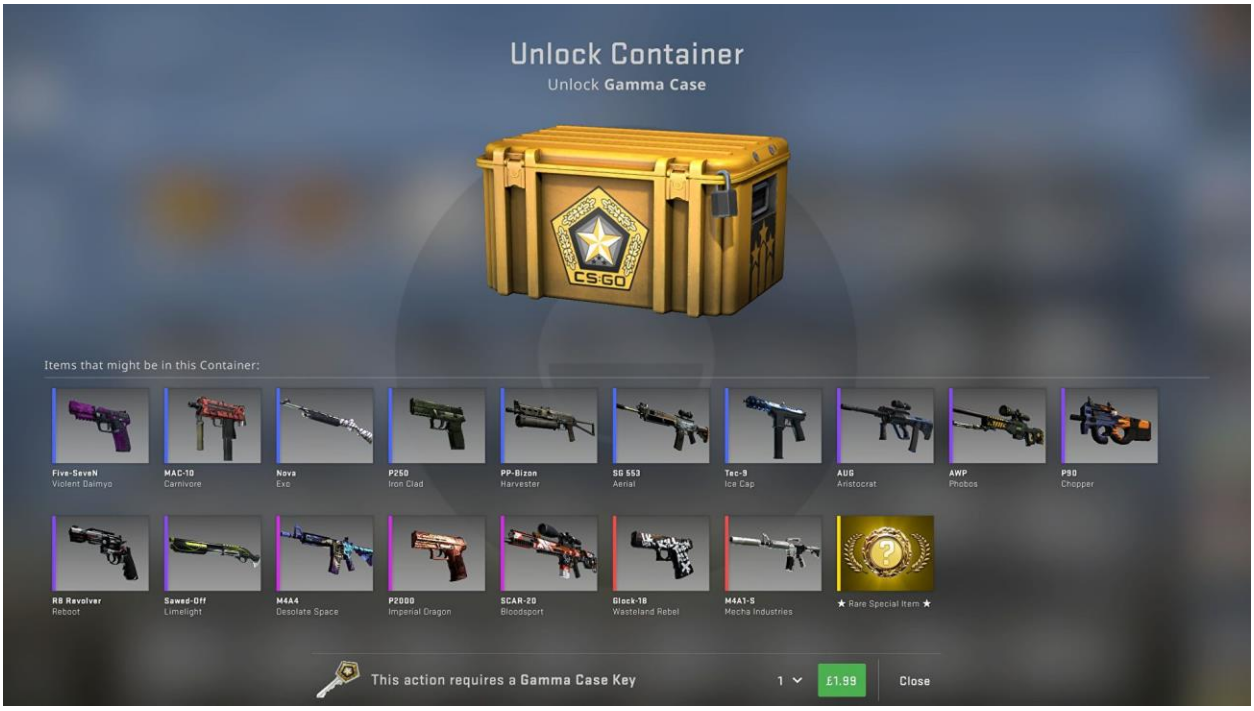
Loot Box General Knowledge Questions

Participants’ comprehension of loot boxes was assessed using 10 (5 true and 5 false) items such as “A loot box delivers a random reward to the player.” (Correct answer = True) And “Players can choose what rewards they receive from loot boxes.” (Correct answer = False). Participants’ responded to these items on a six-point Likert-type scale from 1, *Certain that this statement is false* to 6. *Certain that this statement is true*. Responses of 1-3 indicted the degree to which participants perceived the statement as false, and 4-6 indicted the degree to which participants perceived the statement as true. The full survey is available in the appendix.

Loot Box Image Identification Questions

This measurement consisted of a series of 10 items (5 true and 5 false) containing an image with or without a loot box (see Figure 1 for an example image of a loot box). Participants provided responses to "How certain are you that this screenshot contains a loot box?" on a six-point Likert scale from 1, *Certain that this is not a loot box* to – *6. Certain that this is a loot box*. Response options were identical for each question, and the order of images was randomized for each participant. As above, since the scale did not contain a midpoint, responses of 1-3 indicated that participants thought the image did not contain a loot box, and 4-6 indicated that the participant thought the image contained a loot box.

Figure 1.
Image presented to participants containing a loot box.

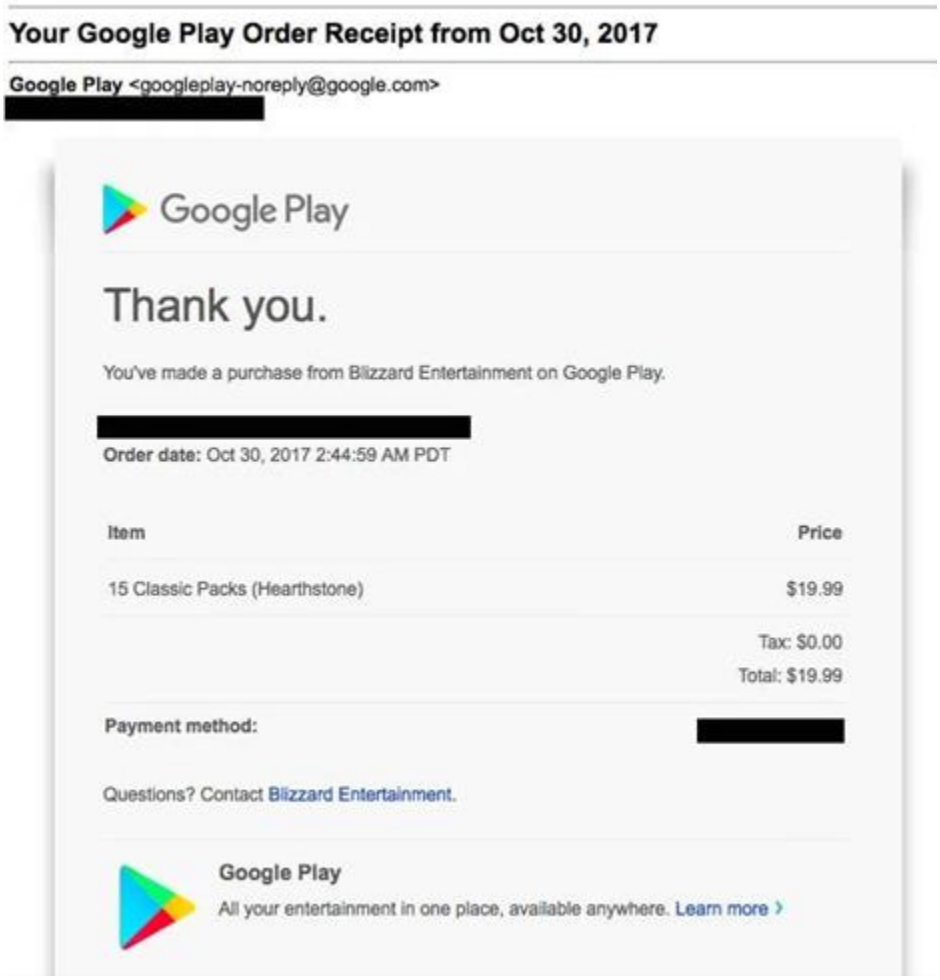


Loot Box Receipt Image Identification Questions

This measure consisted of a series of 10 items (5 true and 5 false) containing images containing an image with or without a loot box receipt (See Figure 2 for an example containing a

loot box receipt). Participants provided responses to: “How certain are you that this screenshot contains a loot box receipt?” on a six-point Likert scale from 1, *Certain that this is not a loot box receipt to* – 6. *Certain that this is a loot box receipt*. Response options were identical for each question, and the order of images was randomized for each participant. Again, as the scale did not contain a midpoint, responses of 1-3 indicated that participants thought the image did not contain a loot box, and 4-6 indicated that the participant thought the image contained a loot box receipt.

Figure 2.
Image presented to participants containing a loot box receipt.



Additional measures

Participant's completed a series of questions assessing their loot box familiarity. This was assessed with questions such as "How familiar are you with in-game purchases?", "Are you familiar are you with what a loot box is?" and "Have you ever purchased a loot box for real life money?". Participants responded to these items on a seven-point Likert-type scale from 1, *not at all familiar* to 7, *extremely familiar*. Although these measures were collected, we did not pre-register any analyses incorporating these familiarity questions, and they were collected as exploratory variables only.

Procedure

The data set was gathered through an online survey. Members of Prolific over the age of 18 were invited to take part in the study and accessed the survey on Qualtrics via an anonymous survey link. Participants that accepted the invitation were required to read through the study information individually and provide informed consent or ceased participation. Participants were then presented with the 10 questions measuring general loot box knowledge. Questions were true or false in nature and the set ended with an additional attention check question. Participants were then presented with the following definition of a Loot box: "Definition of a loot box used during questionnaire: 'Loot box' is a broad term that defines a specific kind of transaction in video games. Loot boxes are rewards within video games, sometimes purchased for real money or using in-game currency that costs money. Loot boxes are any digital container, card pack, crate or case which contains an unknown reward at the time of purchase or being earned.". Following this definition, participants were then presented with the 10-question set of loot box images, one image at a time, each of which either contained a loot box or did not (5 images contained loot boxes and 5 images did not contain loot boxes) and asked to indicate on a scale from 1 (Certain that this is not a loot box) to 6 (Certain that this is a loot box) their certainty that the image showed a loot box. After the

completion of the 10 loot box identification questions, participants were then presented with the 10-question set of loot box receipt images, again one image at a time, each of which either contained a loot box receipt or did not (again, 5 images contained loot box receipts and 5 images did not). Participants were again asked to use the 6-item certainty scale to indicate their certainty that each receipt was a receipt for a loot box purchase. Participants were then asked what gender they identified with and what country they lived in.

Data Analysis

Participant responses to the loot box questions, loot box image questions and loot box receipt questions were transformed into discriminability scores (d prime / d'). To test the hypotheses Bayesian ANOVAs were conducted from the d' scores using the statistical analysis software JAMOVI (v 2.5.5).

Significance testing leads to claims of whether an effect was significant or not, leading to a binary decision about whether the model reaches some (arbitrary) line for significance. In contrast, Bayesian analysis allow the comparison of how probable the data are on one model (I.e., alternative hypothesis) against another model (I.e., null hypothesis) on a continuous measure, providing the strength of evidence for one model compared to another (Dienes, 2014) In contrast to significance testing, Bayes factors are continuous measures of evidence, which weigh the evidence for two hypotheses (alternative and null). Bayes factors reflect the likelihood of the alternative hypothesis being true given the data, against the likelihood of the null hypothesis being true given the data. Advantages of Bayesian analysis include that they are more intuitively understandable, allow for an index of strength of evidence for the null hypothesis, and are less affected by the issues of sample size typical of null hypothesis significance testing (Lee & Wagenmakers, 2015). Bayes Factors produced by Bayesian analyses are interpreted as the ratio of

the likelihood of the data occurring under the null hypothesis to the likelihood of the data accruing under the alternative hypothesis. There is no direct relationship between $p < .05$ when evidence favors an alternative over a null hypothesis (Lindley, 1957, as cited in Dienes, 2021). Here we adopt the guidelines proposed by Lee and Wagenmakers (2015) to interpret the Bayes factors (See Table 1).

Table 1.
Guidelines for the relative strength of evidence indexed by Bayes Factors.

	Evidence Category	
Bayes Factor	**BF_{10} or BF_{+}**	**BF_{01} or BF_{-}**
> 100	Extreme evidence for H_1	Extreme evidence for H_0
30 – 100	Very strong evidence for H_1	Very strong evidence for H_0
10 – 30	Strong evidence for H_1	Strong evidence for H_0
3 – 10	Moderate evidence for H_1	Moderate evidence for H_0
1 – 3	Anecdotal evidence for H_1	Anecdotal evidence for H_0
1	No evidence	No evidence

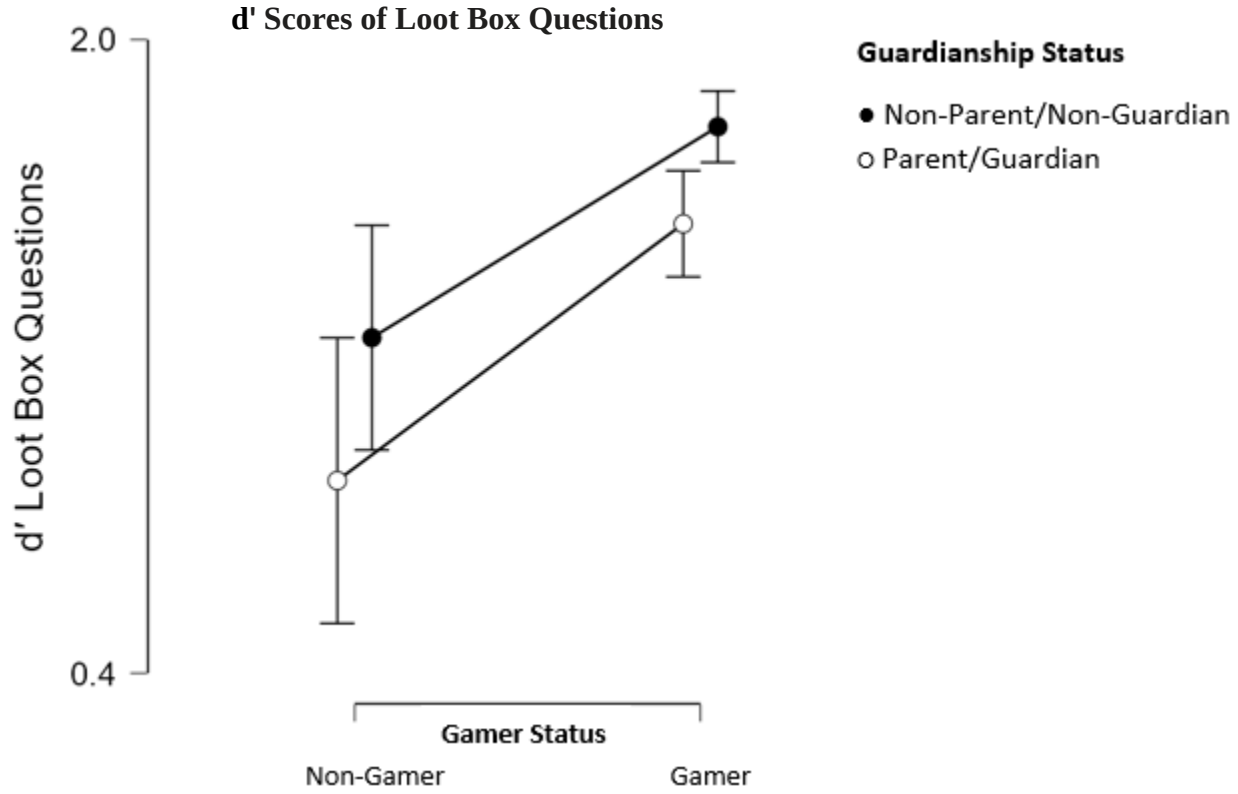
Chapter 4: Results

Data were analyzed using Bayesian ANOVA's for the discriminability scores of each of the three main questionnaires: Loot box general knowledge discriminability, loot box identification discriminability, and identification of loot box receipts discriminability using Bayesian data methods. All Bayes factors were presented as BF10, thereby indexing the strength of evidence for the alternative hypothesis. As noted in the method section, Bayes factors of >3 were interpreted as moderate evidence, >10 were considered strong evidence and >100 were considered very strong evidence.

Loot Box General Knowledge Questions

Figure 3 shows the discriminability scores for loot box general knowledge questions for parents/guardians, non-parents/non-guardians, gamers, and non-gamers. A Bayesian ANOVA with parental/guardianship status and gamer status as factors yielded strong evidence in support of the alternative hypothesis for a difference between guardianship status on the discriminability of loot box general knowledge questions, BF_{10} = *50.17*. As shown in Figure 3, as predicted parents/guardians performed poorer on discriminability than non-parents/non-guardians. The analysis also revealed extreme evidence in support of the alternative hypothesis for a difference in gamer status on loot box questions, BF_{10} = *154,357.99*. Again, as predicted, and as shown in Figure 3, gamers were more accurate in their knowledge about loot boxes than non-gamers. The strongest evidenced model was that of both variables be being independent associations with discriminability scores, with extreme evidence in support for the alternative hypothesis suggesting that Hypotheses 1 and 4 were supported, BF_{10} = *4,940,000*. Including the interaction actually weakened the effect (BF_{10} = *957,278.86*) indicating there did not appear to be an interaction effect between guardianship and gamer status on loot box questions.

Figure 3.
Discrimination scores between true/false loot box general knowledge questions.



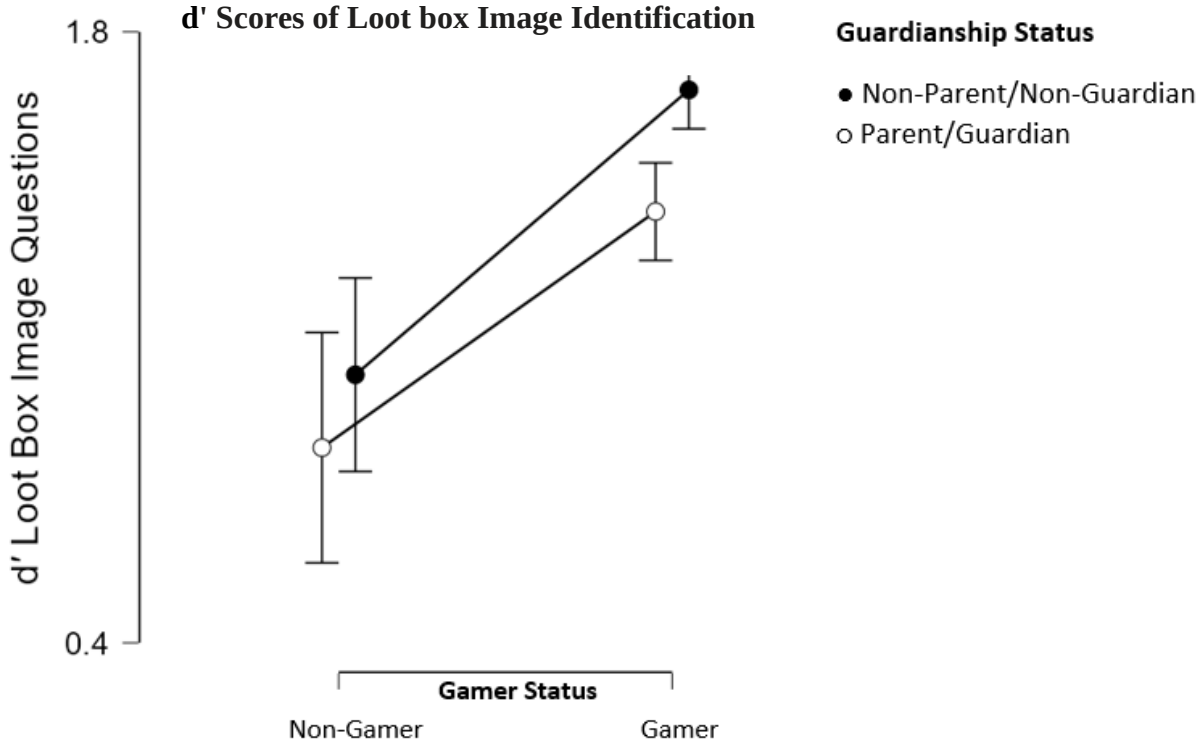
Note. As hypothesized, results indicate parents performed worse in discriminability than non-parents. Again, as hypothesized, non-gamers also performed worse in discriminability than gamers. The results indicate that being a parent or a non-gamer is associated with poorer performance with loot box questions than being a non-parent/guardian or gamer respectively. Error bars represent 95% Credibility Intervals.

Loot Box Image Identification

Figure 4 shows discriminability scores for loot box image questions for parents/guardians, non-parents/non-guardians, gamers, and non-gamers A Bayesian ANOVA with parental/guardianship status and gamer status as independent variables revealed that there was very strong evidence in support of the alternative hypothesis for guardianship status on identifying loot box images, $BF_{10} = 203.51$ and extremely strong evidence in support of the alternative hypothesis

for gamer status on identifying loot box images, BF_{10} = *13,200,00*. Together, both variables having independent associations with discriminability scores had extreme evidence of support of the alternative hypothesis (BF_{10} ~ *166 billion)* for identifying loot boxes. As predicted, parents/guardians were less accurate in identifying the presence of loot boxes than non-parents/non-guardians, and gamers were more accurate in identifying the presence of loot boxes than non-gamers. This provided evidence in support of Hypothesis 2 and 5. Including the interaction actually weakened the effect (BF_{10} = *380,000,00*) indicating there was likely no interaction effect between guardianship and gamer status on loot box image discriminability, providing evidence against the Hypothesis that parental/guardianship status and gamer status would interact as predicted in Hypothesis 7.

Figure 4. Discrimination scores for true/false loot box images.



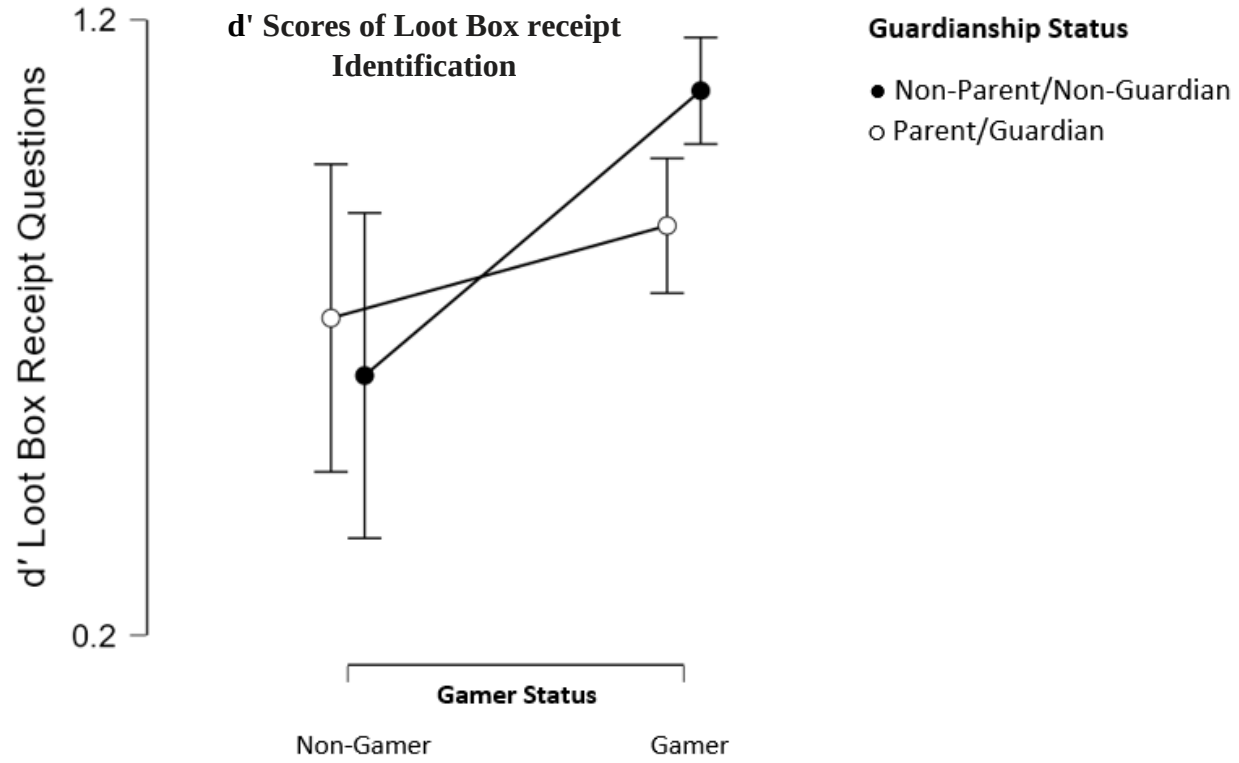
Note: As hypothesized, parents/guardians performed poorer in discriminating between images containing loot boxes and images not containing loot boxes than non-parents/non-guardians. Non-

gamers also performed worse in discriminability than gamers did. The results indicate that being a parent/guardian or a non-gamer is associated with poorer performance in discriminating loot box images than being a non-parent or a gamer respectively. Note that no evidence for an interaction between parental/guardianship status and gamer status was observed providing evidence against the hypothesis that parental/guardianship status and gamer status would interact (Hypothesis 7). Error bars represent 95% Credibility Intervals.

Loot Box Receipt Identification

Figure 5 shows discriminability scores for loot box receipt image questions for parents/guardians, non-parents/non-guardians, gamers, and non-gamers. A Bayesian ANOVA with parental/guardianship status and gamer status as factors revealed moderate evidence in support of the alternative hypothesis for guardianship on identifying loot box receipts, $BF_{10} = 3.57$, and very strong evidence in support of the alternative hypothesis of gamer status on identifying loot box receipts, $BF_{10} = 54.90$. As in previous analyses, the analysis showed that both variables having independent associations with discriminability scores had the strongest evidence, with extreme evidence in support of both parental/guardianship status and gamer status being associated with discriminability on identifying loot box receipts, $BF_{10} = 145.38$. Again, as predicted, and as shown in Figure 5, parents/guardians were less accurate than non-parents/non-guardians, and non-gamers were less accurate than gamers, to identify the presence of a loot box receipt. This provided evidence supporting Hypothesis 3 and 6. As in the other analyses, including the interaction actually weakened the effect ($BF_{10} = 94.32$) indicating evidence against an interaction effect between guardianship and gamer status on loot box receipt discriminability, further providing against the Hypothesis that parental/guardianship status and gamer status would interact (Hypothesis 7).

Figure 5. Discrimination scores for true/false loot box image receipts.



Note: As hypothesized, parents/guardians performed poorer in discriminating between images containing loot box receipts and images not containing loot box receipts than non-parents/non-guardians. Non-gamers also performed worse in discriminability than gamers did. The results indicate that being a parent/guardian or non-gamer is associated with poor performance in discriminating loot box receipt images than being a non-parent or a gamer respectively. No evidence for an interaction between parental/guardianship status and gamer status was observed providing evidence against Hypothesis 7 that parental/guardianship status and gamer status would interact. Error bars represent 95% Credibility Intervals.

Chapter 5: Discussion

The present research explored consumers' accuracy in general loot box knowledge, identifying the presence of loot boxes in screenshots of video games, and identifying the presence of loot box purchases in receipts. Gaining an understanding of how well consumers can identify loot boxes is an important first step toward enabling consumer awareness and self-regulation/parental regulation of loot box engagement within video games. As predicted, our results indicated that parents/guardians had poorer general knowledge about loot boxes, were less accurate at identifying loot boxes, and were less accurate at identifying receipts for loot box purchases than non-parents/non-guardians. Similarly, non-video gamers also performed poorer than gamers on true or false questions on these three measures. Contrary to hypotheses, there was no observed interaction between guardianship and video gamer status on the identifying visual representation and purchase receipts of loot box measures. Taken together, our results suggest parents/guardians and non-gamers have poorer ability to identify loot boxes, and loot box receipts, and therefore, absent of educational intervention, are presently less able to effectively self-regulate loot box purchases than as non-parents/guardians and gamers.

Research indicates that many loot boxes are psychologically and legally analogous to conventional forms of gambling (Drummond & Sauer, 2018; Drummond et al., 2020). Garea et al. (2021) further show the similarities between loot boxes and conventional gambling by showing meta-analytic evidence of a robust small to moderate positive correlation between loot box spending and problem gambling symptomatology. Youth loot box participatory demographics amplify these concerns; as figures indicate that as many as 32-40% of youth purchase loot boxes (Parentzone UK, 2019; Rockloff et al., 2020). Some countries have looked to reduce engagement in loot boxes through implementing legislative regulation, however, many appear to have

experienced suboptimal compliance rates (Xiao et al., 2020). Other countries have implemented consumer awareness techniques such as warning and consumer information labels. However, these too, appear ineffective (Garrett et al., 2023). The lack of effective regulation places the responsibility of regulating youth loot box purchasing at home, by parents. Our findings suggest yet another problem with the labelling strategy: Parents/guardians appear to be less competent at identifying the presence of loot boxes and past loot box purchases from receipts when compared with non-parents/guardians. This suggests that parents/guardians may not be at present sufficiently informed to effectively regulate their childrens' engagement with loot boxes.

Research suggests that parents are largely opposed to purchasing loot boxes; often comparing them to gambling, and believing they are a waste of money (Dong et al., 2020). Despite these negative perspectives, the present research suggests that parents/guardians are not particularly good at identifying the presence of loot boxes in video games. One reason for this may be that loot box can vary widely in their presentation, and this may in turn impede parents' ability to consistently identify loot boxes. Dong et al. (2020) suggests that although their findings provide insight on parental perceptions, definitive conclusions can't be drawn as it was unknown what percentage of parents knew what a loot box was. Our findings add to the literature by showing that parents/guardians tend to be inferior to non-parents in identifying loot boxes, and therefore suggest that Dong's findings may actually underestimate the true proportion of young players engaging with loot boxes. Hing et al. (2020) suggests that education should target children, adolescents, and parents to raise awareness of the harm in loot box purchasing. Our findings complement Hing et al.'s (2020), in suggesting that in addition to raising awareness of potential harm, parents should be educated in how to consistently identify the features, presence of, and purchase receipts for loot boxes.

Previous research conducted by ISFE (2021) analyzed parent's descriptions on their child's in-game spending on loot boxes and suggest that most parents report that their child does not purchase chance-based items such as loot boxes. ISFE's (2021) research presupposes that parent's subjective knowledge is accurate. Our findings cast doubt upon this assumption by suggesting a potential divide between the parental judgements about what their children are engaging with and the objective knowledge those parents have. This divide may suggest a lack in metacognition - that is, knowledge of one's own knowledge about loot boxes (Lai, 2011). Parents may simply have insufficient knowledge of video games and loot boxes. Given our findings show they are relatively poor at identifying the presence of loot boxes and loot box purchases they may be underreporting loot box engagement. In addition, it may be possible that parents are relying on out-of-date schema from a prior experience with loot boxes to regulate future encounters. Parents without the knowledge of the frequent and fast-moving variation in loot box presentation may be unaware of newer or novel loot box features. Instances in which a parent's or other consumers subjectively report knowing what a loot box is, but objectively do not, are likely to experience some of the most problematic environments for self-regulation/parental-regulation stemming from misinformed or ineffective decision making. Successful regulation of a child's loot box purchasing requires as a pre-requisite, parental ability to accurately identify loot boxes when they occur within games.

Our findings also indicated non-gamers were less accurate than gamers in identifying all evidence of loot boxes. This suggests a broader link between the familiarity with games and accuracy in identifying loot boxes. Given that loot boxes are found in video games, non-gamers are less likely to encounter loot boxes compared with gamers. Non-gamers are likely to need the most support to make informative purchasing decisions. This is important, as although non-gamers have a lower likelihood of encountering loot boxes, they, like parents are at higher risk of making

misinformed purchasing decisions. Like parents, non-gamers are likely to be limited in their own knowledge of loot boxes and be less effective in self-regulating them, as such, it may be that causal gamers, or individuals just getting into the hobby, who are also at heightened risk of naively engaging with loot box systems in games.

Applied Implications

Our findings provide insight toward the current level of consumer knowledge. They show that parents and non-gamers are likely to be misinformed when regulating their own or their child's loot box purchases. In addition, parents (and by extension their children), and non-gamers or more causal gamers may be unintentionally and naively opting into activities psychologically and legally analogous to gambling (Drummond & Sauer, 2018; Drummond et al., 2020). Our findings therefore highlight the need for further loot box regulation and/or improved consumer education. Some regulatory action has taken place, As discussed previously, PEGI's "contains randomized items" label and ESRB's "contains loot boxes" label was designed to aid in consumer decision making. However, Garrett et al.'s (2023) research found that consumers do not appear to understand these labels well.

McCaffery (2019) discusses the intentions of the ESRB and PEGI; specifically, they both focus on ensuring support for consumer self-regulation (McCaffery, 2019). However, our findings suggest that supporting self-regulation is not likely to be effective in the absence of further consumer education. A goal of educational campaigns should be to increase the effectiveness of parents limiting loot box engagement for underage gamers, parental and consumer awareness is a pre-requisite of this goal. Although, at the surface level, education campaigns will appear similar to the intentions of ESRB and PEGI, there are important distinctions between informing consumers about what a loot box is, looks like, and appears on a receipt as, to help aid individuals to make

informed decisions for themselves. The constant evolution of loot box systems also means that uninformed consumers may be perpetually at risk of loot box systems.

We suggest that educational campaigns should educate consumers on loot box mechanisms in a way that is unaffected by new variations or adaptions (outcome is unknown, chance-based outcomes, monetary exchange). It is likely that loot boxes will continue to change, and it is necessary that consumers have sufficient awareness to navigate these changes to make informed decisions for themselves and their children.

Limitations

Although the present research has a number of strengths, there are several limitations which require explicit consideration. Most importantly, the present research is quasi-experimental. As such, we are limited in the scope of our results and cannot infer causality. We do not know whether being a parent or non-gamer is causing lower accuracy or whether another factor is impacting these groups lower ability than non-parents and gamers respectively. We are also unsure whether changes in status (i.e., exposing parents or non-gamers to games to increase familiarity with loot box systems) would necessarily improve parents and non-gamers identification of loot boxes. For instance, although it is likely that a lack of exposure may account for the results, it is possible that instead of a deficit in education, it may be a general lack of interest in video games impacting their identification ability. Although, educational programs on loot boxes may prove beneficial for consumer awareness, the present research does not necessarily indicate the effectiveness from such campaigns, nor the specific features to ensure the effectiveness of these campaigns, and thus further research should investigate this possibility. In addition, we do not presently have an objective benchmark for what would constitute “adequate” performance on the loot box identification tasks used in the present research. Although parents and non-gamers performed

poorer than non-parents and gamers respectively, they did still perform better than chance discriminability. It is possible that this level of performance may be all that is required to effectively engage in self-regulation/parental regulation techniques. Further research should investigate this issue to determine how much knowledge about loot boxes is required to ensure effective and satisfactory parental and self-regulatory control.

Future research

Our findings show that gamers are more accurate at identifying all objective evidence of loot boxes when compared with non-gamers. This suggests a link between exposure and experience with video games and increased consumer awareness. To explore the causal directionality further, future research should explore if educating parents about loot boxes to match the natural education a gamer experiences through exposure may increase parental success on the identification of the presence of loot boxes and thus their ability to regulate their children's engagement with them. We recommend that future research should investigate parental accuracy at identifying loot boxes with parents receiving either; none, low, or a large amount of training about loot boxes prior to undertaking objective loot box identification measures similar to those employed in the present research. Such research would allow researchers to draw definitive conclusions about the likely effectiveness of education programs about loot boxes. Furthermore, future research should attempt to examine how much knowledge is needed about loot boxes to engage in effective and satisfactory self-regulation/parental-regulation strategies.

As discussed, our findings compliment those of Garrett et al. (2023), Parents and non-gamers are relatively poor at understanding both warnings about (Garret et al., 2023), and the visual presence of loot boxes or loot box purchases in games. It may therefore prove beneficial for future research to investigate if warning labels can serve as intended, and what additional

information would be required to ensure their effectiveness. We recommend that future research investigates how more enhanced and informative warning labels impact consumer accuracy at identifying loot boxes. In addition, it may be beneficial to ascertain whether loot box labels are more effective when they coincide the loot box in-game at time of purchase, rather than on the video game box. This research may also be insightful in understanding how consumers navigate games which are only sold online, which do not always contain adequate consumer information about the presence of loot boxes. This research may lead to warning labels being more effective at informing consumers about the presence of loot boxes in games.

Although we asked participants from Aotearoa New Zealand, Australia, and the United States, our participant demographics were mostly American. It may be the case that some countries or cultures are better or worse at identifying loot boxes. The fact that Belgium and France have banned loot boxes suggests that there are differences in how loot boxes are perceived at a societal level. It may be informative for other countries that have concerns about loot boxes such as Belgium and France to replicate these findings in domestic populations to see whether understand is higher in these areas.

Conclusion

Loot boxes are psychologically and legally akin to conventional forms of gambling. They are frequently available within video games while easily accessible and commonly purchased by youth. In addition, research has shown that loot box purchasing correlates with problem gambling symptomatology. Current regulation fails to restrict youth from purchasing loot boxes. In turn, the responsibility of regulating youth purchasing behavior is currently squarely upon parents/guardians. Our research investigated consumer accuracy in identifying loot boxes across three measures containing: characteristics, visual representation, and purchase receipts. We sought to investigate how well consumers could identify loot boxes, as a necessary pre-requisite to their ability to regulate their own and their children's purchasing behavior. Our results showed that non-gamers and parents/guardians perform poorly at identifying loot boxes compared with gamers and non-parents/guardians on all three measures. These findings suggest a potential need for further loot box educational campaigns to educate the public about the features and visual presentations of loot boxes in games, as well as the purchase receipts they generate. Further research should evaluate the effective features of these campaigns to maximize their effectiveness.

Reference List

APA Dictionary of Psychology. d'. https://dictionary.apa.org/d-prime

Arkes, H. R., & Blumer, C. (1985). The psychology of sunk cost. Organizational behavior and human decision processes, 35(1), 124-140.

Bowman, N. D., & Banks, J. (2021). Player-avatar identification, relationships, and interaction: Entertainment through asocial, parasocial, and fully social processes.

Brand, J. E., Todhunter, S. & Jervis, J. (2017). Digital New Zealand (Report No. 1). Digital New Zealand Report 2018.

Brooks, G. A., & Clark, L. (2019). Associations between loot box use, problematic gaming and gambling, and gambling-related cognitions. Addictive behaviors, 96, 26-34.

Brooks, G., & Clark, L. (2022). The gamblers of the future? Migration from loot boxes to gambling in a longitudinal study of young adults.

Close, J., Spicer, S. G., Nicklin, L. L., Lloyd, J., & Lloyd, H. (2022). Loot box engagement: relationships with educational attainment, employment status and earnings in a cohort of 16 000 United Kingdom gamers. Addiction.

Cunliffe, M. (2019). Kids Spend £550 Of Dad's Money On FIFA 19 Trying to Unlock Lionel Messi On Their Nintendo Switch. https://www.ladbible.com/technology/latest-kids-spend-550-on-fifa-19-trying-to-unlock-lionel-messi-20190711.

Davidovici-Nora, M. (2014). Paid and free digital business models innovations in the video game industry. Digiworld Economic Journal, (94), 83.

Derrington, S., Star, S., & Kelly, S. J. (2021). The case for uniform loot box regulation: A new classification typology and reform agenda. Journal of Gambling Issues, 46.

Dienes, Z. (2021). How to use and report Bayesian hypothesis tests. Psychology of Consciousness: Theory, Research, and Practice, 8(1), 9.

Dong, L., Allen, S. G., Southall, R., & Zandi, K. (2020). The effect of age-rating labels containing loot boxes on parent's perception of video games.

Drummond, A., & Sauer, J. D. (2018). Video game loot boxes are psychologically akin to gambling. Nature human behaviour, 2(8), 530-532.

Drummond, A., & Sauer, J. D. (2018). Video game loot boxes are psychologically akin to gambling. Nature human behaviour, 2(8), 530-532.

Drummond, A., Sauer, J. D., Ferguson, C. J., & Hall, L. C. (2020). The relationship between problem gambling, excessive gaming, psychological distress and spending on loot boxes in Aotearoa New Zealand, Australia, and the United States-A cross-national survey. PLoS One, 15(3), e0230378. https://doi.org/10.1371/journal.pone.0230378

Drummond, A., Sauer, J. D., Hall, L. C., Zendle, D., & Loudon, M. R. (2020). Why loot boxes could be regulated as gambling. Nature Human Behaviour, 4(10), 986-988.

Electronic Arts Annual Report. (Report No. 1). (2021). https://s22.q4cdn.com/894350492/files/doc_financials/2021/ar/Annual-Report-(2021).pdf

Fortnite: Battle royale (PC version) [Video game]. (2017). Epic Games.

Galinsky, E., Bond, J. T., & Friedman, D. E. (1996). The role of employers in addressing the needs of employed parents. Journal of social issues, 52(3), 111-136.

Garrett, E., Drummond, A., Sauer, J.D., Lowe-Calvary, E., Lewis, I., De Salas, K. (2021) Consumer Perception of Harm of Loot Boxes and the Associated Warning Label. SARMAC Virtual ’21 Symposium Presentation.

Garrett, E. P., Drummond, A., Lowe-Calverley, E., & Sauer, J. D. (2023). Current loot box warnings are ineffective for informing consumers. Computers in Human Behavior, 139, 107534.

Gong, L., & Rodda, S. N. (2020). An exploratory study of individual and parental techniques for limiting loot box consumption. International Journal of Mental Health and Addiction, 1-28.

Green, D. M., & Swets, J. A. (1966). Signal detection theory and psychophysics (Vol. 1, pp. 1969-2012). New York: Wiley.

Green, D. M., & Swets, J. A. (1966). Signal detection theory and psychophysics (Vol. 1, pp. 1969-2012). New York: Wiley.

Griffiths, M. D. (2018). Is the buying of loot boxes in video games a form of gambling or gaming?. Gaming Law Review, 22(1), 52-54.

Hamari, J., Alha, K., Järvelä, S., Kivikangas, J. M., Koivisto, J., & Paavilainen, J. (2017). Why do players buy in-game content? An empirical study on concrete purchase motivations. Computers in Human Behavior, 68, 538-546.

Heeger, D., & Landy, M. (1997). Signal detection theory. Dept. Psych., Stanford Univ., Stanford, CA, Teaching Handout.

Hing, N., Rockloff, M., Russell, A. M., Browne, M., Newall, P., Greer, N., ... & Thorne, H. (2022). Loot box purchasing is linked to problem gambling in adolescents when controlling for monetary gambling participation. Journal of Behavioral Addictions.

Hodge, S. E., Vykoukal, M., McAlaney, J., Bush-Evans, R. D., Wang, R., & Ali, R. (2022). What's in the box? Exploring UK players' experiences of loot boxes in games; the conceptualisation and parallels with gambling. PloS one, 17(2), e0263567.

https://www.juniperresearch.com/press/video-game-loot-boxes-to-generate-over-$20-billion

Hunt, N & Moar, J. (2021) In-game Gambling & Loot Boxes. Juniper Research (Report No. 1). https://www.juniperresearch.com/researchstore/content-digital-media/in-game-gambling-loot-boxes-research-report

Ide, S., Nakanishi, M., Yamasaki, S., Ikeda, K., Ando, S., Hiraiwa-Hasegawa, M., ... & Nishida, A. (2021). Adolescent problem gaming and loot box purchasing in video games: cross-sectional observational study using population-based cohort data. JMIR Serious Games, 9(1), e23886.

Interactive Software Federation of Europe (2021). Children's in-game spending (Report No. 1) https://www.isfe.eu/wp-content/uploads/2021/12/GameTrack-In-Game-Spending-2020.pdf.pdf

Jatkar, U. & Jenkinson, R. 2019. Submission to the Inquiry into Age Verification for Online Wagering and Online Pornography. Australian Government.

King, D. L., & Delfabbro, P. H. (2018). Predatory monetization schemes in video games (eg 'loot boxes') and internet gaming disorder.

King, D. L., Russell, A. M., Delfabbro, P. H., & Polisena, D. (2020). Fortnite microtransaction spending was associated with peers' purchasing behaviors but not gaming disorder symptoms. Addictive Behaviors, 104, 106311.

Lai, E. R. (2011). Metacognition: A literature review. Always learning: Pearson research report, 24, 1-40.

Larche, C. J., Chini, K., Lee, C., Dixon, M. J., & Fernandes, M. (2021). Rare loot box rewards trigger larger arousal and reward responses, and greater urge to open more loot boxes. Journal of gambling studies, 37(1), 141-163.

Lee, M. D., & Wagenmakers, E. J. (2014). Bayesian cognitive modeling: A practical course. Cambridge university press.

Lemmens, J. S. (2022). Play or pay to win: Loot boxes and gaming disorder in FIFA ultimate team. Telematics and Informatics Reports, 8, 100023.

Li, W., Mills, D., & Nower, L. (2019). The relationship of loot box purchases to problem video gaming and problem gambling. Addictive behaviors, 97, 27-34.

Lin, H., & Sun, C. T. (2011). Cash trade in free-to-play online games. Games and Culture, 6(3), 270-287.

Lindley, D. V. (1957). A statistical paradox. Biometrika, 44(1/2), 187-192.

Liu, K. (2019). A global analysis into loot boxes: Is it virtually gambling. Wash. Int'l LJ, 28, 763.

McCaffrey, M. (2019). The macro problem of microtransactions: The self-regulatory challenges of video game loot boxes. Business Horizons, 62(4), 483-495.

Pack Probability In Fifa 19 Ultimate Team. (2019). Electronic Arts. https://www.ea.com/en-gb/games/fifa/news/fifa-19-pack-probabilities

Pastore, R. E., & Scheirer, C. J. (1974). Signal detection theory: Considerations for general application. Psychological Bulletin, 81(12), 945.

Rachlin, H. (1990). Why do people gamble and keep gambling despite heavy losses?. Psychological science, 1(5), 294-297.

Schwartz, N. (2016). 17-year-old uses his dad's credit card to spend $7,600 playing 'FIFA'. https://ftw.usatoday.com/2016/01/17-year-old-uses-his-dads-credit-card-to-spend-7600-playing-fifa.

Skins in the Game: A High-Stakes Relationship Between Gambling and Young People's Health and Wellbeing? (2019). (Report No. 1). Royal Society for Public Health. https://www.rsph.org.uk/static/uploaded/be3b9ba8-ea4d-403c-a1cee2ec75dcefe7.pdf

Stuart, S., Bedell, G., Malster, T., Shotbolt, V., Shotbolt, M., Lington, S., Roberg, T., Mahmood., & Car, J. (2019). The Rip-off Games. Parent Zone UK. (Report 1.) https://parentzone.org.uk/sites/default/files/2021-12/PZ_The_Rip-off_Games_2019.pdf

von Meduna, M., Steinmetz, F., Ante, L., Reynolds, J., & Fiedler, I. (2019). Loot boxes: a game changer. Universität Hamburg. Pobrane z: https://www. wiso. uni-hamburg. de/fachbereich-sozoek/forschung/gluecksspielforschung/Dateien/Veroeffentlichungen/loot-boxes---a-game-changer-meduna-et-al-gambling-research-working-paper-no-2. pd

Wijman, T. (2021). The Games Market and Beyond in 2021: The Year in Numbers. NewZoo. https://newzoo.com/insights/articles/the-games-market-in-2021-the-year-in-numbers-esports-cloud-gaming

Wixted, J. T., & Mickes, L. (2018). Theoretical vs. empirical discriminability: The application of ROC methods to eyewitness identification. *Cognitive Research: Principles and Implications*, *3*(1), 1-22.

Xiao, L. (2022). Breaking Ban: Assessing the effectiveness of Belgium's gambling law regulation of loot boxes.

Xiao, L. Y. (2021). Regulating loot boxes as gambling? Towards a combined legal and self-regulatory consumer protection approach. Interactive Entertainment Law Review, 4(1), 27-47.

Xiao, L. Y., Henderson, L. L., & Newall, P. (2021a). What are the odds? Lower compliance with Western loot box probability disclosure industry self-regulation than Chinese legal regulation. Lower compliance with Western loot box probability disclosure industry self-regulation than Chinese legal regulation (September 30, 2021).

Xiao, L. Y., Henderson, L. L., Nielsen, R. K. L., Grabarczyk, P., Newall, P. W., & Lee, N. (2021). Loot boxes, gambling-like mechanics in video games. In Encyclopedia of computer graphics and games. Springer.

Xiao, L. Y., Henderson, L. L., Yang, Y., & Newall, P. W. (2021b). Gaming the system: suboptimal compliance with loot box probability disclosure regulations in China. Behavioural Public Policy, 1-27.

Youngstrom, E. A. (2014). A primer on receiver operating characteristic analysis and diagnostic efficiency statistics for pediatric psychology: we are ready to ROC. Journal of pediatric psychology, 39(2), 204-221.

Zendle, D., & Cairns, P. (2018). Video game loot boxes are linked to problem gambling: Results of a large-scale survey. PloS one, 13(11), e0206767.

Zendle, D., & Cairns, P. (2019). Loot boxes are again linked to problem gambling: Results of a replication study. PloS one, 14(3), e0213194.

Zendle, D., Meyer, R., & Ballou, N. (2020). The changing face of desktop video game monetisation: An exploration of exposure to loot boxes, pay to win, and cosmetic microtransactions in the most-

played Steam games of 2010-2019. PLoS One, 15(5), e0232780. https://doi.org/10.1371/journal.pone.0232780

Appendix

Loot Box Identification Questionnaire

Q1 **Participant information.**

In this study you will be asked to complete a survey that will ask you a range of questions about your ability to identify images containing a loot box or loot box receipt, and a series of demographic questions. Your participation should take no more than 15 minutes. Your participation is voluntary, and you have the right to refuse to answer any question or withdraw from the study at any time without penalty.

Participants should: Be aged 18 or above.

This study consists of an online questionnaire. The questionnaire consists of a number of multiple-choice and open-answer questions. Questions will be presented in a number of sections. Images will then be presented of loot boxes and loot box receipts, and answers required as to indicate to what degree you think the image contains a loot box or loot box receipt. We are interested in what you know. As such, if you decide to participate, please answer the survey based on your current knowledge and do not use outside sources (internet searches etc.) to find the answers or information to the questions.

If you choose to participate, please complete all sections in one sitting. You will not be able to resume at another time from where you left off.

Once the data have been analyzed, we will ensure that we remove from the data set any information that might inadvertently include any identifying information. We will then make this non-identifiable data available to other researchers and might post it to an online repository. If you wish to participate in this study and all of your questions have been answered, then please move to the next screen. If you do not wish to participate in this study, please return your submission on Prolific by selecting the 'Stop without completing' button.

Contact Information

Researcher:
Matt Hall
Dr. Aaron Drummond
School of Psychology
Massey University
Palmerston North
New Zealand

This project has been evaluated by peer review and judged to be low risk (Notification Number 4000025974). Consequently it has not been reviewed by one of the University's Human Ethics Committees. The researcher named in this document is responsible for the ethical conduct of this research. If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Professor Craig Johnson, Director (Research Ethics), email: humanethics@massey.ac.nz.

Q2 I have read the information above and consent to participate in this study.

- ○ I consent, begin the study.
- ○ I do not consent.

Survey end As you do not wish to participate in this study, please **return** your submission on Prolific by selecting the "Stop without completing" button.

Q4 Before you start, please switch off your phone/ email/ music so that you can focus on this study. Thank-you!

Please enter your Prolific ID:

_____

Q5 Are you a parent or guardian of a child of children?

- ○ Yes
- ○ No

Display This Question:

If Are you a parent or guardian of a child of children? = Yes

Q7 Do any children that you parent or guardian play video games?

- Yes
- No
- I don't know

Q6 How often do you play video games?

- Never
- Monthly
- Weekly
- Most days
- Daily

Display This Question:

If Are you a parent or guardian of a child of children? = Yes

Q8 How familiar are you with the video games your child plays?

- 1, Not at all familiar
- 2
- 3
- 4, Neither unfamiliar or familiar
- 5
- 6
- 7, Extremely familiar

Q9 How familiar are you with in-game purchases?

- 1, Not at all familiar
- 2
- 3
- 4, Neither unfamiliar or familiar
- 7
- 6
- 7, Extremely familiar

Q10 Are you familiar with what a loot box is?

- 1, Not at all familiar
- 2
- 3

- 4, Neither unfamiliar or familiar
- 5
- 6
- 7, Extremely familiar

Q12 Have you ever purchased a loot box using real world money?

- Yes
- No
- I'm not sure

Display This Question:

If Have you ever purchased a loot box using real world money? = Yes

Or Have you ever purchased a loot box using real world money? = I'm not sure

Q11 In the past month, how much money have you spent on loot boxes in your local currency (i.e., randomized items including loot boxes, crates, card packs and keys to open these items)?

(This includes paying real world money for an in-game currency that is used to buy loot boxes, or paying real-world money for a key that is used to open loot boxes. If you did not spend any money on this, please enter 0)

_____

Q62 People have different understandings of what a loot box in a video game is. Please answer the following questions based on your current understanding and knowledge of loot boxes

Q13 A loot box delivers a random reward to the player.

- 1, Certain that this statement is false
- 2
- 3
- 4
- 5
- 6, Certain that this statement is true

Q14 Some loot boxes can be purchased for real world money.

- 1, Certain that this statement is false
- 2
- 3
- 4
- 5
- 6, Certain that this statement is true

Q15 Skill determines the contents of a loot box.

- 1, Certain that this statement is false
- 2
- 3
- 4
- 5
- 6, Certain that this statement is true

Q16 Some loot box rewards can be sold for real world money.

- 1, Certain that this statement is false
- 2
- 3
- 4
- 5
- 6, Certain that this statement is true

Q17 Players can choose what rewards they receive from loot boxes.

- 1, Certain that this statement is false
- 2
- 3
- 4
- 5

- 6, Certain that this statement is true

Q18 The purchase of loot boxes is required to play some games.

- 1, Certain that this statement is false
- 2
- 3
- 4
- 5
- 6, Certain that this statement is true

Q19 Players typically do not know what is in a loot box before opening it.

- 1, Certain that this statement is false
- 2
- 3
- 4
- 5
- 6, Certain that this statement is true

Q20 Chance determines the contents of the loot box.

- 1, Certain that this statement is false
- 2
- 3
- 4

- ○ 5
- ○ 6, Certain that this statement is true

Q21 Sometimes loot boxes contain no rewards.

- ○ 1, Certain that this statement is false
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6, Certain that this statement is true

Q22 Loot boxes are available in every game.

- ○ 1, Certain that this statement is false
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6, Certain that this statement is true (6)

Q61 I once suffered a fatal heart attack.

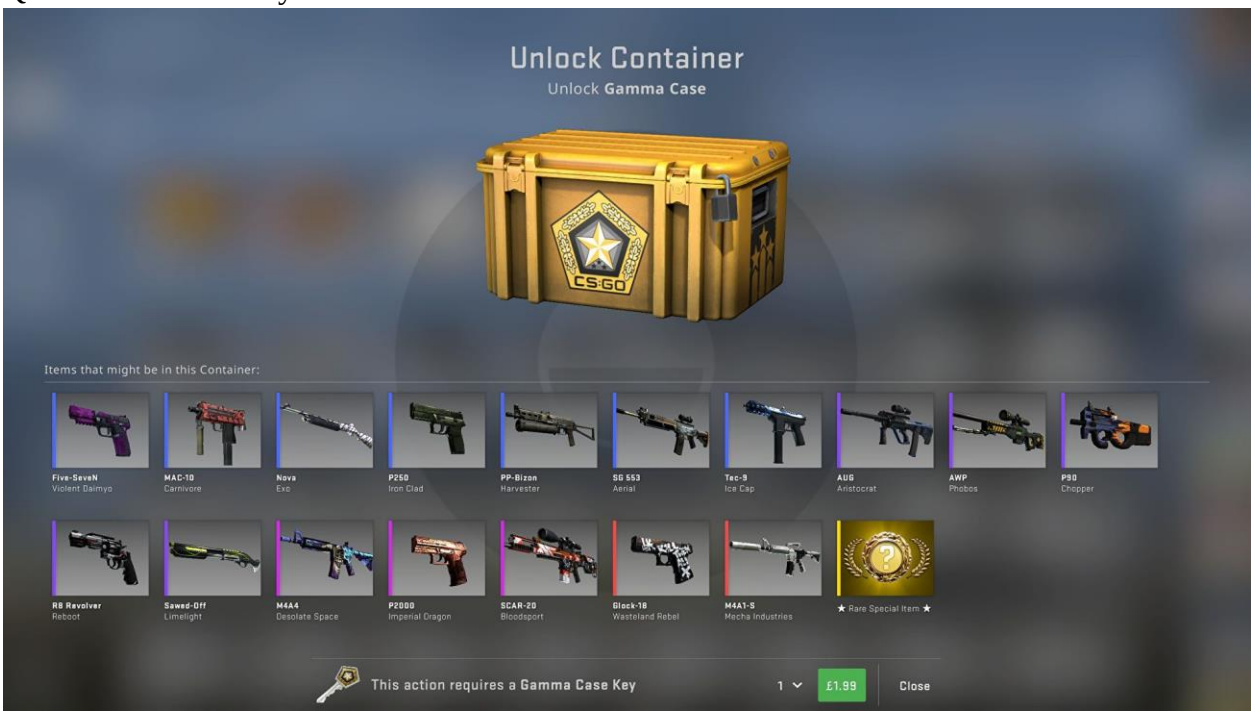
- ○ True
- ○ False

Q23 ‘Loot box’ is a broad term that defines a specific kind of transaction in video games. Loot boxes are rewards within video games, sometimes purchased for real money or using in-game currency that costs money. Loot boxes are any digital container, card pack, crate or case which contains an unknown reward at the time of purchase or being earned.

Q55 The following questions contain screenshots.
Please rate the questions with your response from 1 - 6.
1 = Certain is **that this is not a loot box.**
6 = Certain is **this is a loot box.**

Q56 The following questions contain high resolution graphics. Please be patient and allow them to fully load before selecting your response.

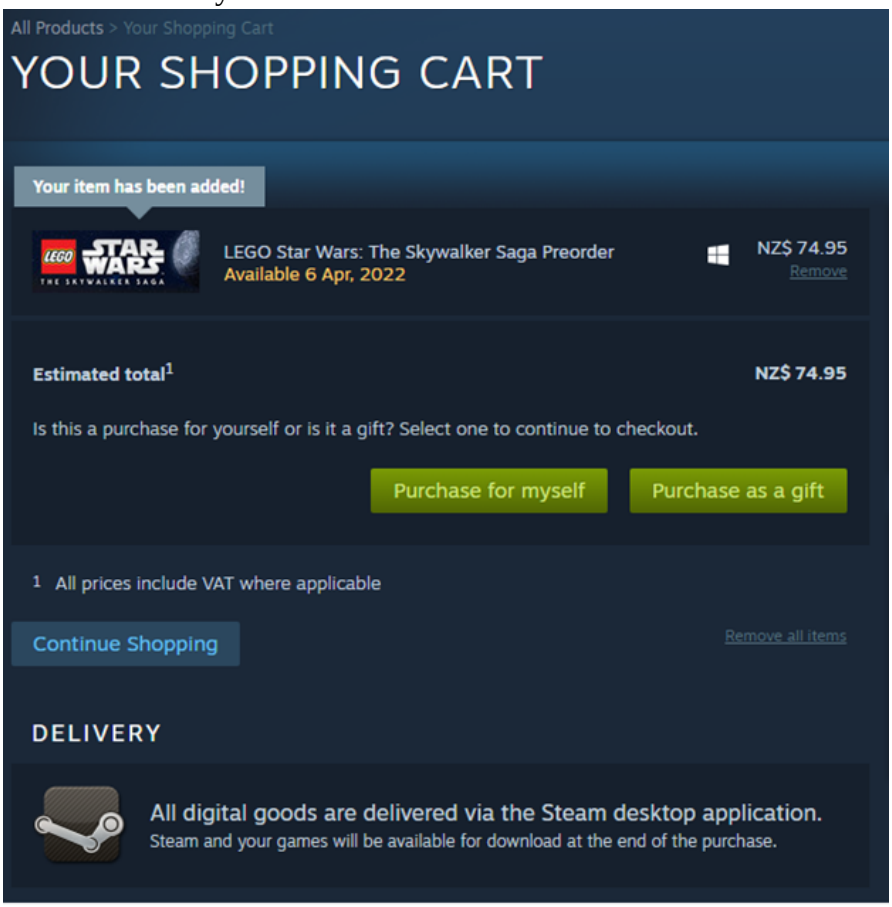
Q25 How certain are you that the screenshot contains a loot box?



- ○ 1, Certain that this is not a loot box
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6, Certain that this is a loot box

Q26

How certain are you that the screenshot contains a loot box?

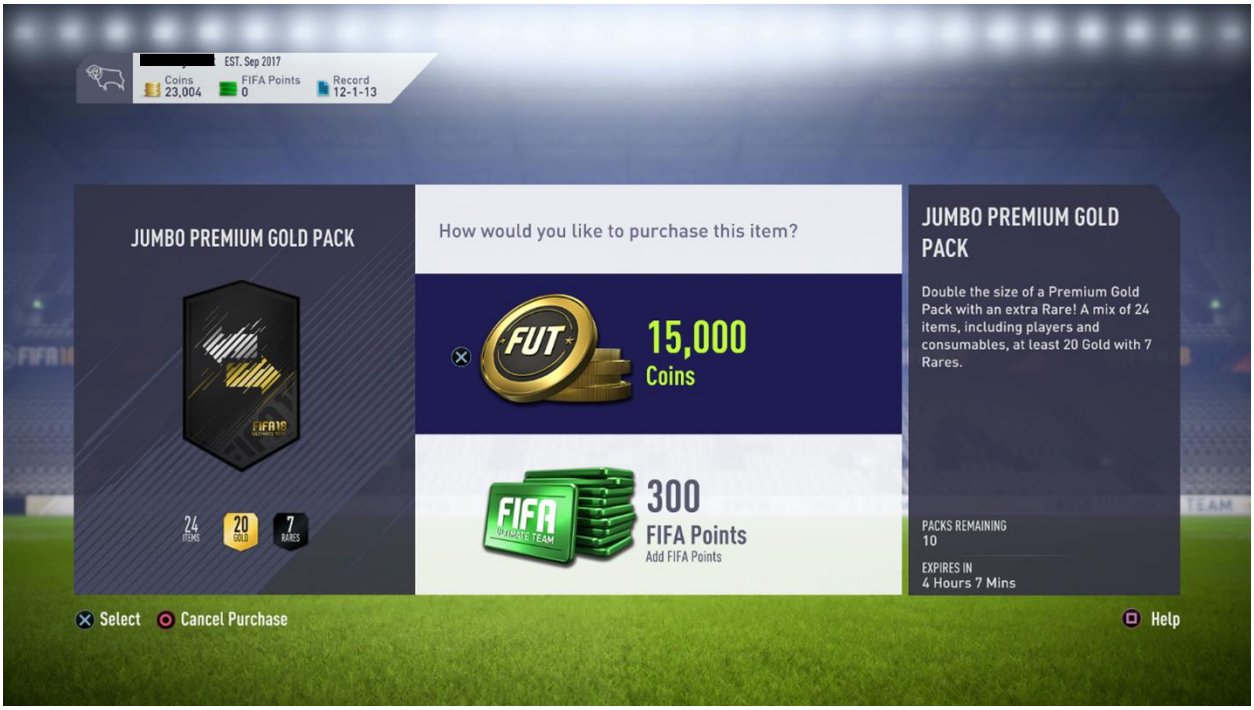


- ○ 1, Certain that this is not a loot box
- ○ 2

- 3
- 4
- 5
- 6, Certain that this is a loot box

Q27

How certain are you that the screenshot contains a loot box?

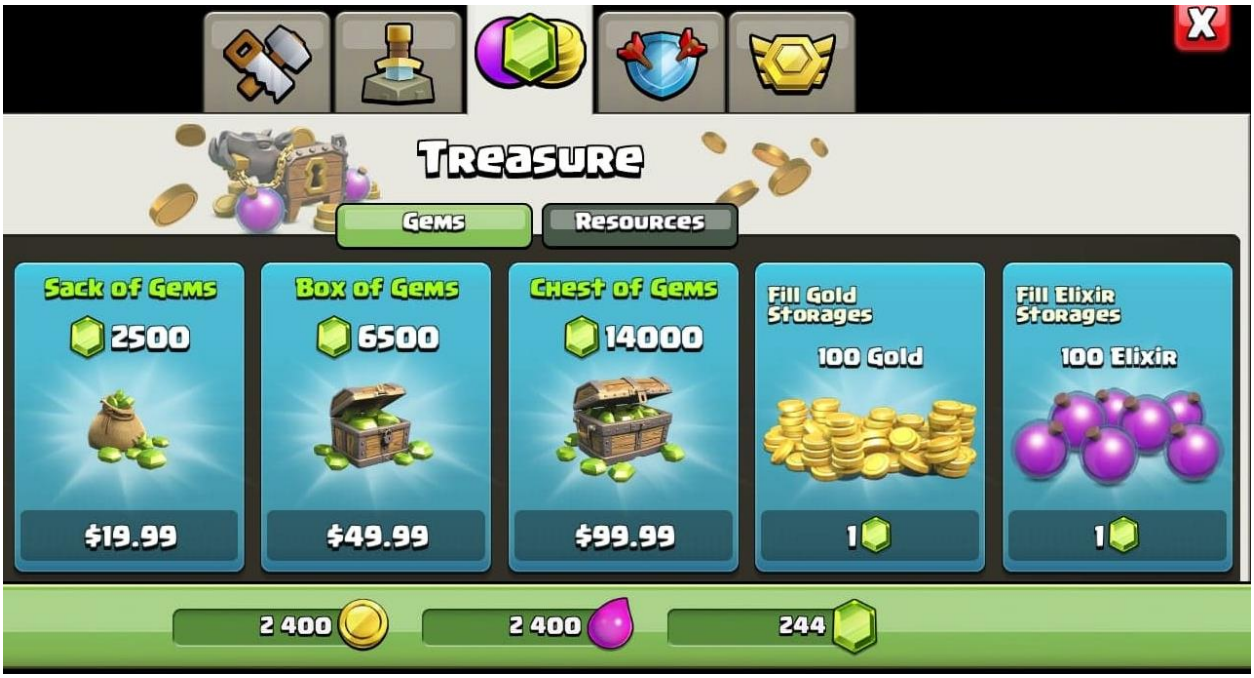


- 1, Certain that this is not a loot box
- 2
- 3
- 4
- 5

○ 6, Certain that this is a loot box

Q28

How certain are you that the screenshot contains a loot box?



○ 1, Certain that this is not a loot box

○ 2

○ 3

○ 4

○ 5

○ 6, Certain that this is a loot box

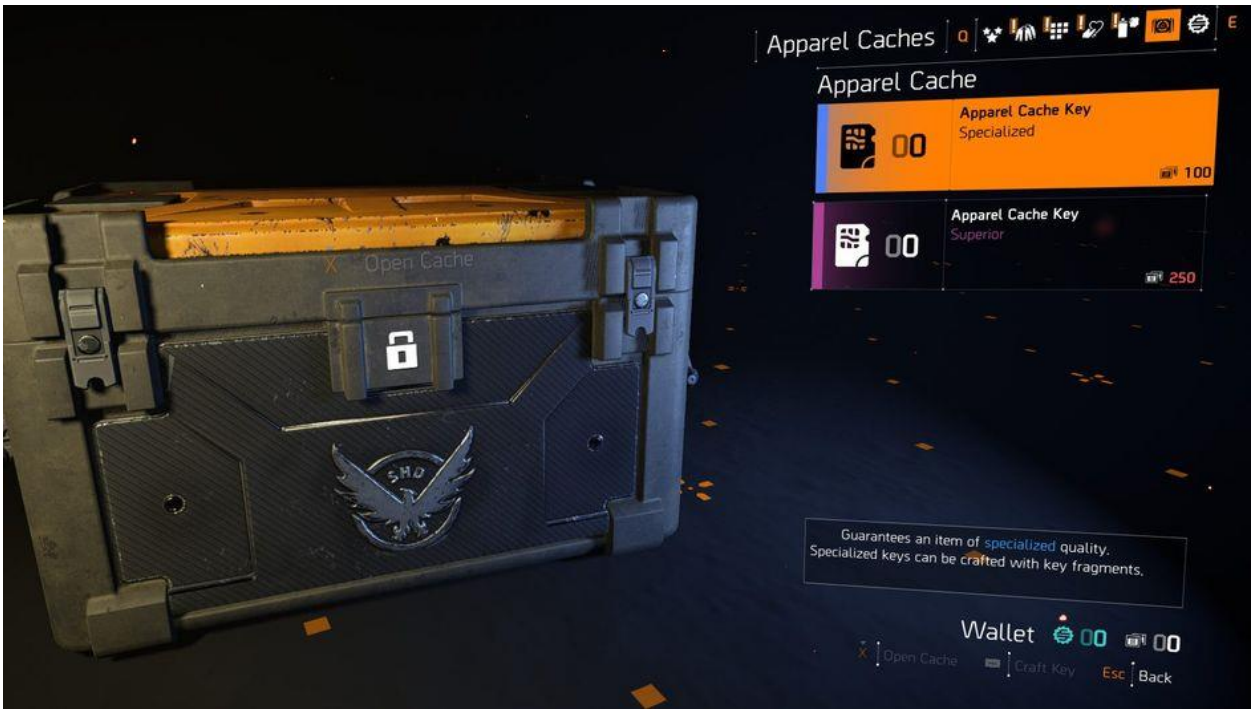
Q29

How certain are you that the screenshot contains a loot box?

- 1, Certain that this is not a loot box
- 2
- 3
- 4
- 5
- 6, Certain that this is a loot box

Q30

How certain are you that the screenshot contains a loot box?



- 1, Certain that this is not a loot box
- 2
- 3
- 4
- 5
- 6, Certain that this is a loot box

Q31

How certain are you that the screenshot contains a loot box?

- ○ 1, Certain that this is not a loot box
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6, Certain that this is a loot box

Q32

How certain are you that the screenshot contains a loot box?

- 1, Certain that this is not a loot box
- 2
- 3
- 4
- 5
- 6, Certain that this is a loot box

Q33

How certain are you that the screenshot contains a loot box?

- 1, Certain that this is not a loot box
- 2
- 3
- 4
- 5
- 6, Certain that this is a loot box

Q34

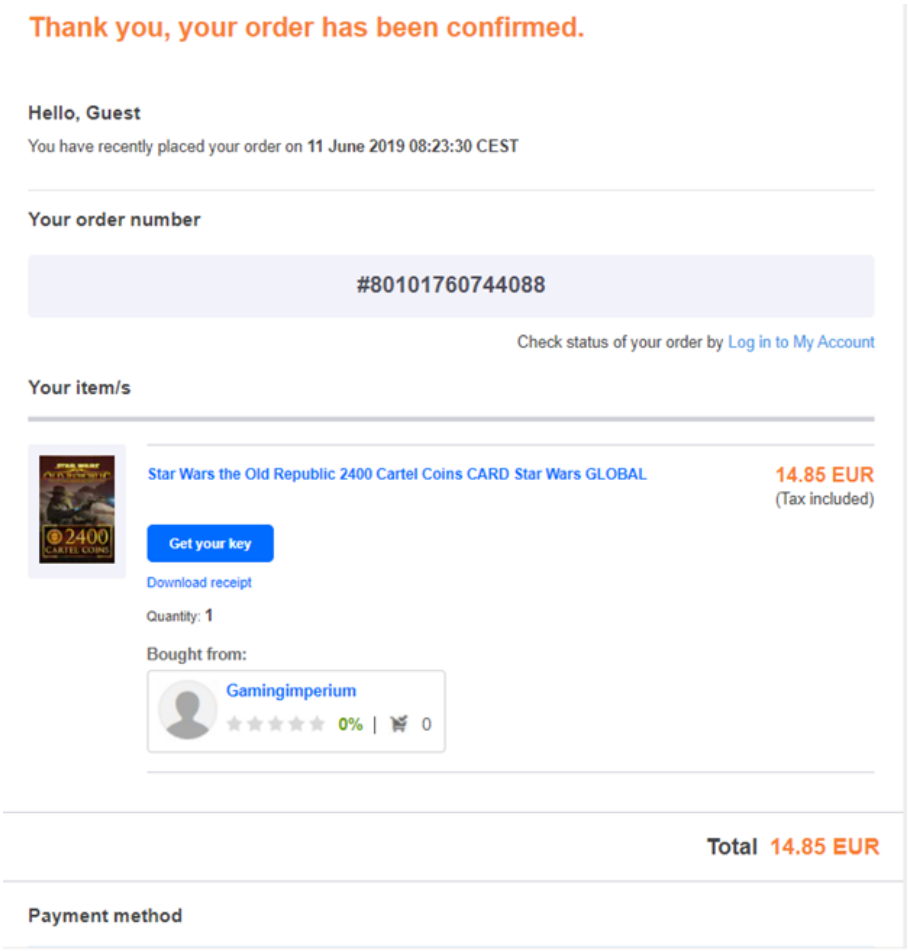
How certain are you that the screenshot contains a loot box?

- 1, Certain that this is not a loot box
- 2
- 3
- 4
- 5
- 6, Certain that this is a loot box

Q53 The following questions contain screenshots.
Please rate the questions with your response 1 - 6.
1 = certain is **this does not contain a loot box receipt.**
6 = certain is **does contain a loot box receipt.**

Q58 The following questions contain high resolution graphics. Please be patient and allow them to fully load before selecting your response.

Q35
How certain are you that the screenshot contains a loot box receipt?

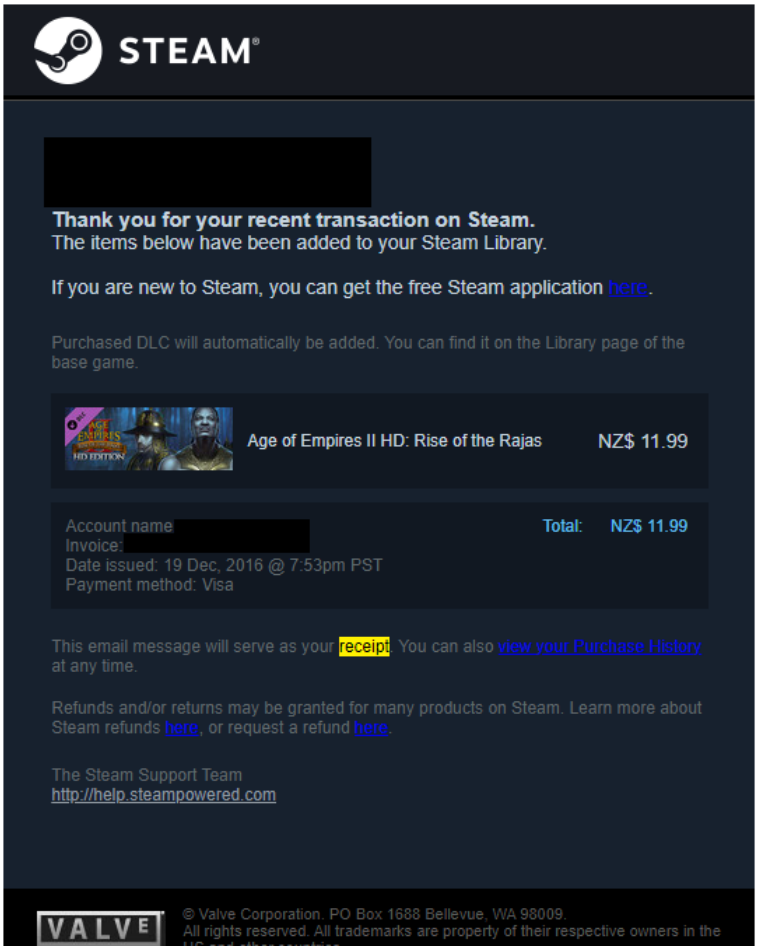


- 1, Certain that this is not a loot box receipt
- 2
- 3
- 4

- 5
- 6, Certain that this is a loot box receipt

Q36

How certain are you that the screenshot contains a loot box receipt?

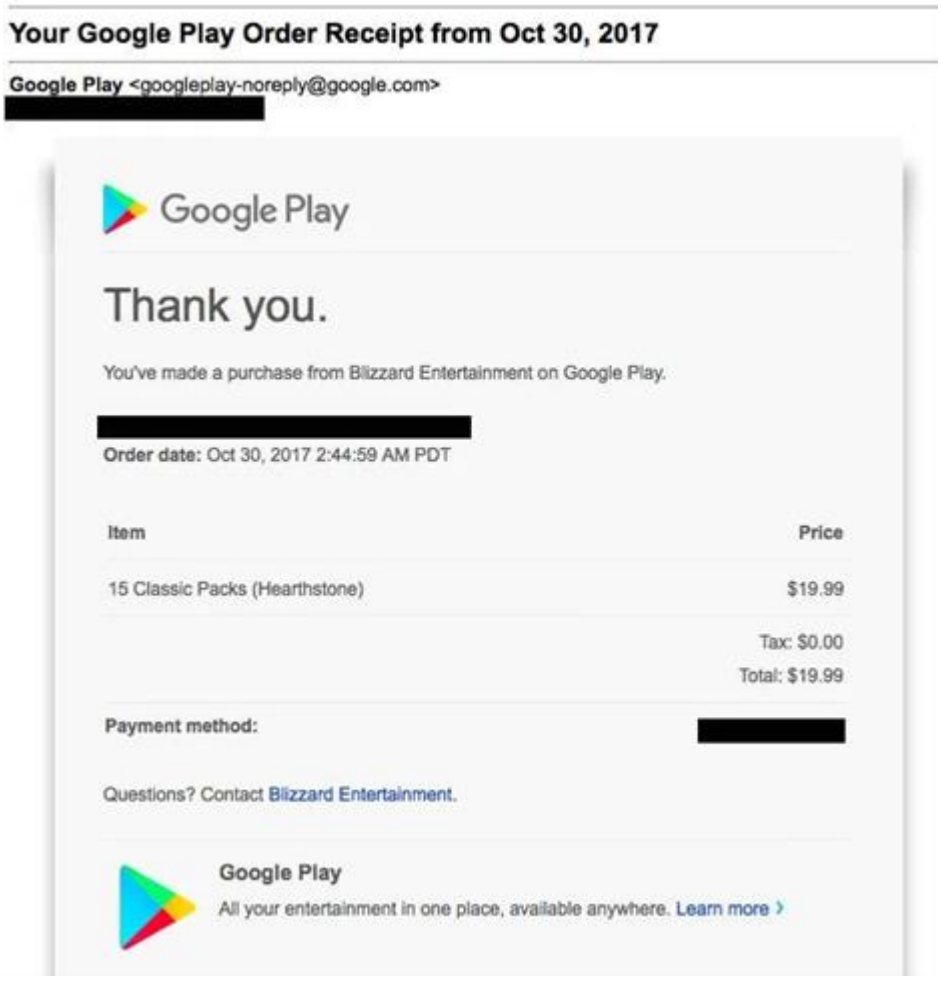


- 1, Certain that this is not a loot box receipt
- 2
- 3

- 4
- 5
- 6, Certain that this is a loot box receipt

Q37

How certain are you that the screenshot contains a loot box receipt?



- 1, Certain that this is not a loot box receipt
- 2

- ○ 3
- ○ 4
- ○ 5
- ○ 6, Certain that this is a loot box receipt

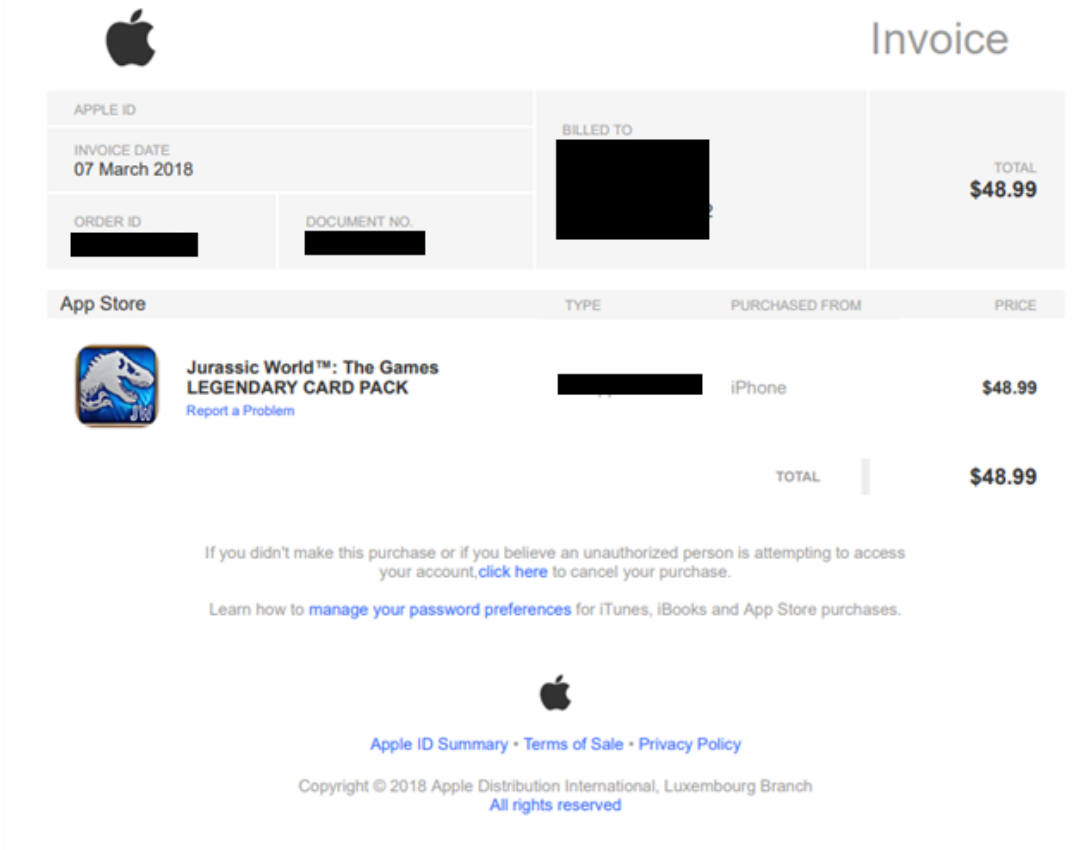
Q38

How certain are you that the screenshot contains a loot box receipt?

- ○ 1, Certain that this is not a loot box receipt
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6, Certain that this is a loot box receipt

Q39

How certain are you that the screenshot contains a loot box receipt?



- 1, Certain that this is not a loot box receipt
- 2
- 3
- 4
- 5
- 6, Certain that this is a loot box receipt

Q40

How certain are you that the screenshot contains a loot box receipt?

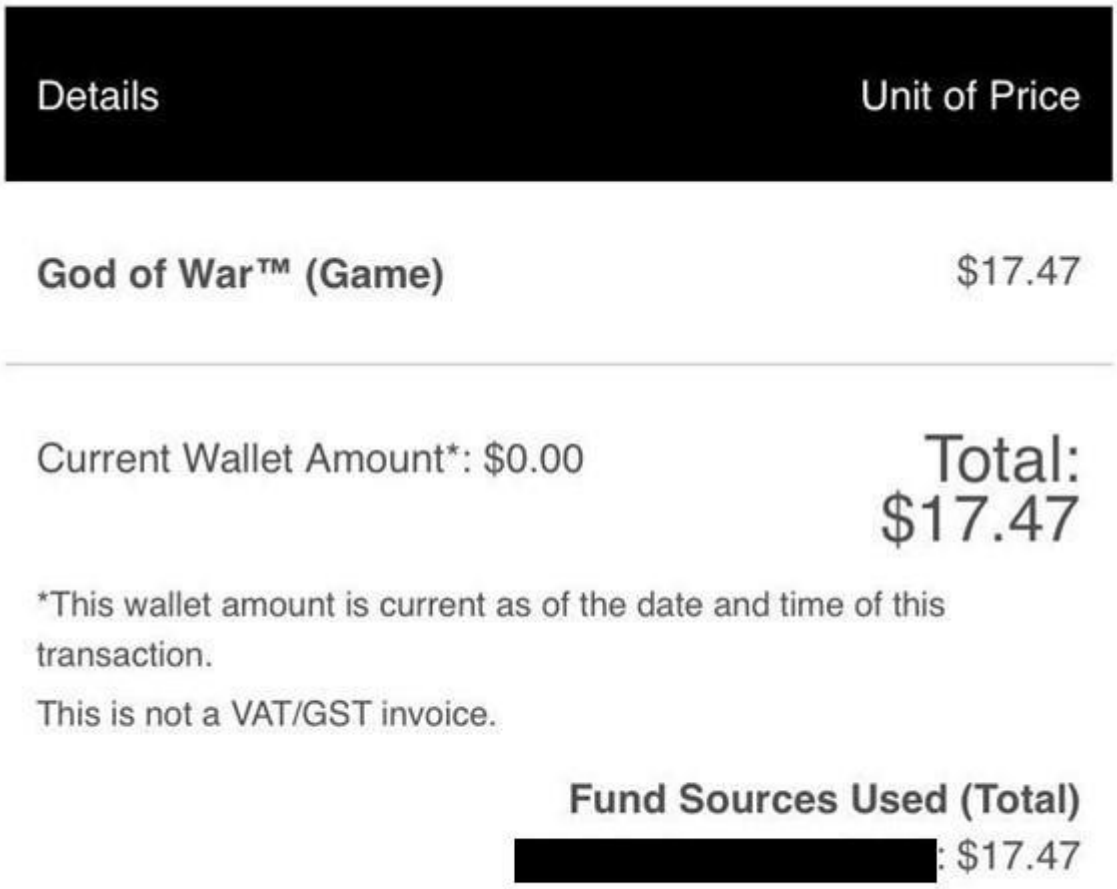
How certain are you that the screenshot contains a loot box receipt?

- 1, Certain that this is not a loot box receipt

- 2
- 3
- 4
- 5
- 6, Certain that this is a loot box receipt

Q41

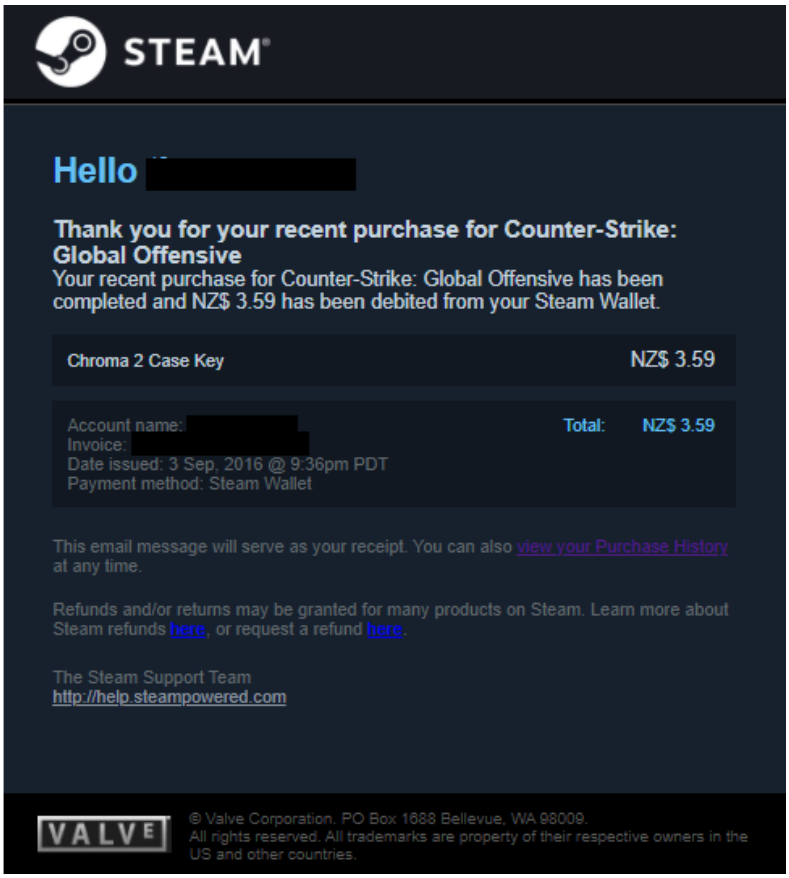
How certain are you that the screenshot contains a loot box receipt?



How certain are you that the screenshot contains a loot box receipt?

- 1, Certain that this is not a loot box receipt
- 2
- 3
- 4
- 5
- 6, Certain that this is a loot box receipt

Q42
How certain are you that the screenshot contains a loot box receipt?

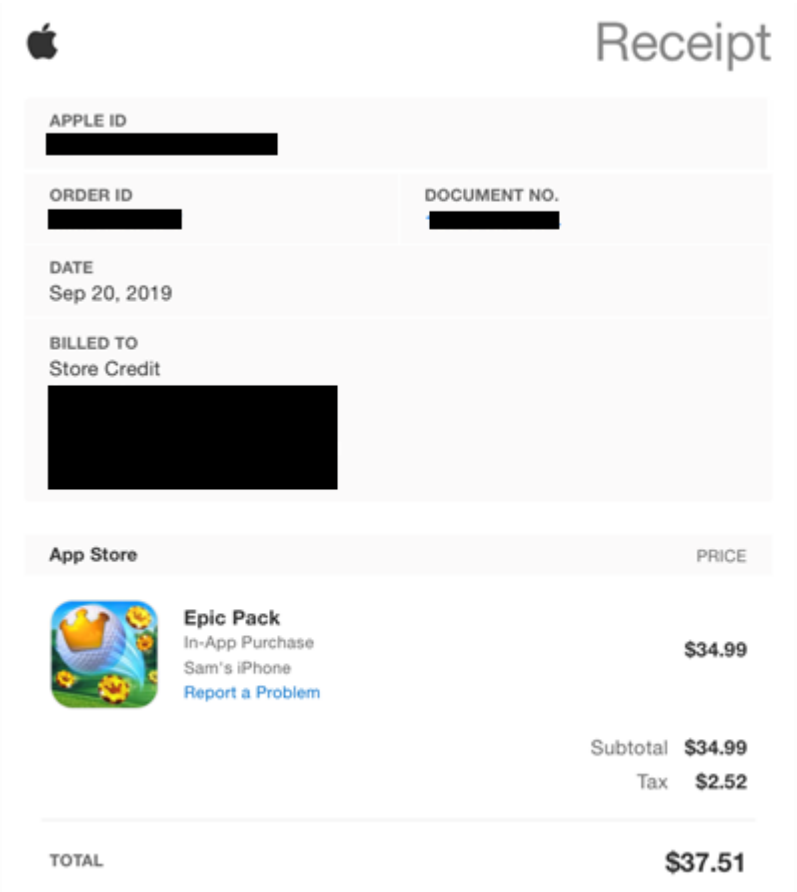


How certain are you that the screenshot contains a loot box receipt?

- 1, Certain that this is not a loot box receipt
- 2
- 3
- 4
- 5
- 6, Certain that this is a loot box receipt

Q43

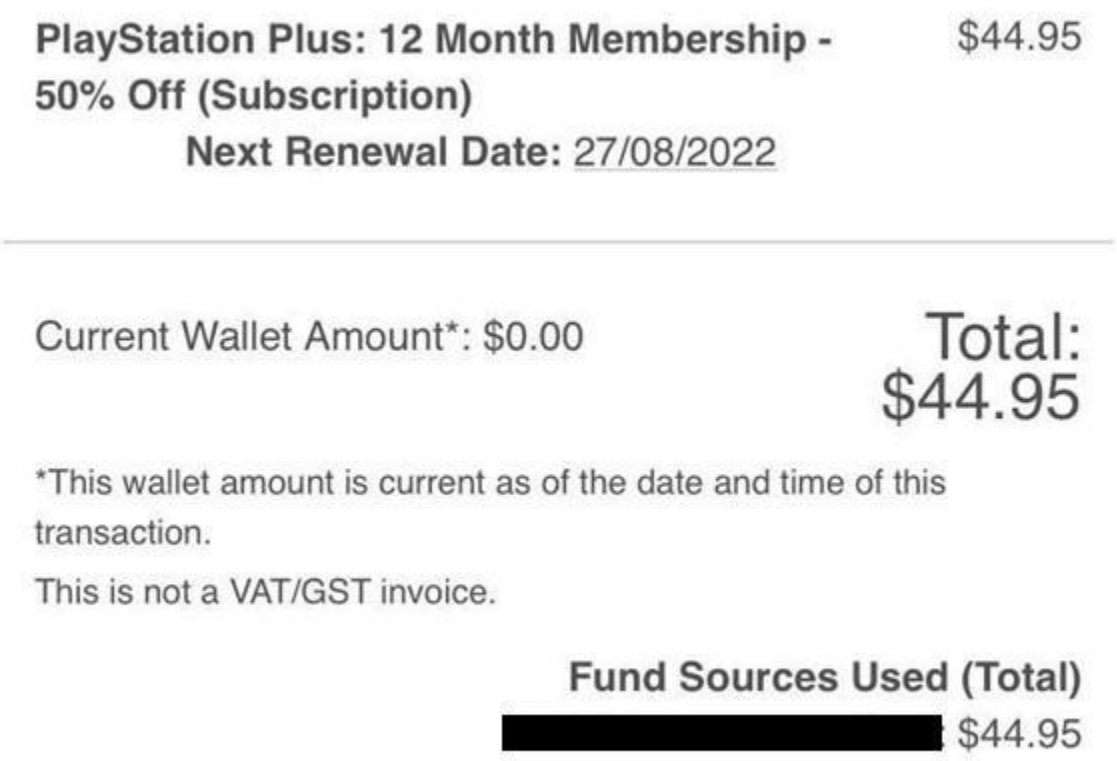
How certain are you that the screenshot contains a loot box receipt?



How certain are you that the screenshot contains a loot box receipt?

- 1, Certain that this is not a loot box receipt
- 2
- 3
- 4
- 5
- 6, Certain that this is a loot box receipt

Q44
How certain are you that the screenshot contains a loot box receipt?



- 1, Certain that this is not a loot box receipt
- 2
- 3
- 4
- 5
- 6, Certain that this is a loot box receipt

Q45 What gender do you identify with?

- ○ Male
- ○ Female
- ○ Non-binary
- ○ Prefer not to say
- ○ Other (Please specify) _____

Q46 What is your age?

Age (1)

▼ 18 (1) ... 100 (83)

Q47 What country do you live in?

- ○ Australia
- ○ New Zealand
- ○ United States
- ○ Other (please specify) _____

Q48 Thank you for taking the time to complete this survey. Your answers will be available to the researchers to better understand how the general public is able to understand and identify loot boxes and loot box receipts. The results of the study will become available when the formal analysis is complete and will be accessible via the Open Science Framework page: https://osf.io/5sud2/ which will become active when the research is completed and published. Please keep a copy of this link if you are interested in finding out the results of this study when available.