

ORIGINAL

Loot boxes use as a new form of gambling within video games

El consumo de loot boxes como una nueva forma de azar en los videojuegos

FRANCISCO JAVIER SANMARTÍN*, JUDITH VELASCO*, FÁTIMA CUADRADO*, MARIO GÁLVEZ-LARA*, VICTORIA DE LARRIVA**, JUAN ANTONIO MORIANA*.

* Departamento de Psicología, Universidad de Córdoba, España.

** Instituto Provincial de Bienestar Social (IPBS), España.

Abstract

Loot boxes are items within video games which players pay to open and, ultimately, to randomly obtain an object whose value is initially unknown. Being easily accessible for both teenagers and adults, loot boxes have been associated with gambling. The purpose of this study was to explore the use of loot boxes and to analyze whether it is associated with guilt, loss of control, and emotional distress. To this end, 475 participants (266 adolescents and 209 adults) were surveyed on their habits regarding loot boxes and gaming. The results showed that teenagers invest more money in loot boxes than adults. This expenditure increases when a new item is announced on online platforms (Twitch, YouTube). Additionally, not obtaining the coveted items, which is common due to loot box randomness, predicts greater levels of guilt and emotional distress, while obtaining them predicts subsequent loss of control. Thus, 45.5% reported guilt over purchasing, 50% distress and 17% loss of control. Summarizing, loot boxes are increasingly present in video games, and owing to their psycho-emotional outcomes, it is necessary for future research to address this matter in order to develop prevention strategies and to provide support to vulnerable populations.

Keywords: loot boxes, problematic gambling, video games, addiction, gambling

Resumen

Las *loot boxes* son cajas dentro de los videojuegos que los usuarios pagan por abrir y obtener, al azar, un objeto cuyo valor inicialmente desconocen. Tanto la población adolescente como la adulta tiene fácil acceso a ellas, y se han relacionado con el juego de azar. El objetivo de este estudio fue examinar el consumo de *loot boxes* y explorar si se asociaba con culpabilidad, pérdida de control y malestar. Para ello, 475 participantes (266 adolescentes y 209 adultos) respondieron a un cuestionario *ex profeso* de elaboración propia. Los resultados mostraron que son los adolescentes los que más dinero invierten en cajas botín. Este gasto se ve aumentado cuando se anuncia nuevo contenido en las plataformas multimedia *online* (entre ellas, Twitch, YouTube). Además, no obtener los ítems que desean, lo cual es frecuente por su aleatoriedad, predice mayores niveles de culpabilidad y malestar, mientras que su obtención predice la posterior pérdida de control. Así, el 45,5% de los participantes refirieron culpabilidad tras la compra, el 50% malestar y el 17% pérdida de control. En síntesis, las *loot boxes* están cada vez más presentes en los entornos virtuales de los adolescentes y adultos, y dadas las consecuencias psicológicas y emocionales que parecen tener, es necesario seguir abordando esta problemática en futuras investigaciones en aras de prevenir y apoyar a la población vulnerable.

Palabras clave: *loot boxes*, juego patológico, videojuegos, adicción, cajas botín

■ Received: November 2020; Accepted: June 2021.

■ ISSN: 0214-4840 / E-ISSN: 2604-6334

■ Send correspondence to:

Juan Antonio Moriana. Departamento de Psicología, Universidad de Córdoba, Avda./San Alberto Magno S/N, 14071, Córdoba, España.
Email: jamoriana@uco.es

The world of video games is continually expanding in most countries. In Spain, they have become the main form of audio-visual and cultural leisure, prevailing over music and cinema, with a total of 15 million users (Asociación Española de Videojuegos, 2019), most of whom are aged between 6 and 24 (*Interactive Software Federation of Europe* [ISFE], 2017). Although the majority spend an average of 1 to 2 hours a day on video games, it is estimated that 3% exceed 3 hours (Rodríguez, Megías, Calvo, Sánchez & Navarro, 2002). This amount of game time can be considered problematic or abusive given the potential interference with daily activities at academic (Lloret, Cabrera & Sanz, 2013) and interpersonal levels (Ameneiros & Ricoy, 2015), for example.

Abusive use of technology and, specifically, video games, has attracted the attention of the scientific community due to the consequences it may have on the psycho-emotional well-being of young people, so much so that the World Health Organization (WHO) has included “Video game use disorder” (WHO, 2019) as a new diagnostic category of addictive behaviours within ICD-11. However, this categorization is seen as controversial on two grounds: they do not seem to share exactly the same mechanisms as addictive behaviours (Perales et al., 2020), and, in addition, it implies that the beneficial effects they may have in different contexts, such as education, are ignored (Eguia-Gómez, Contreras-Espinosa & Solano-Albajes, 2012; Griffiths, 2010). All in all, video game addiction has been widely studied (Ferguson, Coulson & Barnett, 2011; Männikkö, Ruotsalainen, Miettunen, Pontes & Käätäriäinen, 2020).

New dynamics are currently emerging to promote the intensive use of video games, yet given the speed at which this medium is evolving, they have not been documented in depth. One such case is loot boxes, a recent phenomenon characterized by the veiled introduction of gambling elements in video games (Zendle, Cairns, Barnett & McCall, 2020), which has led to them being described as a gateway to other forms of gambling (Zendle & Cairns, 2019). Taking into account the growth in recent years in the demand for psychological treatment in relation to pathological gambling, exploring all phenomena that may constitute risk factors for the appearance of these behaviours is a priority. Thus, while loot boxes have become the object of growing interest in other countries, where their regulation is currently being debated, this phenomenon has not been formally investigated or regulated in countries like Spain.

Loot boxes are items in video games that players pay to open and randomly obtain different objects (characters, weapon skins, new cards), but without previously knowing the value of the product. (Abarbanel, 2018; Drummond & Sauer, 2018; Griffiths, 2018; King & Delfabbro, 2019). These items come not only in the traditional shape of boxes,

but also in the form of chests, packages and/or envelopes (Griffiths, 2018), adapted to the video game theme. The items contained are generally categorized from common (e.g., cosmetic, without major significance for the game) to legendary (acquiring these gives players a differentiating characteristic, such as empowered cards or greater damage from a weapon). In addition, in certain video games, these items may be tradable (Abarbanel, 2018), that is, they can be exchanged for other objects of similar value or sold, either for symbolic money from the game itself (e.g., FIFA coins) or for real money through third parties (e.g., websites for buying and selling items).

Although not all video games have loot boxes, many, especially the most popular ones among gamers, do (Zendle, Meyer, Cairns, Waters & Ballou, 2020). Such boxes are a frequent mechanism in freemium games (free-to-play + premium), for example, games that combine a free mode with a microtransaction system (Neely, 2019). They are also found, however, in so-called triple-A games that have large development and marketing budgets and are usually market leaders (e.g., NBA2k).

An essential feature of loot boxes is that they seem to share the same mechanisms as traditional games of chance. In fact, current research has linked both dynamics (Drummond et al., 2018; Zendle, Meyer & Over, 2019), finding that players obtaining more loot boxes are more likely to play other games of chance (Drummond, Sauer, Ferguson & Hall, 2020; Li, Mills & Nower, 2019). Loot boxes have thus been considered a form of “predatory monetization” within video games, that is, “purchasing systems that disguise or withhold the long-term cost of the activity until players are already financially and psychologically committed” (King & Delfabbro, 2018). For all these reasons, studies have been carried out to explore the potential of loot boxes to generate addiction (Brady & Pretince, 2019; Drummond et al., 2018). Although the research is at an early stage, the central element that could confer addictive potential to loot boxes is the variable (Drummond et al., 2018; Larche, Chini, Lee, Dixon & Fernandes, 2021) or random reward mechanism (Navas & Perales, 2014), depending on the algorithm underlying the loot box in the different video games. As a result of these mechanisms, environmental cues, including aspects such as eye-catching visual and sound effects (Parke, Parke & Blaszczynski, 2016) and near-misses (Zendle et al., 2020) could become excessively powerful incentives, ultimately leading to loss of control (Berridge & Robinson, 2016). Additionally, other characteristics such as the randomness of results (Zendle et al., 2020), profit expectation and no-skill requirement (King et al., 2019) could also contribute to this.

Although all players have access to loot boxes, children, adolescents and young adults, representing the majority of the gaming population, are more exposed (ISFE, 2017).

This is an important issue since some authors warn of this population's greater vulnerability to gambling due to their lower impulse control compared to adults (Drummond et al., 2018).

There are various mechanisms to encourage the use of loot boxes among gamers, including the visualization of boxes being opened and other players subsequently obtaining the desired items (King et al., 2018; Zendle, 2020), so that platforms such as YouTube or Twitch can play an important role in their acquisition. Focusing on electronic sports or eSports (massive online games), Meduna, Steinmetz, Ante, Reynolds and Fiedler (2019) found a positive link between betting on these competitions and a greater purchase of loot boxes. As in traditional gambling, the purchase of loot boxes creates the illusion that in exchange for their outlay, players can obtain an advantage, although the chances of winning the desired special items in loot boxes are minimal (Griffiths, 2018).

All in all, the acquisition of loot boxes seems to be prevalent among gamers. A study carried out by the United Kingdom Gambling Commission in 2018 found that 54% of adolescents between 11 and 16 years old were aware of the possibility of buying loot boxes, and that 31% had already paid real-world money to open them. In the case of adults, Zendle and Cairns (2018) found that 78% had bought loot boxes.

While the use of loot boxes seems to be associated with negative consequences for gamers (Schwiddessen & Karius, 2018; Zendle et al., 2018; 2019), the specific effects, both short and long term, have not yet been sufficiently studied. However, given that loot boxes can be considered a form of gambling (Griffiths, 2018), some of its consequences could also be involved, including guilt (Slecza & Romild, 2020), loss of control (Moreau, Chauchard, Sévigny & Giroux, 2020) and sense of distress (Oksanen, Savolainen, Sirola & Kaakinen, 2018). The research carried out by Yücel et al. (2019) offers a detailed review of the key elements of addiction.

Taking into consideration the absence of studies on this phenomenon in our country, the present study had two objectives: 1) To analyze the use of loot boxes among players and examine variables that may be related to higher spending. Specifically, it is hypothesized that higher socioeconomic level (Meduna et al., 2019), greater number of hours spent gaming (Li et al., 2019), seeing other players open boxes (King et al., 2018) and the inclusion of new items (e.g., weapon skins, characters) will be associated with greater purchasing/spending; and 2) To analyze the effects of excessive loot box use on the psycho-emotional health of gamers. Specifically, it is suggested that, given the similarities between loot boxes and traditional gambling, players who buy loot boxes and do not obtain the desired item will experience negative emotions similar to those of gamblers, such as guilt (Slecza et al., 2020), loss of control

(Moreau et al., 2020) and perceived distress (Oksanen et al., 2018).

Method

Participants

The sample initially comprised 520 participants, but 45 of them were excluded by: (a) country of residence: wanting to study only what happens at the national level, people living in other countries were not allowed to participate ($n = 24$; 4.52%), and questionnaires not indicating country were rejected ($n = 4$; 0.75%); (b) age: given the need to divide the sample into adolescents and adults, participants not indicating this were excluded ($n = 14$; 2.64%); and (c) use/purchase: a small number of participants ($n = 3$; 0.56%) were eliminated for indicating a disproportionate and improbable outlay (e.g., €3,000 per day), considering them as potential outliers (atypical or unlikely values).

Of the total number of participants, 475 were thereby finally selected, with an average age of 19.26 ($SD = 6.23$). The sample was not matched in terms of sex, [$\chi^2(1, N = 475) = 43.05$; $p = .000$], with 309 men (65.05%) and 166 women (34.95%), a ratio consistent with the literature, which reflects a greater male representation in the use of video games (Willoughby, 2008).

The sample was divided into two groups: adolescents (11-18 years) and adults (aged over 18 years). The adolescent sample was made up of 266 students in compulsory secondary education (ESO in Spain) at state schools in Córdoba (Spain). Girls made up 43.23% ($n = 115$) and boys 56.77% ($n = 151$) of the sample, with ages ranging from 11 to 18 years ($M = 14.62$; $SD = 1.840$). The adult sample in turn comprised 209 participants and was recruited from different social networks (Facebook, Twitter, Instagram), with 158 men (75.6%) and 51 women (24.4%), and an age range of 19 to 38 years ($M = 25.17$; $SD = 4.65$).

Following the typology of Hussain and Griffiths (2009), participants were categorized by hours dedicated to gaming: casual gamer (15 hours a week or less); regular gamer (from 15 to 30 hours a week); and excessive or hardcore gamer (over 30 hours a week). Thus, 191 (54.57%) were classified as casual gamers, 107 (30.57%) as regular and 52 (14.86%) as hardcore. Finally, only four participants (0.8%) identified themselves as content creators on online multimedia platforms (e.g., YouTube, Twitch).

Instrument

In the absence of standardized instruments to assess loot box use, a specific scale was designed for this study, comprising two parts (see annex 1). The first gathered sociodemographic data, gambling behaviour and use of loot boxes. In the second, the emotions and feelings associated with this behaviour were assessed, specifically, guilt, loss of control, and distress experienced after purchase. The

questionnaire contained 25 items with different question types: open (“What is your profession?”), dichotomous (“Do you play video games?”) and polytomous (“How many hours do you spend gaming daily?”).

Procedure

The data collection process differed for adolescents and adults. Information was obtained in two ways: (a) paper questionnaires, which were completed by ESO and higher secondary school students, as well as by master’s degree students, and (b) a Google form, for adults, disseminated on the main social networks (Facebook, Twitter, Instagram), following the procedure used by Zendle and Cairns (2018), using the hashtags or content labels of video game containing loot boxes. The Declaration Helsinki (Art. 25) guidelines and the Organic Law 3/2018 on Data Protection (Art.7) were followed in all aspects of the research. Participation was voluntary. In the case of the adolescent sample, randomly selected schools were asked to participate by telephone, using the list of schools and their contact details shown on the website of Andalucía’s regional government Ministry of Education. Prior approval and permission were obtained to carry out the assessment, with the written consent to participate provided by the parents or legal guardians, and with the informed consent of the individuals concerned. In the online version, participants were asked for consent, and assessment began once this was obtained.

Participants were given information about the research aims, with a focus on the definition of loot boxes. The only instruction provided was to consider specifically this form of use, so as not to confuse it with other microtransactions that could skew the data (e.g., DLC, that is, specific additional content known to the player which added to video games after payment). In the online version, the instructions were specified alongside the research aims as a prior step to starting the questionnaire. In schools, they were stated in writing in the consent and given again orally on the day of data collection.

To guarantee that the questionnaire was correctly completed in the schools, two researchers participated in the data collection. The time required to complete the questionnaire varied by population. Adults took between 5 and 7 minutes to complete it, while in adolescents approximately 15 minutes was needed due to the difficulties inherent in administering tests in this age group (e.g., classroom settings, time between classes).

Data analysis

In order to characterize loot box use among the participants, descriptive analyses were first carried out. Subsequently, to examine the influence of different variables on this use, different statistical procedures were performed. Given that the normality assumption for the variable *spen-*

ding on loot boxes was not fulfilled, as shown with the Kolmogorov-Smirnov test ($p < 0.05$), the analysis was carried out using non-parametric tests. For comparisons between the adolescent and adult population, two different tests were carried out. First, a 2 x 2 table with Pearson’s chi-square statistic (to find out whether differences exist in the need to buy loot boxes after seeing them advertised on online multimedia platforms; in the need to buy boxes after seeing them being opened on these platforms; in the perception of winning items and in the distress/guilt/loss of control on not obtaining the desired item); and, secondly, the Mann-Whitney U test (for loot box use and spending on new content).

Continuing with statistical analyses, Kruskal-Wallis H tests were applied to find out whether family socioeconomic level and hours gaming were related to loot box spending. Finally, binomial logistic regressions were performed to predict, on the one hand, the influence of the need to buy loot boxes after seeing them being opened on online multimedia platforms (independent/predictor variable) and their subsequent use (dependent/predicting variable); and, on the other hand, the influence of obtaining or not obtaining the desired item (independent/predictor variable) on feelings of guilt, distress and loss of control (dependent/predictor variables).

With respect to this last analysis, it was necessary to previously consider the goodness of fit of the model through the omnibus test (χ^2), Cox and Snell’s R squared or Nagelkerke’s R squared. Once assessed, we examined the β parameter and its significance, which provides information about whether the independent variable explains the dependent variable (Catena, Ramos & Trujillo, 2003).

Effect sizes were measured for each of the aforementioned tests: the phi (Φ) coefficient for Pearson’s chi-square; Pearson’s correlation coefficient (r) for the Mann-Whitney U test; the epsilon squared (ϵ^2) for the Kruskal-Wallis H test (Tomczak & Tomczak, 2014); and, finally, the B exponent for Binomial Logistic Regressions (Berlanga-Silvente & Vilà-Bañós, 2014).

Data analysis was performed with IBM SPSS Statistics statistical package version 25, applying a level of statistical significance of $p = 0.05$.

Results

Sociodemographic data, together with the prevalence of loot box purchases, divided into adolescent and adult samples, are presented in table 1 and 2, respectively.

Regarding loot box use, it was found that players spent an average of €18.05 per month ($n = 167$; $SD = 36.30$), with statistically significant differences between adolescent and adult populations, ($U = 2737$, $p = 0.023$; $r = 0.21$), the former spending the most money ($M = 21.84$; $SD = 38.06$ vs $M = 15.04$; $SD = 34.75$). An increase in the purchase of

Table 1
Sociodemographic data and prevalence of loot box use consumption in the adolescent population

	Total sample (N = 266)	Do not play video games (n = 93.35%)	Play video games (n = 173.65%)	
			Do not buy loot boxes (n = 99; 57.22%)	Buy loot boxes (n = 74; 42.78%)
	M (SD)	M (SD)	M (SD)	M (SD)
Age	14.62 (1.84)	14.70 (1.63)	14.71 (1.97)	14.39 (1.91)
	N (%)	n (%)	n (%)	n (%)
Sex				
Male	151 (56.8)	13 (14)	69 (69.7)	69 (93.2)
Female	115 (43.2)	80 (86)	30 (30.3)	5 (6.8)
Marital status				
Single	266 (100)	-	-	-
Level of education				
Lower secondary	189 (71.1)	65 (69.9)	65 (65.7)	59 (79.7)
Higher secondary	69 (25.9)	26 (28)	30 (30.3)	13 (17.6)
Vocational training	8 (3)	2 (2.1)	4 (4)	2 (2.7)
Employed	0 (0)	-	-	-
Level of family income				
Low	6 (2.3)	3 (3.3)	3 (3.1)	-
Low-medium	48 (18.4)	14 (15.2)	18 (18.4)	16 (22.5)
Medium	154 (59)	66 (71.7)	53 (54.1)	35 (49.3)
Medium-high	44 (16.9)	9 (9.8)	19 (19.4)	16 (22.5)
High	9 (3.4)	-	5 (5.1)	4 (5.6)

Table 2
Sociodemographic data and prevalence of loot box use in the adult population

	Total sample (N = 209)	Do not play video games (n = 24; 11.48%)	Play video games (n = 185; 88.52%)	
			Do not buy loot boxes (n = 91; 49.19%)	Buy loot boxes (n = 94; 50.81%)
	M (SD)	M (SD)	M (SD)	M (SD)
Age	25.17 (4.65)	23.63 (3.20)	25.95 (5.10)	24.82 (4.39)
	N (%)	n (%)	n (%)	n (%)
Sex				
Male	158 (75.6)	5 (20.8)	71 (78)	82 (87.2)
Female	51 (24.4)	19 (79.2)	20 (22)	12 (12.8)
Marital status				
Single	196 (93.8)	24 (100)	84 (92.3)	88 (93.6)
Married	13 (6.2)	-	7 (7.7)	6 (6.4)
Level of education				
Primary	1 (0.5)	-	-	1 (1.1)
Lower secondary	8 (3.8)	-	4 (4.4)	4 (4.3)
Higher secondary	46 (22)	3 (12.5)	18 (19.8)	25 (26.6)
Vocational training	40 (19.1)	-	16 (17.6)	24 (25.5)
University degree	69 (33)	12 (50)	32 (35.2)	25 (26.6)
Postgraduate	44 (21.1)	9 (37.5)	20 (22)	15 (16)
PhD	1 (0.5)	-	1 (1.1)	-
Employed	85 (40.9)	6 (25)	42 (46.7)	37 (39.4)
Level of family income				
Low	7 (3.4)	-	3 (3.3)	4 (4.3)
Low-medium	62 (30)	7 (29.2)	26 (28.9)	29 (31.2)
Medium	103 (49.8)	10 (41.7)	48 (53.3)	45 (48.4)
Medium-high	32 (15.5)	7 (29.2)	13 (14.4)	12 (12.9)
High	3 (1.4)	-	-	3 (3.2)

loot boxes when video game companies announced new content (skins, legendary weapons, etc.), was reported by 42.8% ($n = 71$) of gamers, increasing average spending to €43.90 ($n = 68$; $SD = 51.41$), with no differences across the different age groups, ($U = 527$, $p = 0.679$; $r = 0.06$).

In terms of the profiles, casual gamers ($n = 67$) spent a monthly average of €15.41 ($SD = 42.43$), regular gamers ($n = 65$) around €20.17 ($SD = 33.75$) and hardcore gamers ($n = 31$) €20.97 ($SD = 29.01$). It was not possible to determine whether content creators spent more on loot boxes given the small number of participants who identified as such ($n = 4$).

As for the need to buy loot boxes after seeing them advertised on online multimedia platforms, 37% ($n = 60$) of the participants reported experiencing this, with half of them ($n = 30$) making such a purchase. No significant differences were observed between the adolescent and adult samples, [$\chi^2 (1, N = 162) = 1.475$; $p = 0.25$; $\Phi = 0.11$]. Bank cards used for purchasing loot boxes were generally found that be the gamers' own in the case of adults, while belonging to parents or others in adolescent gamers. In the latter case, 97.2% ($n = 70$) reported that their parents/other people knew about the purchase.

Regarding the psychological and emotional aspects associated with the use of loot boxes, table 3 shows the variables assessed, together with the percentage and number of participants who experienced these feelings, and the statistical results of the differences between the age groups. Regarding this disparity, a greater ratio of adolescents reported having obtained the desired items through loot boxes (56% vs. 44%), while adults reported feeling greater guilt after purchasing (71% vs. 29%). No statistically significant differences were found for the loss of control and perceived distress variables.

In order to analyze whether the explored variables were linked to greater use, it was firstly examined whether a higher family socioeconomic level was associated with higher spending, with no significant differences found [$\chi^2 (4) = 6.798$; $p = 0.147$; $\epsilon^2_R = 0.04$]. Secondly, in relation to gamer profiles, it was examined whether those dedicating more hours a day to gaming spent more money on loot boxes, with no significant differences found [$\chi^2 (2) = 4.647$; $p = 0.098$; $\epsilon^2_R = 0.03$].

Regarding psychological and emotional effects, no differences were found between adults and adolescents in the need to purchase after seeing loot boxes opened on online multimedia platforms [$\chi^2 (1, N = 162) = 1.104$; $p = 0.293$; $\Phi = 0.08$]. Moreover, it was found that feeling this need did not predict the subsequent purchase [$\beta (1) = -16.578$; $p = 0.997$]. On the other hand, it was observed that not obtaining the desired item predicted feelings of distress and guilt in the players, while obtaining the desired item predicted greater feelings of loss of control among the participants (Table 4). To find out whether sociodemographic data acted as moderating variables, these were entered in the regression analyses as covariates. No statistical significance was found ($p < 0.05$), so it could be concluded that these variables have no influence on the dependent variable.

The goodness of fit of the model for these regressions, as expressed with the omnibus test, was statistically significant for the guilt variables [$\chi^2 (1, N = 164) = 14.296$; $p = 0.000$; Cox and Snell $R^2 = 0.083$], perceived distress [$\chi^2 (1, N = 164) = 23.814$; $p = 0.000$; Cox and Snell $R^2 = 0.135$] and loss of control [$\chi^2 (1, N = 164) = 9.083$; $p = 0.003$; Cox and Snell $R^2 = 0.054$].

Table 3
Psychological and emotional aspects associated with loot box purchase

Psychological and emotional variables	%	<i>n</i>	Differences between adolescents and adults
Not obtaining the desired item	35.4	58	$\chi^2 (1, N = 164) = 20.633$; $p \leq 0.05$; $\Phi = 0.355$
Guilt	45.5	75	$\chi^2 (1, N = 165) = 9.523$; $p = 0.002$; $\Phi = 0.253$
Loss of control	16.9	28	$\chi^2 (1, N = 166) = 2.323$; $p = 0.127$; $\Phi = -0.135$
Perceived distress	48.5	80	$\chi^2 (1, N = 165) = 1.937$; $p = 0.164$; $\Phi = 0.108$

Table 4
Binary logistic regression of obtaining the desired items by psychological and emotional aspects associated with loot box use

	B	E.T.	Wald	df	Sig.	Exp(B)	95% CI for EXP (B)	
							Lowest	Highest
Guilt	-1.265	0.343	13.581	1	0.000	0.282	0.144	0.553
Perceived distress	-1.676	0.363	21.379	1	0.000	0.187	0.092	0.381
Loss of control	1.276	0.430	8.812	1	0.003	3.581	1.543	8.313

Discussion

Given that the acquisition of loot boxes is a recent phenomenon, there is currently no solid theoretical base nor sufficient research to enable support or comparison of all results. However, the nature and characteristics of loot boxes have led to them being seen as games of chance (Griffiths, 2018), so that the results of research in this area could be extrapolated (e.g., on-site/online gambling, slot machines, etc.) and applied to this new modality, albeit with caution.

Following the stated aims, it was first decided to analyze the type of loot box use among gamers. Throughout this study, an attempt was made to explore this phenomenon, and approximately 43% of adolescents and 51% of adults assessed reportedly bought loot boxes. These findings are similar to the results of the studies by Zendle et al. (2019), and Kristiansen and Severin (2020), with loot box use of 41% in adolescents and 45% in adults, respectively. The data thus points to greater purchasing by the adult population. This age difference in loot box acquisition could be explained by bank card availability, with adolescents having less access to them because of the necessary permission of an adult, usually a family member, to enable the transaction.

Although adult players seemed to buy more loot boxes, it was surprising to find that teenagers spent more money on them. This result is consistent with the study by Brooks and Clark (2019), which observed that undergraduate students spent \$7 more per month than adults. This spending on loot boxes may increase when video game companies announce new content, as suggested by the responses of participants in this study.

These data are especially relevant since they could be indicating a change in adolescent leisure and in their way of relating, with both being mediated by the use of ICTs (Espuny, González, Lleixà & Gisbert, 2011); this would translate into an increase in spending on online items (e.g., microtransactions, loot boxes, sports betting), rather than on other conventional activities such as, for example, going to the movies with friends or renting a football pitch (Megías, 2020). These new forms of leisure could become linked to the normalization of virtual behaviours, which could motivate a change in attitude towards gambling, destigmatizing its use and leading to it being considered one more means of peer group integration (Sirola, Kaakinen, Savolainen & Oksanen, 2019). Consequently, as occurs in other problematic behaviours (Herrero, 2003), adolescents may be less reluctant to buy loot boxes if their peers also buy them (King, Russell, Delfabbro & Polisena, 2020).

In addition to contributing to the sense of group inclusion, loot boxes generate other motivations that increase their acquisition, such as gaining an advantage over other players, getting valuable objects or the entertainment and uncertainty generated by the opening itself (Zendle et al., 2019). As regards the latter, channels on various online

multimedia platforms, such as YouTube or Twitch, show content creators opening a vast number of loot boxes, and the recording are accessible to users. Seeing these contents could increase the desire to buy loot boxes (King et al., 2018; Zendle, 2020). Indeed, the descriptive results of this study show that a third of the assessed adolescent and adult gamers feel the need to buy them after seeing them on these platforms, and half end up making the purchase. These data show the potential importance of the media in attracting players, mainly through advertising. This fact is shown in the Report of the Observatory on the Protection of Online Gamblers (Informe del Observatorio de la Protección al Jugador Online) (Ministerio de Hacienda y Administraciones Públicas, 2013), which indicates that 13% of players find advertising or promotion of games to be an aspect that increases the need to keep playing them repeatedly.

Taking these implications into account, there is a clear need to discover what psychological and emotional consequences the purchase of loot boxes may have for adolescents and adults. Thus, we found that 16.9% of gamers analyzed show frequent feelings of loss of control. This result can be compared to data from the Ministerio de Hacienda y Administraciones Públicas (2015), which showed that 11.1% of online gamblers felt they had lost control at some point in their lives. In the adolescent population, loss of control could indicate that they are not yet fully prepared to face gambling situations, given that this is a stage of vulnerability in this difficult area (Carbonell & Montiel, 2016). Among adults, we found risk factors such as impulsivity, the use of alcohol or other substances, and sensation seeking (Dowling et al., 2017), which could explain the loss of control. This feeling could in turn lead them to experience negative emotions associated with distress and guilt (WHO, 2019). In our study, these two feelings are described by approximately half of the adolescents and adults who buy loot boxes. Therefore, although experiencing negative emotions after purchase should be a sufficiently aversive stimulus for gamers to stop using them, purchasing is actually boosted (Juniper Research, 2018). In adolescents, this fact could be related to the stronger perception of winning and being in control they feel in relation gambling (Moore & Ohtsuka, 1999).

Once loot box use of the participating gamers had been specified, the first objective also set out to examine certain variables that could be related to higher spending, including family socioeconomic level, number of gaming hours and seeing others open loot boxes on online multimedia platforms. Regarding the first variable, it was hypothesized that higher family socioeconomic level was associated with higher spending; no statistically significant differences were found, however. The results of the present study are consistent with those of Meduna et al. (2019) and Meduna et al. (2020), in which no relationship between the

level of income and greater loot box purchasing was found. A plausible explanation for this finding could be that loot boxes are affordable for the general population, regardless of their economic status, given that the cost of opening them can vary greatly. In the FIFA 21 video game, for example, loot boxes start at €1 (Vandal, 2020).

Regarding player profiles, the potential link between daily hours dedicated to gaming and loot box spending was explored. Contrary to expectations, no statistically significant differences were found between the gamer types. These results differ from those of Li et al. (2019), which established a positive association between gambling frequency and purchasing of loot boxes, or by King et al. (2020), in which the number of hours of play was linked to the spending in microtransactions within the Fortnite video game. Although the statistical data are not significant, qualitative observation of loot box use shows variation across the different profiles, with the gamers dedicating the most hours to video games, that is, regular and hardcore, spending approximately €5 more per month than casual gamers.

With regard to seeing content creators opening loot boxes on online multimedia platforms, it was hypothesized that feeling the need to open loot boxes after seeing them being opened on these platforms predicted greater purchasing. Contrary to expectations, however, the results of this study indicated that feeling this need did not predict the subsequent purchase. This result differs from the study by Zendle (2020), which established a positive link between spending on loot boxes and the visualization of loot box opening, both live and recorded. Although the results of this study were not statistically significant, we must point out that a section of gamers do feel such a need, and that half of them end up making the purchase. For this reason, more research is necessary to investigate the relationship between these variables.

The second and final objective was to analyze the effects of abusive loot box purchasing on the psychological and emotional health of gamers, specifically, the extent to which not obtaining the desired items in these loot boxes predicted higher levels of guilt, perceived distress, and loss of control. Regarding guilt and perceived distress, the results showed that not obtaining the wanted items could predict higher levels in both variables. These results are in line with those of Slecza et al. (2020) and Oksanen et al. (2018), who found that gamers with excessive and/or problematic gambling presented high feelings of guilt and psychological distress after gaming. Everything seems to point to the fact that, due to the inherent characteristics of loot boxes, the chances of winning the desired item are minimal (Griffiths, 2018), with the money invested generally being greater than the value of the item obtained. This disparity between money spent and item obtained could arouse these associated negative emotions, in this case, guilt and perceived distress.

Finally, in relation to loss of control, it was found, unexpectedly, that obtaining the desired items could predict greater loss of control. This could be explained by the fact that obtaining the articles they wanted could trigger various cognitive and heuristic biases, such as the illusion of control (Chóliz, 2006) or prediction biases (Labrador & Mañoso, 2005), among others, making gamers believe that they will have the same chances of obtaining another item that they want when opening the next box.

Faced with the problem of gambling, different organizations are directing their efforts to reduce the impact of its use. Thus, entities such as the Spanish Foundation for Help against Drug Addiction (FAD), the Youth Council of the Principality of Asturias and the Junta de Extremadura with the Red Cross, among others, are launching a range of campaigns (e.g., 'It's obvious', 'You win' or 'Bet on yourself, don't gamble') in order to raise public awareness of the consequences and implications of onsite/online gambling, both on a psychological and social level. However, while all these adopted measures would be suitable for already consolidated gambling problems (such as slot machines addiction), this does not apply to loot boxes since, being such a novel phenomenon, they tend to go unnoticed.

The above campaigns could start taking loot boxes into account as a veiled form of gambling in the near future since the Ministerio de Consumo, more specifically the Dirección General de Ordenación del Juego, is formulating a draft law (Proyecto de Real Decreto) to regulate their use (Vélez, 2020). Discussions about reviewing the law to include loot boxes have been ongoing since 2018, during which time 15 European countries, including Spain, and the US state of Washington met at the Forum of European Regulators with the aim of regulating them (Pascual, 2018). Some countries have already done so, such as Belgium, Poland, China and Japan (Abarbanel, 2018; Griffiths, 2018; Schwidessen et al., 2018), while others, such as the United Kingdom or France, are in the process.

It is necessary to take into consideration a series of limitations when interpreting the results presented in this study: (a) results should be generalized with caution since the sample size was small. It must be remembered that as it is such a specific microtransaction within video games, approximately half of the sample reported not doing this type of gambling; (b) this was a cross-sectional study limited to a certain period of time, so that it is not possible to establish causality across the variables assessed. Predictions using binomial logistic regressions must therefore be made carefully since the concept of prediction would only be purely statistical – it would be more accurate to speak about the relationship between the variables studied; (c) the self-report methodology has certain limitations. Firstly, given that there are no adequate instruments aimed at assessing this phenomenon, a self-elaborated questionnaire was designed that has not been

validated, so data reliability and validity may be reduced. The results must be interpreted within the framework of an exploratory study and not as a reflection of a precise reality. Secondly, the inherent disadvantages of self-reports must be considered (e.g., social desirability, acquiescence, response biases); and (d) regarding data gathering, an online version of the questionnaire was used in the adult sample, so that possible difficulties associated with this medium have to be considered (e.g., loss of contextual control, convenience sampling). For adolescents, data was collected in the schools during school hours, so that certain contextual variables could not be controlled (e.g., availability of students, privacy when responding).

All in all, the above limitations notwithstanding, it should be noted that, to the knowledge of the authors, this is the first empirical study carried out in Spain with the aim of examining the growing phenomenon of loot boxes. The preliminary results of this research reveal the use of loot boxes and its consequences, leading to a need for new lines of research to be opened on a subject that has aroused growing interest in other countries due to its relationship with gambling. Thus, as a proposal for future research in this field, it would be interesting to examine the prevalence of loot box use in a larger sample and to identify buyer profiles in order to develop prevention measures, as well as personalized interventions adapted to the needs of the users which include families and the educational community instead of focusing on gambling strategies.

Conclusions

This study highlights the need to continue researching this problem, one which is increasingly present in the world of video games. In conclusion and, in line with the results of previous studies, the present work found that (1) a section of gamers spent a significant amount of money on loot boxes; (2) adolescents frequently used loot boxes; (3) advertising new content on multimedia platforms could incentivize use; and (4) loot box use may cause negative emotions, including guilt, loss of control, and distress.

Conflict of interests

The authors declare no conflicts of interest.

References

- Abarbanel, B. (2018). Gambling vs. gaming: A commentary on the role of regulatory, industry, and community stakeholders in the loot box debate. *Gaming Law Review*, 22, 231–234. doi:10.1089/blr2.2018.2243.
- Ameneiros, A. & Ricoy, M. C. (2015). Los videojuegos en la adolescencia: Prácticas y polémicas asociadas. *Revista de Estudios e Investigación en psicología y educación*, 13, 115–119. doi:10.17979/reipe.2015.0.13.451.
- Asociación Española de Videojuegos. (2019). *La industria del videojuego en España. Anuario 2019*. <http://www.aevi.org.es/web/wp-content/uploads/2020/04/AEVI-ANUARIO-2019.pdf>.
- Berlanga-Silvente, V. & Vilà-Baños, R. (2014). Cómo obtener un modelo de regresión logística binaria con SPSS. *REIRE, Revista d'Innovació i Recerca en Educació*, 7, 105–118.
- Berridge, K. C. & Robinson, T. E. (2016). Liking, wanting, and the incentive-sensitization theory of addiction. *American Psychologist*, 71, 670–679. doi:10.1037/amp0000059.
- Brady, A. & Prentice, G. (2019). Are loot boxes addictive? Analyzing participant's physiological arousal while opening a loot box. *Games and Culture*, 16, 419–433. doi:10.1177/1555412019895359.
- Brooks, G. A. & Clark, L. (2019). Associations between loot box use, problematic gaming and gambling, and gambling-related cognitions. *Addictive Behaviors*, 96, 26–34. doi:10.1016/j.addbeh.2019.04.009.
- Carbonell, E. & Montiel, I. (2016). Vulnerabilidad y riesgo en los adolescentes: Perfil del jugador online. In E. Echeburúa (Ed.), *Abuso de Internet ¿antesala para la adicción al juego de azar online?* (pp. 169–190). Madrid: Pirámide.
- Catena, A., Ramos, M. M. & Trujillo, H. (2003). *Análisis Multivariado: Un manual para investigadores*. Madrid: Biblioteca Nueva.
- Chóliz, M. (2006). Adicción al juego: Sesgos y heurísticos implicados en el juego de azar. *Revista Española de Drogodependencias*, 31, 173–184.
- Dowling, N. A., Merkouris, S. S., Greenwood, C. J., Oldenhof, E., Toumbourou, J. W. & Youssef, G. J. (2017). Early risk and protective factors for problem gambling: A systematic review and meta-analysis of longitudinal studies. *Clinical Psychology Review*, 51, 109–124. doi:10.1016/j.cpr.2016.10.008.
- Drummond, A. & Sauer, J. (2018). Video game loot boxes are psychologically akin to gambling. *Nature Human Behaviour*, 2, 530–532. doi:10.1038/s41562-018-0360-1.
- 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. doi:10.1371/journal.pone.0230378.
- Espuny, C., González, J., Lleixà, M. & Gisbert, M. (2011). Actitudes y expectativas del uso educativo de las redes sociales en los alumnos universitarios. *Revista de Universidad y Sociedad del Conocimiento (RUSC)*, 8, 171–185. doi:10.7238/rusc.v8i1.839.
- Eguia-Gómez, J. L., Contreras-Espinosa, R. S. & Solano-Albajes, L. (2012). Videojuegos: Conceptos, historia y su

- potencial como herramienta para la educación. 3c *TIC: Cuadernos de Desarrollo Aplicados a Las TIC*, 1, 1–14.
- Ferguson, C. J., Coulson, M. & Barnett, J. (2011). A meta-analysis of pathological gaming prevalence and comorbidity with mental health, academic and social problems. *Journal of Psychiatric Research*, 45, 1573–1578. doi:10.1016/j.jpsychires.2011.09.005.
- Griffiths, M. (2010). Adolescent video game addiction: Issues for the classroom. *Education Today*, 60, 28–31.
- Griffiths, M. D. (2018). Is the buying of loot boxes in video games a form of gambling or gaming? *Gaming Law Review*, 22, 52–54. doi:10.1089/blr.2018.2216.
- Herrero, M. N. (2003). Adolescencia, grupo de iguales, consumo de drogas y otras conductas problemáticas. *Revista de Estudios de Juventud. Aspectos psicosociales de la violencia juvenil*, 62, 81–91.
- Hussain, Z. & Griffiths, M. D. (2009). The attitudes, feelings, and experiences of online gamers: A qualitative analysis. *CyberPsychology & Behavior: The impact of the Internet, multimedia and virtual reality on behavior and society*, 12, 747–753. doi:10.1089/cpb.2009.0059.
- Interactive Software Federation of Europe. (2017). *GameTrack European Summary Data*. https://www.isfe.eu/wp-content/uploads/2019/01/gametrack_european_summary_data_2017_q4.pdf.
- Juniper Research. (2018). *Loot Boxes & skin gambling to generate a \$50 billion industry by 2022*. <https://www.juniperresearch.com/press/press-releases/loot-boxes-and-skins-gambling>.
- King, D. L. & Delfabbro, P. H. (2018). Predatory monetization schemes in video games (e.g. 'loot boxes') and internet gaming disorder. *Addiction*, 113, 1967–1969. doi:10.1111/add.14286.
- King, D. L. & Delfabbro, P. H. (2019). Video game monetization (e.g., 'loot boxes'): A blueprint for practical social responsibility measures. *International Journal of Mental Health and Addiction*, 17, 166–179. doi:10.1007/s11469-018-0009-3.
- King, D. L., Russell, A. M. T., Delfabbro, P. H. & Polisená, D. (2020). Fortnite microtransaction spending was associated with peers' purchasing behaviors but not gaming disorder symptoms. *Addictive Behaviors*, 104. doi:10.1016/j.addbeh.2020.106311.
- Kristiansen, S. & Severin, M. C. (2020). Loot box engagement and problem gambling among adolescent gamers: Findings from a national survey. *Addictive Behaviors*, 103. doi:10.1016/j.addbeh.2019.106254.
- Labrador, F. J. & Mañoso, V. (2005). Cambio en las distorsiones cognitivas de jugadores patológicos tras el tratamiento: Comparación con un grupo control. *International Journal of Clinical and Health Psychology*, 5, 7–22.
- Larche, C. J., Chini, K., Lee, C., Dixon, M. J. & Fernandes, M. (2021). Rare loot box rewards trigger larger arousal and reward responses, and greater urge to open more loot boxes. *Journal of Gambling Studies*, 37, 141–163. doi:10.1007/s10899-019-09913-5.
- Ley Orgánica 3/2018, de 5 de diciembre, de Protección de Datos Personales y garantía de los derechos digitales. *Boletín Oficial del Estado*, 294, 1–68. <https://www.boe.es/eli/es/lo/2018/12/05/3/con>.
- 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. doi:10.1016/j.addbeh.2019.05.016.
- Lloret, D., Cabrera, V. & Sanz, Y. (2013). Relaciones entre hábitos de uso de videojuegos, control parental y rendimiento escolar. *European Journal of Investigation in Health Psychology and Education*, 3, 249–260. doi:10.1989/ejihpe.v3i3.46.
- Männikkö, N., Ruotsalainen, H., Miettunen, J., Pontes, H. M. & Kääriäinen, M. (2020). Problematic gaming behavior and health-related outcomes: A systematic review and meta-analysis. *Journal of Health Psychology*, 25, 67–81. doi:10.1177/1359105317740414.
- Meduna, M., Steinmetz, F., Ante, L., Reynolds, J. & Fiedler, I. (2019). Loot boxes - a game changer? *Gambling Research Division*, 2, 1–14. https://www.researchgate.net/publication/331935977_Loot_Boxes_A_Game_Changer.
- Meduna, M., Steinmetz, F., Ante, L., Reynolds, J. & Fiedler, I. (2020). Loot boxes are gambling-like elements in video games with harmful potential: Results from a large-scale population survey. *Technology in Society*, 63. doi:10.1016/j.techsoc.2020.101395.
- Megías, I. (2020). *Jóvenes, juegos de azar y apuestas. Una aproximación cualitativa*. Madrid: Centro Reina Sofía sobre adolescencia y juventud, FAD. doi:10.5281/zenodo.3601078.
- Ministerio de Hacienda y Administraciones Públicas. (2013). *Informe Observatorio de la protección al jugador online*. <https://www.ordenacionjuego.es/en/art-informe-observatorio-nov-2013>.
- Ministerio de Hacienda y Administraciones Públicas. (2015). *Estudio sobre prevalencia, comportamiento y características de los usuarios de juegos de azar en España*. <https://www.ordenacionjuego.es/es/estudio-prevalencia>.
- Moore, S. M. & Ohtsuka, K. (1999). Beliefs about control over gambling among young people, and their relation to problem gambling. *Psychology of Addictive Behaviors*, 13, 339–347. doi:10.1037//0893-164X.13.4.339.
- Moreau, A., Chauchard, É., Sévigny, S. & Giroux, I. (2020). Tilt in online poker: Loss of control and gambling disorder. *International Journal of Environmental Research and Public Health*, 17. doi:10.3390/ijerph17145013.
- Navas, J. F. & Perales, J. C. (2014). Comprensión y tratamiento del juego patológico: Aportaciones desde la neurociencia del aprendizaje. *Clínica y salud*, 25, 157–166. doi:10.1016/j.clysa.2014.10.001.

- Neely, E. L. (2019). Come for the game, stay for the cash grab: The ethics of loot boxes, microtransactions, and freemium games. *Games and Culture*, 16, 228–247. doi:10.1177/1555412019887658.
- Oksanen, A., Savolainen, I., Sirola, A. & Kaakinen, M. (2018). Problem gambling and psychological distress: A cross-national perspective on the mediating effect of consumer debt and debt problems among emerging adults. *Harm Reduction Journal*, 15, 45. doi:10.1186/s12954-018-0251-9.
- Organización Mundial de la Salud. (2019). *Clasificación Internacional de Enfermedades, 11ª Edición*. <https://icd.who.int/es/>.
- Parke, J., Parke, A. & Blaszczynski, A. (2016). *Key issues in product-based harm minimization: Examining theory, evidence and policy issues relevant in Great Britain*. <http://eprints.lincoln.ac.uk/id/eprint/26363/>.
- Pascual, J. A. (2018). *15 países europeos, incluido España, se unen para regular las loot boxes*. <https://computerhoy.com/noticias/industria/15-paises-europeos-incluido-espana-unen-acabar-loot-boxes-304053>.
- Perales, J. C., King, D. L., Navas, J. F., Schimmenti, A., Sescousse, G., Starcevic, V.,... Billieux, J. (2020). Learning to lose control: A process-based account of behavioral addiction. *Neuroscience and Biobehavioral Reviews*, 108, 771–780. doi:10.1016/j.neubiorev.2019.12.025.
- Rodríguez, E., Megías, I., Calvo, A., Sánchez, E. & Navarro, J. (2002). *Jóvenes y videojuegos: Espacio, significación y conflictos*. Madrid: Centro Reina Sofía sobre adolescencia y juventud, FAD.
- Schwiddessen, S. & Karius, P. (2018). Watch your loot boxes! - Recent developments and legal assessment in selected key jurisdictions from a gambling law perspective. *Interactive Entertainment Law Review*, 1, 17–43. doi:10.4337/ielr.2018.01.02.
- Sirola, A., Kaakinen, M., Savolainen, L. & Oksanen, A. (2019). Loneliness and online gambling-community participation of young social media users. *Computers in Human Behavior*, 95, 136–145. doi:10.1016/j.chb.2019.01.023.
- Sleczka, P. & Romild, U. (2020). On the stability and the progression of gambling problems: Longitudinal relations between different problems related to gambling. *Addiction*, 116, 116–125. doi:10.1111/add.15093.
- Tomczak, M. & Tomczak, E. (2014). The need to report effect size estimates revisited. An overview of some recommended measures of effect size. *TRENDS in Sport Sciences*, 1, 19–25.
- United Kingdom Gambling Commission, Young People and Gambling. (2018). *A research study among 11-16 years old in Great Britain*. <https://www.gamblingcommission.gov.uk/pdf/survey-data/young-people-and-gambling-2018-report.pdf>.
- Vandal. (2020). *FIFA 21: ¿Cómo conseguir FIFA Points en FUT y para qué sirven?*. <https://vandal.elespanol.com/guias/guia-fifa-21-trucos-consejos-y-secretos/fifa-points>.
- Vélez, A. M. (2020). *Consumo anuncia una reforma legal para considerar las cajas botín o “loot boxes” de los videojuegos como juegos de azar*. https://www.eldiario.es/economia/consumo-anuncia-reforma-legal-considerar-cajas-botin-loot-boxes-juegos-azar_1_6438216.html.
- Willoughby, T. (2008). A short-term longitudinal study of internet and computer game use by adolescent boys and girls: Prevalence, frequency of use, and psychosocial predictors. *Developmental Psychology*, 44, 195–204. doi:10.1037/0012-1649.44.1.195.
- World Medical Association. (1964). *WMA Declaration of Helsinki – Ethical Principles for Medical Research involving Human Subjects*. <https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/>.
- Yücel, M., Oldenhof, E., Ahmed, S. H., Belin, D., Billieux, J., Bowden-Jones, H.,... Verdejo-Garcia, A. (2019). A transdiagnostic dimensional approach towards a neuropsychological assessment for addiction: An international Delphi consensus study. *Addiction*, 114, 1095–1109. doi:10.1111/add.14424.
- Zendle, D. (2020). Beyond loot boxes: A variety of gambling-like practices in video games are linked to both problem gambling and disordered gaming. *PeerJ*, 8. doi:10.7717/peerj.9466.
- Zendle, D. & Cairns, P. (2018). Video game loot boxes are linked to problem gambling: Results of a large-scale survey. *PLOS ONE*, 13. doi:10.1371/journal.pone.0206767.
- Zendle, D. & Cairns, P. (2019). Loot boxes are again linked to problem gambling: Results of a replication study. *PLOS ONE*, 14. doi:10.1371/journal.pone.0213194.
- Zendle, D., Cairns, P., Barnett, H. & McCall, C. (2020). Paying for loot boxes is linked to problem gambling, regardless of specific features like cash-out and pay-to-win. *Computers in Human Behavior*, 102, 181–191. doi:10.1016/j.chb.2019.07.003.
- Zendle, D., Meyer, R., Cairns, P., Waters, S. & Ballou, N. (2020). The prevalence of loot boxes in mobile and desktop games. *Addiction*, 115, 1768–1772. doi:10.1111/add.14973.
- Zendle, D., Meyer, R. & Over, H. (2019). Adolescents and loot boxes: Links with problem gambling and motivations for purchase. *Royal Society Open Science*, 6. doi:10.1098/rsos.190049.

Annex 1. Questionnaire on the use of loot boxes in video games.

1. Age _____
2. Sex Male Female
3. Country of residence _____
4. Marital status Single Separated
 Married Widowed
5. Level of education Primary University degree
 Lower secondary Postgraduate
 Higher secondary PhD
 Vocational training
6. Are you currently employed? Yes No
7. What is your profession? _____
8. If currently working: What is your job? _____
9. How would you describe your family's socioeconomic level? Low Medium -high
 Medium-low High
 Medium
10. Do you play video games? Yes No

If the **answer to question 10** was **No** → **THIS IS THE END OF THE QUESTIONNAIRE**

If the **answer to question 10** was **Yes** → **PLEASE CONTINUE**

11. If you answered Yes to question 10, how many hours a day do you spend gaming
 < than 1 hour 5-6 hours
 1-2 hours 7-8 hours
 3-4 hours > 8 hours

12. Put an **X** in the respective box, considering these 4 options:

Video games	I don't know this videogame	I know this videogame, but I don't play it	I know this videogame and have played it sometimes	I know this videogame and usually play it
Fortnite				
Apex				
Dota 2				
Hearthstone				
Overwatch				
Heroes of the Storm				
FIFA				
Pro Evolution Soccer (PES)				
Clash Royale				
Counter Strike				
Brawl Stars				
League of Legends (Lol)				
Tom Clancy´s Rainbow Six Siege				
Mario Kart Tour				

13. In the above video games (12), have you ever bought boxes, keys or envelopes? Yes No

If the **answer to question 13** was **No** → **THIS IS THE END OF THE QUESTIONNAIRE**

If the **answer to question 13** was **Yes** → **PLEASE CONTINUE**

14. How often do you buy boxes, keys or envelopes in these video games?

- Weekly Once every 6 months
 Monthly Once a year

15. Approximately how much money, in euros, would you say you have spent on this, considering the frequency given above?

_____€.

16. When new items, players, or characters become available, do you spend more money on boxes, keys or envelopes?

- Yes No

17. Approximately how much money, in euros, would you say you have spent on these new items/players/characters (16)?

_____€.

18. If you create content for video games on these platforms (Twitch, YouTube, Mixer), have you ever made a financial profit from it?

- Yes No

19. Have you ever felt the need to buy boxes, keys or envelopes after seeing them advertised on YouTube/Twitch/Mixer?

- Yes No

20. If you answered Yes to the previous question (19), have you ever bought them?

- Yes No

21. Was the bank card used for the purchase your own, did it belong to your parents or to someone else?

- Own
 My parents
 Other person (who?) _____

22. If the previous answer (21) was "my parents" or "other person", did they know that you used your card to buy these boxes, keys or envelopes?

- Yes No

23. Have you ever felt that you lost control after buying these boxes, keys or envelopes?
(For example: After buying a box/envelope/key, you bought another one straightaway)

- Never
 Almost never
 Sometimes
 Often
 Always

24. Did you get what you wanted when you bought these boxes, keys or envelopes?

- Yes No

25. Have you ever felt bad when you didn't get what you wanted?

- Yes No

26. Have you ever felt guilty about spending money on boxes, keys or envelopes?

- Yes No

