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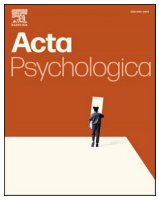

The moderating effect of understanding advertising intent on the relation between advertising recognition and problematic use of loot boxes among minors: An exploratory study

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ABSTRACT

The use of loot boxes has been compared to gambling due to its random nature, with the consequent risk of being conceived as an ordinary activity implemented in the daily routine. One of the factors contributing to these gambling behaviors is exposure to gambling advertisements. It is essential to protect children and adolescents from prejudicial advertising, since due to their psycho-evolutionary development, advertising makes them impressionable and suggestible. Currently, there is scarcely any research on the influence of advertising on underage buyers of loot boxes. Knowledge in this regard is important to adequately address efforts to protect minors from the potential impact of gambling and its advertising. Thus, this study aims to examine how understanding advertising intent in loot box advertising moderates the relationship between the recognition of loot box advertising and the problematic usage of loot boxes in a sample of adolescents. The present study used a cross-sectional design, and the sample is composed by 451 adolescents (85.8 % male) that played videogames and purchased loot boxes in the last 12 months. Results indicated that understanding advertising intent played a moderating role in the relationship between advertising recognition and Problematic Use of Loot Boxes, strengthening it positively. The findings showed that when there was a low degree of understanding advertising intent, the former relationship was not significant. However, with a high level of understanding advertising intent the relationship between advertising recognition and Problematic Use of Loot Boxes was significant and strengthened. This means that knowing how ads try persuading the player affects how adverts are linked to PULB. Specifically, if adolescents understand that ads are trying to sell them loot boxes, this knowledge makes the relationship between seeing ads and having PULB stronger. These results are of interest for advertising literacy strategies.

1. Introduction

Video games are a form of interactive entertainment that has become popular worldwide in recent decades. However, video games can also be considered a form of cultural expression because they reflect the creativity, values, beliefs, and experiences of those who create and play them (Muriel & Crawford, 2018). Despite this more global and inclusive view of video games, it is worth reflecting that this industrial sector has been growing every year reaching in 2022 a global value of $229.4 billion dollars (expecting that in 2027 the global turnover value will be close to $400 billion dollars (Statista, 2023). Likewise, playing video games has become in recent years almost a normative activity, especially among children and adolescents. This assertion can be supported by the YouGov study, Gaming & Esports Report (2023) in which 31 % of the world's population plays video games regularly on PC, console, or mobile devices during the week. This percentage rises to 42 % between the ages of 18 and 24, spending an average of almost 11 h per week.

The video game industry, in addition to selling copies of the games it

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creates, has created other dynamics with which to obtain economic benefits, with microtransactions becoming more and more frequent. With these transactions players pay a known and fixed price for a benefit, object, or skin (King & Delfabbro, 2019) and it has become a relevant source of revenue for the industry (Kristiansen & Severin, 2020; Li et al., 2019). One particular type of microtransactions are the so-called loot boxes (LB), also known as crates, gachas, cases or chests. Unlike other microtransactions, the LB is the purchase of a virtual object, which is randomized and paid for with legal money (this can be obtained from a prepaid card, from a credit card payment or with previous purchase of in-game currency/environment to buy LBs) (Montiel et al., 2022). The fact that it is a virtual object that presents a random reward is what has made it similar to gambling, as both share a random reward mechanism (Drummond et al., 2020; Montiel et al., 2022; Zendle & Cairns, 2018). Most reviews indicate that the purchase of LBs is a frequent phenomenon in both adults and minors and that there is a relationship between LBs and problems with video games and online gambling (Garea et al., 2021; Gibson et al., 2022; Montiel et al., 2022; Spicer et al., 2022). Some research has generated instruments to assess LB risk (Risky Loot Box Index-RLI- by Brooks & Clark, 2019) or problematic use of LBs (Problematic Use of Loot Boxes Questionnaire-PU-LB- by González-Cabrera et al., 2022). New evidence with minors has also established that the purchase of LBs is a stable phenomenon over time and that it is associated with an increased risk of having gambling problems (González-Cabrera et al., 2023).

After all that has been said, it could be concluded that there is an association between LBs and problem gambling, but it is still necessary to better understand many dynamics and processes, one of the most important of which is advertising. Through advertising activity, video game companies try to maximize benefits and this is especially worrying in sectors with a still poorly defined regulation and with potentially exposed minors (Xiao et al., 2022). This is of concern because one of the factors contributing to the gambling behaviors is the exposure to gambling advertisements (Bouguettaya et al., 2020; Markham & Young, 2015; McGrane et al., 2023). Despite existing regulations prohibiting gambling advertising aimed at minors, they are often exposed to it on different occasions, on social networks, in front of traditional media, or at sporting events (Djohari et al., 2021; Martinez-Pastor & Vizcaino-Laorga, 2021). For example, Kristiansen and Severin (2020) confirmed that almost 50 % of Danish adolescents receive at least one input from gambling ads per day. This exposure to gambling advertising leads to a higher recall of brands (Thomas et al., 2018; Nyemcsok et al., 2018; Djohari et al., 2019) and informs attitudes toward gambling (Pitt et al., 2016) and gambling-related behaviors (Fried et al., 2010; Parrado-González & León-Jariego, 2020).

Research on video game advertising has focused on in-game advertising, advergames and social media advertising, and how external brands are incorporated into the game (Terlutter & Michael, 2013). More current studies have focused on case studies of how a video game company directly sells to its players through advertisements and promotions (Kelling & Tham, 2021) and relating loot box spending to loot box advertising consumption (Tham & Perreault, 2021). Thus, adequate efforts must be made to protect children and adolescents from the impact of gambling and its advertising.

These general aspects about gambling have been seen in loot boxes as well. It is important to highlight that the relationship between gambling and advertising are transferable to the LB phenomenon, as they are also considered as another form of gambling in the videogame itself.

Given this media and advertising context, it becomes necessary to question how qualified minors are to face this type of advertising, which depends on the ability to recognize and understand advertising messages (Friestad & Wright, 1994). We refer to the ability to recognize advertising, understand its persuasive and sales purpose, and use this knowledge to evaluate the advertising of a product (De Jans et al., 2017). Identifying and understanding advertising involves differentiating the commercial message in a program or content (An et al., 2014). Moreover, advertising literacy includes both knowledge about advertising and its techniques, as well as the ability to understand persuasive intentions (Daems et al., 2019). Protecting children and adolescents from harmful advertising is essential as their age makes them highly impressionable to advertising due to their limited persuasive knowledge (Friestad & Wright, 1994; Rozendaal et al., 2011; Van Dam & Van Reijmersdal, 2019).

Studies in the last decade on advertising literacy and minors have mainly focused on new digital advertising formats, such as advertising on social networks, brand placements, advergaming, or influencer marketing (An et al., 2014; De Pauw et al., 2018; Feijoo et al., 2023; Hudders et al., 2016; Neyens et al., 2017; Van Reijmersdal et al., 2017). In general, these studies have shown that simply recognizing the advertising intention of a message does not guarantee the ability to interpret its content. Moreover, children may struggle to identify specific types of advertising as a form of persuasion (Rozendaal & Buijzen, 2023). This is because many digital ads are seamlessly integrated with organic or entertainment content, making them less intrusive and annoying for young audiences who may need to realize they are being marketed to (De Jans & Hudders, 2020; Van Dam & Van Reijmersdal, 2019). Following the PCMC model (Processing of commercialized media content) proposed by Buijzen et al. (2010), which differentiates three levels of processing (systematic, heuristic, and automatic), children apply low-effort cognitive processing when encountering these new digital advertising formats, that is, the automatic level, and do not activate the associative knowledge network they have developed about the phenomenon (An et al., 2014; An & Kang, 2014; Mallinckrodt & Mizerski, 2007; Van Reijmersdal et al., 2017; Vanwesenbeeck et al., 2017). These studies, focused on the advergaming format, found that recognizing the advertising intent of a message does not automatically translate into the ability to interpret the received content. Several studies on attitude formation indicate that varying levels of processing can lead to different types of attitudes, which in turn influence various consumer decisions (Buijzen et al., 2010); specifically, lower levels of processing tend to generate implicit attitudes, which play a more significant role in spontaneous and impulsive consumer behavior. This low cognitive elaboration in processing non-traditional advertising formats is exacerbated by several factors, one of which is that the child's attention is focused on the recreational part of the format, leaving the processing of the persuasive message in the background, a behavior that can be transferred to the LBs.

The variables mentioned above are inserted in the theoretical perspective of Rozendaal et al. (2011), who proposed a multidimensional construct in advertising literacy. This includes a cognitive dimension, based on the classical components like the recognition of advertising and understanding of its persuasive and selling intent (Daems et al., 2019; Wright et al., 2005), and an attitudinal dimension, which relies on acquired knowledge to elicit consumer responses of like or dislike toward commercial content and fosters healthy skepticism leading to reflection on biases and persuasive intentions (De Veirman et al., 2019; Hudders et al., 2017). In recent years, a third dimension has been added to advertising literacy: the ethics dimension (Adams et al., 2017; De Jans et al., 2018; Hudders et al., 2017; Sweeney et al., 2022; Zarouali et al., 2019). Although the attitudinal and the ethics dimensions were not taking into account in the current study, it is worth considering the advertising literacy at the cognitive level, since, as according to previous studies, it could mitigate the adverse effects of advertising (Cornish, 2014; Rozendaal et al., 2011; Wright et al., 2005). However, although the recognition of persuasive sales intent and its influence on commercial messages has been extensively studied in previous years in other contexts, its study in relation to video games and loot box ads has not been studied. Therefore, the potential effect it may have on the relationship between mere ad recognition and problematic loot box use is still unknown and it should not be forgotten that this cognitive processing is the necessary first step of advertising literacy. Knowing its influence could help guide research in future studies, as

minors are confronted with commercial messages with less identifiable and, consequently, less recognisable characteristics. This situation is especially frequent in LBs and therefore we have considered interesting to explore this line of research as a particular form of gambling (often covert) and that is found in a widely accepted ludic ecosystem (video games).

This study was intended to answer the following research question, which is based on the model of Rozendaal et al. (2011): What is the relationship between the advertising recognition, understanding advertising intent in loot boxes, and problematic use of loot boxes? Thus, this study aims to examine how understanding advertising intent in loot box advertising moderates the relationship between the recognition of loot box advertising and the problematic usage of loot boxes in a sample of adolescents.

2. Method

2.1. Design and participants

The present study used a cross-sectional design. The sampling was incidental and was carried out in 24 educational centres of eight Autonomous Communities from Spain. The sample is composed by 451 adolescents (85.8 % male) that played videogames and purchased loot boxes in the last 12 months. The average age of the sample was 15.05 ± 1.53 years (age range: 10–19 years), out of which the 99.6 % ($n = 449$) were minors. The non-university educational stages of the sample were as follows: 30 sixth grade of Primary school (6.7 %), 384 Compulsory Secondary Education (85.2 %), and 37 Baccalaureate (8.1 %). This would encompass all three levels of education in Spain from Primary to Higher Education.

2.2. Assessment instruments

Sociodemographic data were collected from all participants (gender, age, study center and province). These included the following questions to select the sample: 1) "*Have you played any video games* (*of any genre*) *on any platform* (*PC, Console, smartphone, etc.*) *in the last 12 months?*"; 2) "*Have you purchased a loot box in any video game in the last 12 months with real money or in-game money* (*which was previously legal tender*)". The answer to these questions was dichotomous (i.e., Yes/No). It is worth mentioning that, before asking questions about loot boxes, a definition of loot boxes and even a composition of six images containing the main loot boxes in games (FIFA, CS:GO, etc.) has been provided. The definition given was: "Remember that loot boxes are virtual objects such as chests, envelopes, keys, and surprise boxes within a video game that offer random content such as equipment, accessories, weapons, or any other in-game advantage in exchange for an amount of money (real money paid by credit card, prepaid card, etc.)". In addition, the following questions were asked: 1) How many times have you bought a loot box in the last week? 2) When was the last time you paid to open a loot box? 3) How much money have you invested/spent on loot boxes in the last month?

Advertising recognition (AR) was assessed with two ad-hoc items, inspired by the scale of Rozendaal et al., 2016 (ALS scale): "*Have you identified advertising related to loot boxes at any point?*" and "*Do you remember seeing advertisements for loot boxes at some point?*". These items were rated with a 4-item frequency response scale from 1 (*never*) to 4 (*almost daily*). In relation to its internal reliability, the Cronbach's alpha coefficient in the present sample was 0.794.

Understanding advertising intent (UAI) was measured through two ad-hoc items, inspired in ALS scale (Rozendaal et al., 2016): "*Do you think advertising makes you like loot boxes more?*" and "*Do you think advertising makes you want to buy loot boxes?*". In this case we have linked the concepts of persuasion and selling intent because we assume that liking a LB leads to acquiring a LB, as with other certain advertising formats, such as product placement (Auty & Lewis, 2004; Law & Braun, 2000; Van Reijmersdal et al., 2007). Participants were asked to indicate their responses on a 5-point Likert type scale from 1 (*totally disagree*) to 5 (*totally agree*). For the current sample, the Cronbach's alpha coefficient was 0.797.

The Problematic Use of Loot-Boxes (PU-LB) scale (González-Cabrera et al., 2022), consists of 18 items assessing the potentially problematic nature of engaging in loot box purchasing behavior through a response scale that presented six response alternatives from 0 (*strongly disagree*) to 5 (*strongly agree*), with total scores ranging from 0 to 90, where higher scores suggest a more problematic use of loot boxes. Two items in the questionnaire are: *Loot boxes have caused problems in my life* (*either social, economic, family, school, or work etc.*) and *I usually buy loot boxes to feel better or happier*. In relation to its internal reliability, the Cronbach's alpha coefficient in the present sample was 0.924.

2.3. Procedure

The survey was conducted online through the Survey Monkey platform. E Mobile devices or computers were used to complete the survey. The participants were given access and supervised by their teachers. The duration of the survey varied between 5 and 15 min based on the age and reading level of the students.

2.4. Ethical considerations

The study received consent from all participants and school principals. Consent forms were sent to parents/guardians for participants under 18 years old, and the purpose of the study was explained. <1 % of parents/guardians refused participation. Participants over 18 years old provided informed consent when completing the survey. The study was approved by the Research Ethics Committee of [masked for review] (PI007-2020) and is part of a larger study on loot boxes. Although there were no formal exclusion criteria, except for refusal to participate by parents/guardians for the overall sample, to be included in this study, participants had to answer affirmatively to the two questions in the Assessment instruments section (about video games and LBs).

2.5. Statistical analysis

The Statistical Package for the Social Sciences (SPSS v29) program was used to: 1) explore and screen all data through descriptive statistics; 2) test for reliability by Cronbach's Alpha and normality through skewness and kurtosis; and 3) explore the relationships between variables through bivariate correlations.

IBM SPSS AMOS (v. 29) was used to test the relationships between AR, PU-LB, and the moderating role of UAI through structural equation modelling (SEM) analysis. The Maximum Likelihood Estimator (ML) was used, and the fit of the model was estimated with the most reliable fit indices (Hu & Bentler, 1999): the Chi-square ($\chi 2$), the root mean square error of approximation (RMSEA), the comparative ft. index (CFI), the Tucker-Lewis index (TLI), and the standardized root mean square residual (SRMR). A model was considered to adequately fit the data at values of $\leq$0.08 for RMSEA, $\geq$0.90 for CFI and TLI, with values above 0.95 preferred, and values of $\leq$0.08 for SRMR (Bentler & Bonett, 1980). The mixed model method for testing moderation in a structural model (Collier, 2020) was used to examine the moderating role of UAI in the relationship between AR with PU-LB. The variables of AR and PU-LB were latent unobservable constructs with all the indicators included. The moderator of UAI was a composite variable formed from the average of the moderator indicators. The interaction between the predicting variable (AR) with moderating variable (UAI) was performed creating an interaction term with both composite variables mean centred in SPSS and data were transferred into AMOS for testing the interaction effects. If the interaction is statistically significant, it means that UAI is moderating the relationship from AR to PU-LB (Collier, 2020).

3. Results

3.1. Descriptive statistics, normality, and reliability

Descriptive for all variables, including the means, standard deviations, and Pearson's bivariate correlations between the variables of the study, are presented in Table 1. The skewness and kurtosis absolute values of each variable indicated that data is normal because were below ±3 for skewness and ±10 for kurtosis (Brown, 2015).

AR was found to be associated with both PU-LB and UAI. In fact, all variables were significantly associated with each other. See Table 1.

Furthermore, regarding the sociodemographic data related to loot box purchases, the following results were obtained: Out of the 451 respondents, 78.5 % ($n = 354$) reported not purchasing any loot boxes in the last week, 12.6 % ($n = 57$) bought between 1 and 5 boxes, 3.8 % ($n = 17$) between 6 and 10, 2.4 % ($n = 11$) between 11 and 30, 0.4 ($n = 2$) between 31 and 50, only 1.6 % ($n = 7$) purchased >50 boxes, and there 3 missing responses. Regarding the timing of the last purchase, there were 27 missing responses, 51.2 % ($n = 231$) of respondents indicated they made a purchase last year, 28.6 % ($n = 129$) did so last month, 8.4 % ($n = 38$) purchased last week, and only 5.8 % ($n = 26$) purchased a loot box the day before. Additionally, 64.1 % ($n = 289$) did not spend any money on loot boxes in the last month, 16.9 % ($n = 76$) spent between €1 and €10, 6.4 % ($n = 29$) spent between €11 and €25, 5.1 % between €26 and €50, 3.3 % between €51 and €100, and 4.0 % ($n = 18$) spent more than €100, while there was one missing answer. This data provides an overview of the respondents' recent purchasing behaviors but is presented separately from the main statistical analysis.

3.2. Measurement model fit

Before analysis, measurement models were used to test the factor structure of AR, UAI, and PU-LB as latent variables. The factor loadings (≥0.4) (Hair et al., 2010; Stevens, 2009) supported a one-factor solution for both constructs, AR and UAI. The PU-LB model showed an acceptable measurement model fit ($\chi^2(119) = 367.59$, RMSEA = 0.068 [90 % CI, 0.060–0.076], CFI = 0.946, TLI = 0.931, SRMR = 0.044) and factor loadings were significant (≥0.4).

3.3. Moderation test of understanding advertising intent

The mixed model (Fig. 1) provided an acceptable fit to the data ($\chi^2(189) = 473.97$, RMSEA = 0.058 [90 % CI, 0.051–0.064], CFI = 0.943, TLI = 0.931, SRMR = 0.046). The findings showed that there was a direct effect from AR to PU-LB (B = 0.22, $p < .001$). Furthermore, the interaction between AR and UAI was positive and significant (B = 0.077, $p = .027$). Therefore, UAI played a moderating role in the relationship between AR and PU-LB, strengthening it positively. Moreover, when probing the interaction, the findings showed that when there was a low degree of UAI, the relationship between AR and PU-LB was not significant (B = 0.134, $p = .211$). Finally, when there was a high level of UAI, the relationship between AR and PU-LB was significant and stronger (B = 0.39, $p < .001$), as the unstandardized estimate is bigger than the previously mentioned one (B = 0.22).

4. Discussion

The purchase of LBs constitutes a risky behavior, as they are based on a random reward mechanism (Larche et al., 2019) and longitudinal studies have shown that the purchase of LB increases the risk of online gambling over time, specifically at six months (Brooks & Clark, 2023; González-Cabrera et al., 2023). For this reason, studies on LBs have experienced exponential growth in recent years as evidenced by the increase in publications on the topic and the efforts of some governments to regulate the phenomenon (Drummond et al., 2020; Xiao, 2023).

As of today, we know that one of the factors contributing to these gambling behaviors is the exposure to gambling advertisements (McGrane et al., 2023). The marketing strategies for loot boxes often mimic those used in gambling advertising (Ghosh, 2023), creating similar effects on players. However, this study specifically examines the impact of loot box advertising rather than broader gambling advertising. In addition, many platforms advertise video games without announcing that they contain loot boxes, thus violating current regulations in EU (Xiao, 2024). This is of concern because the most effective advertising campaigns by the video game industry are those in which children are not aware that advertisers are targeting them (Kervin et al., 2012). However, authors such as Radesky et al. (2020) have shown that children who are aware of the tactics being used against them can resist these temptations and this implies that digital literacy is a possible way to counter these practices (Feijoo et al., 2023). Much of the research on children's advertising knowledge has focused on two components: recognition of advertising and understanding its selling intent (Kunkel, 2010). However, a smaller proportion of studies have analyzed more complex features, such as the understanding of the persuasive intent of advertising, whose recognition occurs at later ages than the understanding of selling intent (Carter et al., 2011; Rozendaal et al., 2010) and in attitudes toward the loot boxes themselves (Tham & Perreault, 2021).

However, despite the above, there are no previous studies in the literature examining the relationship between advertising variables and the problematic use of loot boxes in underage buyers of LBs. Therefore, this research aimed to fill this gap in the literature, performing a model that allowed us to analyse whether there is an effect from advertising recognition (AR) to problematic use of LBs (PU-LB) in a sample of adolescents' buyers of LBs and if understanding advertising intent (UAI) plays a moderating role in the relationship, by applying the model of Rozendaal et al. (2011) to loot boxes.

Given the research question formulated, the results indicate that the conceptual level of advertising literacy (AR and UAI) does not serve as a filter to curb the problematic use of LB. Therefore, in line with previous research on advertising literacy (Rozendaal & Buijzen, 2023), the key could be to work on attitudinal and ethical dimensions of consumption. However, while there are studies where there is evidence of this relation, in another study attitudes toward advertising and gambling did not predict whether people were willing to spend time watching advertising (Tham & Perreault, 2021). In relation to the results, this study found that knowing how ads try persuading the player affects how ads are linked to PULB. Specifically, if adolescents understand that ads are trying to sell them loot boxes, this understanding makes the relationship between seeing ads and having PULB stronger. This may be due to the low importance given by children to the recognition of the intentionality of

Table 1
Correlation matrix, descriptive statistics, and reliabilities for AR, PU-LB and UAI.

	M	*SD*	α	Skew	Kurt	(1)	(2)	(3)
AR (1)	3.87	1.452	0.794	0.588	0.167			
PU-LB (2)	12.54	14.80	0.924	2.15	6.085	0.257**	1	
UAI (3)	4.39	2.20	0.797	0.561	−0.488	0.352**	0.240**	1

M = mean, SD = standard deviation, α = Cronbach's alpha, Skew = Skewness; Kurt = Kurtosis; * = $p \leq .05$; ** = $p \leq .01$. AR = Advertising recognition; UAI = Understanding persuasive selling intent; PU-LB = The Problematic Use of Loot-Boxes.

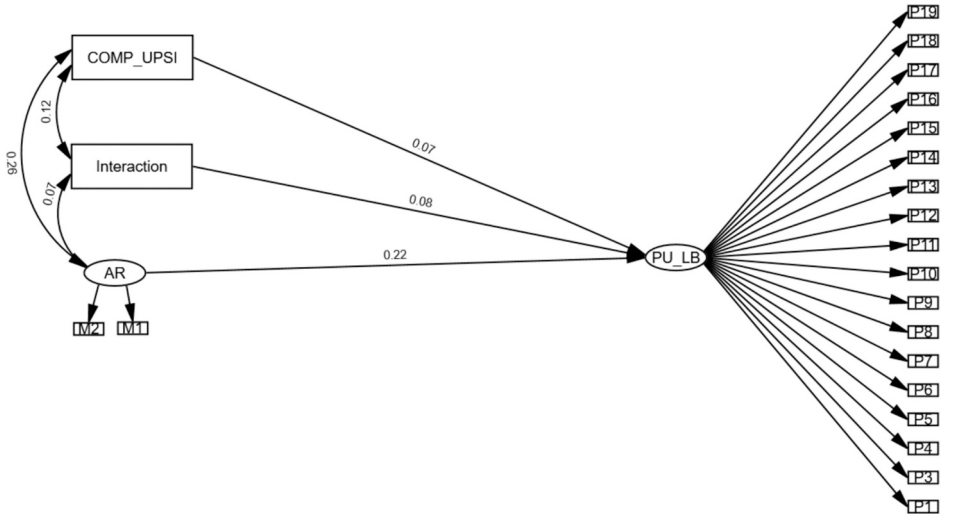

Fig. 1. Structural equation model for AR, PU-LB, and UAI with unstandardized estimates. * < 0.001. AR = Advertising recognition; COMP_UAI = composite variables formed from the average of understanding advertising intent indicators; Interaction = product term of the composite and mean centered variables, AR and UAI; PU-LB = The Problematic Use of Loot-Boxes.

the messages they consume, something already pointed out by studies focused on influence marketing (Feijoo et al., 2023).

Despite its novel findings and important contributions, this study has some potential limitations: 1) only self-report measures were used, which may generate response bias and social desirability; 2) the current study is cross-sectional, and causality cannot be established; 3) although the sample of participants was large and geographically dispersed, the sampling was not random, so it is not representative of the Spanish context; 4) there is an overrepresentation of males in the study, which is a common problem in many studies since consumers of video games, gambling and LBs are mostly male. However, this may be because women's data may be underreported. For instance, females might play games with gacha mechanics and so do not identify as having engaged with "loot boxes" per se.

This study has focused mainly on the cognitive dimension of advertising literacy (Rozendaal et al., 2010; Wright et al., 2005), which is a potential limitation. However, to the authors' knowledge, it is the first to be conducted with a sample of minors who are video game players and loot box purchasers. Analyzing advertising in this sample is a contribution of the study. Other components should be taken into account in the future, such as the attitudinal dimension that relies on acquired knowledge to elicit in consumers like/dislike responses that commercial content can produce in minors and a healthy skepticism that leads them to reflect on biases and persuasive intentions (De Veirman et al., 2019; Hudders et al., 2017). It will also be necessary to take into account a third dimension to advertising literacy: the ethical dimension (Sweeney et al., 2022).

Other future lines for future studies are to conduct longitudinal studies to establish causality between AR and PU-LB moderated by UAI. The present study provides results that are important to develop an adequate advertising literacy, since understanding the advertising intention has been shown to be a factor that increases the problematic use of PU-LB. Therefore, it will be necessary to increase the critical competence of adolescents (Feijoo et al., 2023), for example, by promoting advertising literacy educational programs through schools (Rozendaal & Buijzen, 2023).

In conclusion, understanding advertising intent played a moderating role in the relationship between advertising recognition and Problematic Use of Loot Boxes, strengthening it positively. Moreover, the findings showed that when there was a low degree of understanding advertising intent, the former relationship was not significant. However, with a high level of understanding advertising intent the relationship between advertising recognition and Problematic Use of Loot Boxes was significant and strengthened. That is, when the adolescent has a greater understanding of the advertising intention, the relationship between seeing loot box ads and having a problematic use of loot boxes is greater.

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CRediT authorship contribution statement

Joaquín González-Cabrera: Writing – review & editing, Writing – original draft, Validation, Project administration, Methodology, Funding acquisition, Data curation, Conceptualization. **Vanessa Caba-Machado:** Visualization, Methodology, Formal analysis, Data curation. **Beatriz Feijóo:** Writing – review & editing, Writing – original draft, Conceptualization. **Adoración Díaz-López:** Writing – review & editing, Investigation. **Raquel Escortell:** Writing – review & editing, Investigation. **Juan Manuel Machimbarrena:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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