

This is a self-archived version of an original article. This version may differ from the original in pagination and typographic details.

Author(s): Nyrhinen, Jussi; Sirola, Anu; Frank, Lauri; Nuckols, Julia; Wilska, Terhi-Anna

Title: An Ethical Perspective on Loot Box Purchasing : Examining Psychosocial Antecedents and the Association with Indebtedness

Year: 2023

Version: Published version

Copyright: © University of Maribor, University Press

Rights: CC BY 4.0

Rights url: <https://creativecommons.org/licenses/by/4.0/>

Please cite the original version:

Nyrhinen, J., Sirola, A., Frank, L., Nuckols, J., & Wilska, T.-A. (2023). An Ethical Perspective on Loot Box Purchasing : Examining Psychosocial Antecedents and the Association with Indebtedness. In A. Pucihar, M. Kljajić Borštnar, R. Bons, G. Ongena, M. Heikkilä, & D. Vidmar (Eds.), 36th Bled eConference : Digital Economy and Society : The Balancing Act for Digital Innovation in Times of Instability (pp. 301-318). University of Maribor.
<https://doi.org/10.18690/um.fov.4.2023.19>

AN ETHICAL PERSPECTIVE ON LOOT BOX PURCHASING - EXAMINING PSYCHOSOCIAL ANTECEDENTS AND THE ASSOCIATION WITH INDEBTEDNESS

JUSSI NYRHINEN,¹ ANU SIROLA,¹ LAURI FRANK,²

JULIA NUCKOLS,¹ TERHI-ANNA WILSKA¹

¹ University of Jyväskylä, Faculty of Humanities and Social Sciences, Jyväskylä, Finland
jussi.nyrhinen@jyu.fi ,anu.r.s.sirola@jyu.fi, julia.a.nuckols@jyu.fi, terhi-anna.wilsk@jyu.fi

² University of Jyväskylä, Faculty of Information Technology, Jyväskylä, Finland
lauri.frank@jyu.fi

Loot boxes are popular random reward mechanisms in digital games, attracting players to invest real money to enhance their gaming experiences. Loot boxes share striking similarities to gambling and might contribute to one's economic strain, but more research is needed on the underlying vulnerabilities and motivational traits in loot box purchasing. This paper examines associations with self-reported increase in loot box purchasing and debt problems during the first year of the COVID-19 pandemic. International survey data were collected in 2021, consisting of Finnish, Swedish, and British respondents (N = 2,991) aged 18 to 75. Partial least squares modeling was used as an analytical technique. The findings bring valuable insight into the underlying psychosocial and motivational factors in loot box purchasing and its association with indebtedness.

Keywords:

loot
box,
indebtedness,
resilience,
loneliness,
social
relationships



DOI <https://doi.org/10.18690/um.fov.4.2023.19>
ISBN 978-961-286-751-5

1 Introduction

Loot boxes are an example of gambling-gaming convergence, referring to random-reward in-game purchase opportunities present in modern video games (Drummond & Sauer, 2018; Spicer et al., 2022; Zendle et al. 2019). Loot boxes can be defined as chance-based “mystery boxes” containing a selection of game-related items (e.g., weapons, cosmetic features), and they are typically purchasable with real money (Zendle et al., 2020). The chance-based mechanism of loot boxes is often juxtaposed with gambling (Delfabbro & King, 2020; Spicer et al., 2022), and loot box opening even provokes similar physiological and psychological reactions as gambling does (Brady & Prentice, 2021). Since gambling is highly addictive, the gambling-like nature of loot boxes make them an addictive characteristic of video games (Király et al., 2023). From an ethical perspective, this raises concerns particularly regarding vulnerable players such as young people or individuals with psychosocial or financial problems.

Even though loot boxes have gained scholars’ attention particularly in relation to disordered gambling, there is a call for research to explore underlying factors and individual characteristics which might contribute to excessive loot box spending and consequent problems (Yokomitsu et al., 2021). There is some evidence that loot box expenditure is associated with financial harm (Carey et al., 2022), but more detailed studies are needed. Additionally, adolescent players with psychosocial problems such as depression are more susceptible to unplanned loot box purchasing (Irie et al., 2022), but more research is needed to gain better insight on psychosocial risks and protective factors. Most studies on loot box purchasing have focused on adolescent players (e.g., Hing et al., 2022; Irie et al., 2022; Kristiansen & Severin, 2020), which is important given the popularity of loot boxes in games that children play (Zendle et al., 2020). However, research on adult gamers is needed as well. Frank, Salo, & Toivakka (2015) conclude that digital gamers’ purchasing decisions are dominantly based on hedonic motivations, but loot box purchasing might have unique motivational traits due to their gambling-like nature. Despite the similarities with gambling, ethical issues regarding personal, social, and financial vulnerabilities in loot box purchasing, have to our knowledge, not been researched before.

Additionally, the impact of the COVID-19 pandemic on problematic gambling and gaming behaviors is still topical. Due to shutdowns of societies and excessive social isolation, opportunities for daily recreational activities and enjoyment were highly limited particularly during the first year of the pandemic, making the role of online technologies more emphasized. In the early onset of the pandemic, the World Health Organization recommended digital gaming as a safe activity to spend time and connect with friends and family (King et al., 2020). Some individuals have been more vulnerable to develop harmful habits over the course of the pandemic. For example, problematic online behaviors such as excessive engagement in online gaming or gambling have acted as a response to a crisis and related mental distress for some individuals (Savolainen et al., 2022). Developing harmful habits such as increased purchase behaviors as a response to the pandemic might have long-lasting effects on one's financial wellbeing such as the tendency for indebtedness.

This paper investigates the (self-reported) increase in loot box purchasing and its association with indebtedness during the first year of the COVID-19 pandemic. We approach increased loot box purchasing as a form of problematic behavior because of its potential to harm one's finances (Carey et al., 2022) and its striking resemblance with gambling mechanisms (Delfabbro & King, 2020; Király et al., 2023; Spicer et al., 2022). The aim of this paper is to first examine if loneliness, social support, and COVID-19 worry are drivers for loot box purchasing and if psychological resilience protects consumers from excessive loot box purchasing. Second, we study if loot box purchasing predicts tendencies for indebtedness.

2 Theoretical Framework

Because the chance-based mechanism of loot boxes holds an analogy for gambling (Delfabbro & King, 2020, Király et al., 2023; Spicer et al., 2022), we build our framework on the work of Sirola et al. (2023), who examined the psychosocial drivers on gambling during the COVID-19 pandemic. Sirola et al. (2023) discovered an indirect association between COVID-19 worry and problem gambling through loneliness (H1). Therefore, in a similar manner, we investigate whether there is direct or indirect link between COVID-19 worry and loot box purchasing (H2). In line with prior studies (Sirola et al., 2023), we suggest that social support is negatively associated with loneliness (H3). However, according to a review by Nordmyr & Forsman (2020) there is contradictory evidence on the role of social support in

problem gambling. For example, some studies indicate that social support and socializing with peers might be positively associated with problem gambling, and social support might be particularly problematic if it promotes gambling activities (Dowling et al., 2017; Räsänen et al., 2016; Sirola et al., 2023; Yücel et al., 2015). Additionally, social identification and peer-pressure in team-based digital gaming might influence in-game purchase behaviors (Sirola et al., 2021). This makes it worth testing whether social support has a positive association with loot box purchasing (H4). Prior studies have shown social support to have positive associations with psychological resilience (H5) (Cohen & Wills, 1985; Mancini & Bonanno, 2009; Zhang et al., 2022). Existing research has also found positive associations between loneliness and higher problem gambling severity (Khazaal et al., 2017; Sirola et al., 2019; 2023; Vuorinen et al., 2021) and therefore we expect loneliness to have similar association with loot box purchasing (H6).

Lussier et al. (2007) suggest that psychological resilience is a protective factor to gambling particularly among youth, while more recent studies have provided contradictory evidence on the role of resilience among adult gamblers (Mishra et al., 2019; Oei & Goh, 2015; Scholes-Balog et al., 2015; Sirola et al., 2019). Thus, it is also worth testing whether psychological resilience is negatively associated with loot box purchasing (H7). We also expand the framework by Sirola et al. (2023) by examining the consequences of loot box purchasing. Because harmful habits or compulsive behaviors such as excessive purchase behaviors and overspending might have long-lasting effects on one's financial wellbeing (Achtziger, 2022), we postulate that loot box purchasing is positively associated with the tendency for indebtedness (H8). We controlled the research model for the effects of a respondent's age, gender, and level of education. The research hypotheses are listed in Table 1 and the summary of our theoretical framework is illustrated in Figure 1.

Table 1: List of Research Hypotheses

| Hypotheses | |
|------------|----------------------------------------------------------------------------------------------|
| H1 | <i>Loneliness is positively associated with COVID-19 worry.</i> |
| H2 | <i>COVID-19 worry is positively associated with increased loot box purchasing.</i> |
| H3 | <i>Social support is negatively associated with perceived loneliness.</i> |
| H4 | <i>Social support is positively associated with increased loot box purchasing.</i> |
| H5 | <i>Social support is positively associated with psychological resilience.</i> |
| H6 | <i>Loneliness is positively associated with increased loot box purchasing.</i> |
| H7 | <i>Psychological resilience is negatively associated with increased loot box purchasing.</i> |
| H8 | <i>Loot box purchasing is positively associated with indebtedness.</i> |

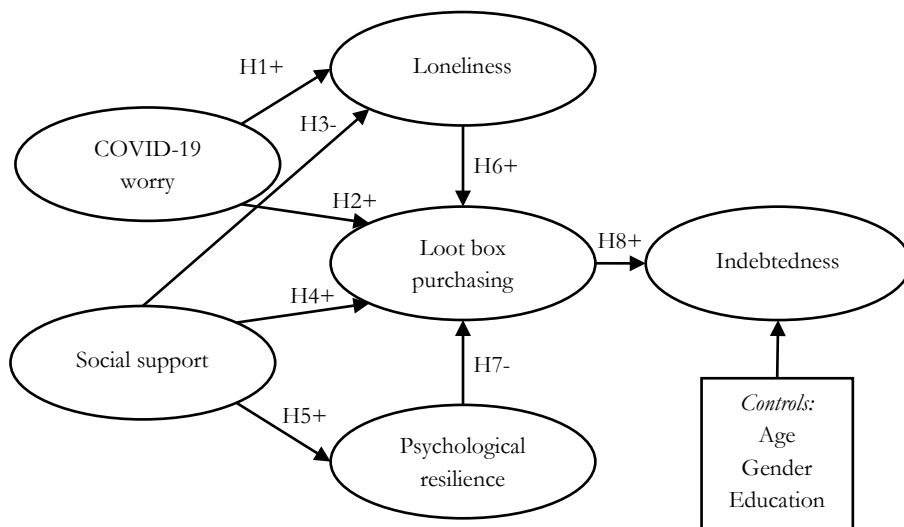


Figure 1: Theoretical framework and hypotheses

3 Methods and Materials

3.1 Sample and Data Collection

The participants in this study's cross-national dataset (N = 2,991) ranged in age from 18 to 75 and originated from Finland (n = 995; mean age = 44.60; 50.4% female; SD = 15.67); Sweden (n = 998; mean age = 43.84; SD = 15.78; 50.3% female); and the UK (n = 998; mean age = 43.56; SD = 15.76; 50.8% female). During the COVID-19 pandemic in April 2021, information was simultaneously collected from

these three nations utilizing an anonymous online survey. The questionnaire was created to examine how the pandemic has affected people's general lives, including their online activity, consumption, and wellbeing. We selected Finland, Sweden, and the UK for our study, because these are three technologically advanced and culturally relatively similar European nations. In Finnish, Swedish, and English, the survey's format and metrics were all similar.

A data-provider company recruited respondents from an internet panel (CINT) using a random sample in each nation. Contacts with the panelists were made in a random order. The web panelists are volunteers who select to participate in surveys based on their preferences and areas of interest. Also, the panelists receive rewards and pay in exchange for their time and labor as provided by the research company.

3.2 Measures

The measurement scales comprised of 15 items that involved 4 latent constructs and 2 single items. The scales used to measure loneliness, psychological resilience, and social support were drawn from prior literature. *A three-item loneliness scale* that was created for survey research and is a condensed but comparable version of the complete UCLA loneliness scale (Hughes et al., 2004) was used to measure loneliness during the pandemic. *A condensed version of the Connor-Davidson resilience scale* (CD-RISC) (Campbell-Sills & Stein, 2007; Connor & Davidson, 2003), which evaluates psychological resources to deal with challenging circumstances like crises, was used to measure psychological resilience. *Brief Form of the Perceived Social Support Questionnaire* (F-SozU K-6) was used to measure social support (Kliem et al., 2015; Lin et al., 2019). *COVID-19 worry* was measured using a scale that was modified from previous studies that assessed pandemic-related worry (e.g., Broos et al., 2022; Mónaco et al., 2022; Okruszek et al., 2020; Ranta et al., 2020).

'Loot box purchasing' (Mean = 2.03, Standard Deviation = 1.13) and indebtedness (Mean = 1.17, Standard Deviation = 1.11) were measured using single items. 'Loot box purchasing' was measured with the following item "How have your online consumer habits changed during the coronavirus pandemic regarding the following services in comparison to your previous habits: Loot box purchases in digital games", with a 5-point response scale (1 = I have not purchased at all 2 = I have purchased less 3 = the same amount 4 = more to some degree 5 = considerably

more)“. The measure for indebtedness was adopted from Wang and Xiao (2009) and it used a 5-point semantic differential scale: “Which of the following statements best describe your indebtedness? Choose the option which best suits your situation: 1 = The payment of bills, payments, and/or payment instalments is not troublesome, and I am able to save money in the process; 2 = The payment of bills, payments, and/or payment instalments is not troublesome, however I am unable to save money in the process; 3 = The payment of bills, payments, and/or payment instalments is continuously challenging for me; 4 = I have received payment notices and have been subject to paying tardiness interest, as I have not had sufficient funds to complete payments when the needed payments have been due; and 5 = I have a compromised credit score/have been subject to repossession actions.”

3.3 Nonresponse Bias and Common Method Bias

Nonresponse bias was assessed by comparing the national samples to the structure of the populations aged 18–75 years in Finland, Sweden, and UK. Except for a few categories that are less than 8% over- or underrepresented in the data, the distributions of age, gender, and region are generally within the margin of error when compared to the overall population (see Appendix 1). Therefore, nonresponse bias is unlikely an issue in our data set. Finland had a response rate of 26%, the UK had a response rate of 73%, and Sweden had a response rate of 27%. The standard deviation is 3.1% across all nations. Less than 3.7% of the values for each item in this study were missing.

The following steps were taken to reduce common method bias (CMB) (see Podsakoff et al., 2012). In order to prevent questions measuring the same dimension from being subsequent, the order of the questionnaire items was first mixed. Second, we alternated the scales' answer formats. These two methods were used to lessen the possibility that respondents would rely their following responses on their previous responses. Thirdly, we reduced the ambiguity in the phrases used to describe the items. This method was chosen because, if the questions are not straightforward and clear, respondents may find it difficult to comprehend the meaning of confusing statements and instead rely on systematic answer patterns. The Harman single factor a common latent factor (CLF) test (Harman, 1976; Podsakoff et al., 2003) was run to reveal any potential CMB interference with the results. Because the total variance extracted by one component was 27.34% and was below the 50% criterion in our

data set, the findings of Harman's single factor CLF test indicate that CMB was likely not present.

3.4 Analysis Strategy

For the following reasons, we used partial least squares structural equation modeling (PLS-SEM) with SmartPLS 3.2.7 to test our hypotheses: 1) Our work was exploratory in the sense that it examined the multiple new relationships in a complicated model, and many of the variables were not normally distributed; and 2) Hair et al. (2017) emphasize that factor indeterminacy makes covariance-based SEM unsuitable for prediction purposes. Under these conditions, Hair et al. (2017) suggest PLS-SEM as the method to be used.

4 Analysis and Results

4.1 Assessment of Measurement Model

Because the factor loadings were all $>.78$ (see Table 2), the composite reliabilities were all $.75$, and the Cronbach's alphas were all $>.85$ (the suggested cut-off value is $.70$) (see Table 3), the construct measures demonstrated good reliability and validity (Hair et al. 2017). Also, all Variance Inflation Factors (VIF) were below the threshold value of 5, which indicates that there were no collinearity problems (Hair, Ringle & Sarstedt, 2011). In order to formally attain discriminant validity, the Fornell-Larcker criterion was applied (i.e., a latent variable should better explain the variance of its own indicators than the variance of other latent variables) (See Table 3). The Heterotrait-Monotrait (HTMT) Ratio was also examined (Appendix 2). All HTMT ratios were below the threshold value of $.90$ (Appendix 2), and the square root of the AVE of each latent variable outperformed the correlations with all the other latent variables (Table 3).

Table 2: Constructs and measures

| Construct | Items | M | SD | FL | VIF |
|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|----------|-----------|-----------|------------|
| Loneliness (1 = hardly ever, 2 = some of the time, 3 = often) | <i>Thinking about the past year, how often have you felt that you lack companionship?</i> | 1.86 | .72 | .85 | 1.82 |
| | <i>Thinking about the past year, how often have you felt left out?</i> | 1.77 | .72 | .89 | 2.03 |
| | <i>Thinking about the past year, how often have you felt isolated from others?</i> | 1.86 | .73 | .84 | 1.80 |
| COVID-19 worry (1 = not worried at all; 5 = extremely worried) | <i>Concern on the health of your loved ones.</i> | 3.69 | 1.16 | .69 | 1.66 |
| | <i>Concern on your own mental wellbeing.</i> | 3.04 | 1.28 | .93 | 2.04 |
| | <i>Concern on the mental wellbeing of your loved ones.</i> | 3.31 | 1.21 | .91 | 2.59 |
| Psychological resilience (0 = not true at all; 4 = true nearly all of the time) | <i>I can deal with whatever comes my way.</i> | 2.55 | .92 | .78 | 1.63 |
| | <i>I believe I can achieve my goals, even if there are obstacles.</i> | 2.50 | .97 | .84 | 1.82 |
| | <i>Under pressure, I stay focused and think clearly.</i> | 2.41 | 1.01 | .80 | 1.71 |
| | <i>I think of myself as a strong person when dealing with life's challenges and difficulties.</i> | 2.48 | 1.03 | .82 | 1.76 |
| Social support (1 = not true at all; 5 = very true) | <i>I receive a lot of understanding and security from others.</i> | 3.69 | 1.16 | .80 | 1.36 |
| | <i>If I need to, I can borrow something from friends or neighbors without any problems.</i> | 3.04 | 1.28 | .80 | 1.56 |
| | <i>I know several people with whom I like to do things.</i> | 3.31 | 1.21 | .84 | 1.63 |
| Notes: M = Mean, SD = Standard Deviation, FL = Factor Loading, VIF = Variance Inflation Factor | | | | | |

Table 3: Construct reliability and validity and discriminant validity

| | CA | CR | AVE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|-----|-----|-----|------|------|------|------|------|------|------|-----|-----|
| 1 | n/a | n/a | n/a | n/a | | | | | | | | |
| 2 | .82 | .88 | .72 | -.20 | .85 | | | | | | | |
| 3 | n/a | n/a | n/a | -.07 | .03 | n/a | | | | | | |
| 4 | n/a | n/a | n/a | -.17 | .17 | .05 | n/a | | | | | |
| 5 | n/a | n/a | n/a | -.12 | .11 | -.16 | .05 | n/a | | | | |
| 6 | .83 | .90 | .74 | -.32 | .33 | -.01 | .13 | .23 | .86 | | | |
| 7 | n/a | n/a | n/a | -.34 | .11 | .01 | -.11 | .17 | .20 | n/a | | |
| 8 | .82 | .88 | .65 | .14 | -.12 | .13 | -.03 | -.18 | -.29 | -.06 | .81 | |
| 9 | .74 | .85 | .66 | .01 | .07 | .10 | .05 | -.17 | -.28 | .03 | .40 | .81 |

Notes: CA = Cronbach's Alpha, CR = Composite Reliability, AVE = Average Variance Extracted; n/a = not applicable; 1 = Age, 2 = COVID-19 Worry, 3 = EDUC = Education, 4 = Gender, 5 = Indebtedness, 6 = Loneliness, 7 = Loot box purchasing, 8 = Psychological resilience, 9 = Social support; Square roots of AVES on diagonal

Henseler (2014) suggested that the standardized root mean square residual (SRMR) should be used to assess the model fit in PLS-SEM because it does not give model fit statistics as covariance-based SEM does. In common factor models, values below .08 are regarded as a good fit. In our investigation, the SRMR value was only .05, and thus much below the threshold value.

4.1 Assessment of Structural Model

To test our hypotheses we first analyzed the direct associations. We used the bootstrapping technique with 5,000 re-samples to determine the relevance of the pathways. Table 4 displays the outcomes of the testing of our hypothesis.

Table 4: Results of hypotheses testing

| Hyp | DV | IV | β | f^2 | R^2 |
|------|--------------------------|--------------------------|---------|-------|-------|
| H1 | Loneliness | COVID-19 worry | .35*** | .15 | .20 |
| H2 | Loot box purchasing | COVID-19 worry | ns | | |
| H3 | Loneliness | Social support | -.30*** | .11 | |
| H4 | Loot box purchasing | Social support | .10*** | .01 | .05 |
| H5 | Psychological resilience | Social support | .40*** | .19 | .16 |
| H6 | Loot box purchasing | Loneliness | .21*** | .04 | |
| H7 | Loot box purchasing | Psychological resilience | -.04** | .00 | |
| H8 | Indebtedness | Loot box purchasing | .16*** | .02 | .07 |
| Cntl | Indebtedness | Age | -.07*** | .00 | |
| | Indebtedness | Gender | .06*** | .00 | |
| | Indebtedness | Education | -.17*** | .03 | |

Notes: ns=not significant, **= $p < .01$, ***= $p < .001$; Hyp = Hypotheses, Cntl = Control variables, DV = Dependent variable, IV = Independent variable

As Table 4 presents, the conceptual model for 20% of the variance in 'Loneliness', 5% of the variance in 'Loot box purchasing', 16% of the variance in 'Psychological resilience', and 7% of the variance in 'Indebtedness'. All of our hypotheses with the exception of H2 were supported (Table 4). Thus, only the hypothesised association between 'COVID-19 worry' and 'Loot box purchasing' was found not statistically significant. However, we also tested for mediation and discovered that there was a positive total effect between 'COVID-19 worry' and 'Loot box purchasing' ($\beta = .21$, $p < .001$), and a positive specific indirect effect from 'COVID-19 worry' to 'Loot box purchasing' through 'Loneliness' ($\beta = .07$, $p < .001$). Therefore, the association between 'COVID-19 worry' and 'Loot box purchasing' seems to be indirect and mediated through 'Loneliness'. With respect to H1, 'COVID-19 worry' was positively associated with 'Loneliness' ($\beta = .35$, $p < .001$). 'Social support' had a negative association with 'Loneliness', supporting H3 ($\beta = -.30$, $p < .001$). With respect to H4 and H5, 'Social support' had also positive associations with both, 'Loot box purchasing' ($\beta = .10$, $p < .001$) and 'Psychological resilience' ($\beta = .40$, $p < .001$). 'Loneliness' was positively associated with 'Loot box purchasing' ($\beta = .21$, $p < .001$), supporting H6. Contrary, 'Psychological resilience' had a negative association with 'Loot box purchasing' ($\beta = -.04$, $p < .01$), confirming H7. As hypothesized in H8, 'Loot box purchasing' was positively associated with 'Indebtedness' ($\beta = .16$, $p < .001$). The control variables also had significant associations to 'Indebtedness' which

is the outcome variable of our model. However, the effect sizes of age and gender were smaller than the effect of 'Loot box purchasing' on 'Indebtedness'. Education had slightly bigger effect on 'Indebtedness' than 'Loot box purchasing', but it did not efface the effect of 'Loot box purchasing'.

5 Conclusion and Discussion

This paper investigated loot box purchase behavior, indebtedness, and associated psychosocial factors during the first year of the COVID-19 pandemic. The findings supported most of the proposed hypotheses, and bring valuable insight into psychosocial and financial vulnerabilities in loot box buying behavior. Thus, the findings also serve as a ground for digital ethics issues related to the phenomena.

Psychological resilience was negatively associated with loot box purchasing, indicating that psychological resources can protect from the development of problem behaviors particularly during crises situations (Brailovskaia & Margraf, 2022; Fletcher & Sarkar, 2013). COVID-19 worry, however, was not associated with increased loot box purchasing. Even though worrying about coronavirus was a common experience during the first year of the pandemic, with excessive worry making people vulnerable to problems such as addictive behaviors (Avena et al., 2021), our results did not support this idea in relation to increased loot box buying.

The findings regarding the role of loneliness and its association with loot box purchasing indicates that loneliness is a major risk to problematic monetary behaviors. Indeed, loneliness is associated with a myriad of harms and problems such as online addictive behaviors (Kuss et al., 2014) and problematic gambling (Sirola et al., 2023). However, given that social support was positively associated with loot box purchasing, it is important to understand the sources and quality of support. Even though meaningful social relationships are crucial for wellbeing, social support is not always beneficial and can promote or help to maintain harmful behaviors (Savolainen et al., 2022; Sirola et al., 2021). Given that social motives are a central aspect for team-based digital gaming and in-game purchases (Sirola et al, 2021), it is possible that social relationships and peer pressure inside the game might lead to excessive loot box purchasing. Individuals who are already socially excluded from meaningful in-person relationships, and thus prone to loneliness, may seek out meaningful social contacts via video games and video game communities.

The findings also revealed an association between loot box purchasing and indebtedness. However, it is likely that loot box purchasing is not the only reason for debt problems. For example, excessive loot box purchasing often co-occurs with problematic gambling (Delfabbro & King, 2020), and thus, underlying gambling problems might at least partially explain the association between loot box purchasing and debt problems. Nevertheless, loot box purchasing can add to one's financial strain particularly when problematic (Hing et al., 2022) and thus reinforce financial problems and vulnerabilities. Loot boxes are typically made attractive for gamers, and their mechanisms encourage players to make hasty purchase decisions, thus posing risks for vulnerable individuals in particular. These kinds of monetary mechanisms and their resemblance with mechanisms of gambling in digital games are an essential contributor to develop addictive or disordered gaming habits and consequent problems (Király et al., 2023).

Our findings highlight that ethical concerns that are related to gambling apply also to loot boxes. Policy makers and game companies should consider these ethical aspects when fostering responsible gaming, similarly to how legislation, regulation and the industry's own self-regulation is applied to gambling. These regulation practices would be crucial to protect particularly vulnerable players such as minors and individuals with psychosocial problems.

This study is not without limitations. First, data were cross-sectional and thus, causal interpretations between the studied variables are theoretical. Second, the self-reported nature of the survey items might be prone to biases. Third, the amount of money used in loot box purchasing, motives for buying loot boxes, or the particular games played were not asked, and these should be targeted by future studies. Additionally, the source of social support was not specified. Given that social support from other gamers or online networks is likely to work differently compared to support from one's family members, for example, future studies should also investigate different sources of social support in more detail. It would be important to study how other (excessive) purchase behaviors, such as excessive gambling, overlap with loot box spending and contribute to debt problems. Our study focused on three culturally relatively similar European countries; thus, more cross-national studies would provide insight on potential cultural differences in loot box purchasing and associated factors. Finally, longitudinal studies are needed to gain evidence on the causal mechanisms in loot box purchasing.

References

- Achtziger, A. (2022). Overspending, debt, and poverty. *Current opinion in psychology*, 101342.
- Avena, N. M., Simkus, J., Lewandowski, A., Gold, M. S., & Potenza, M. N. (2021). Substance use disorders and behavioral addictions during the COVID-19 pandemic and COVID-19-related restrictions. *Frontiers in Psychiatry*, 12, 653674.
- Brady, A., & Prentice, G. (2021). Are loot boxes addictive? Analyzing participant's physiological arousal while opening a loot box. *Games and Culture*, 16(4), 419-433.
- Brailovskaia, J., & Margraf, J. (2022). Addictive social media use during Covid-19 outbreak: Validation of the Bergen Social Media Addiction Scale (BSMAS) and investigation of protective factors in nine countries. *Current Psychology*, 1-19.
- Broos, H. C., Llabre, M. M., Saab, P. G., Leite, R. O., Port, J. H., & Timpano, K. R. (2023). The relationship between health worry, work distress, and affective symptoms during the COVID-19 pandemic: The mediating role of hopelessness and helplessness. *British journal of clinical psychology*, 62(1), 10-27.
- Campbell-Sills, L., & Stein, M. B. (2007). Psychometric analysis and refinement of the Connor–Davidson resilience scale (CD-RISC): validation of a 10-item measure of resilience. *Journal of Traumatic Stress: Official Publication of The International Society for Traumatic Stress Studies*, 20(6), 1019–1028.
- Carey, P. A. K., Delfabbro, P., & King, D. (2022). An evaluation of gaming-related harms in relation to gaming disorder and loot box involvement. *International Journal of Mental Health and Addiction*, 20(5), 2906-2921.
- Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, 98(2), 310.
- Connor, K. M., & Davidson, J. R. (2003). Development of a new resilience scale: the Connor–Davidson resilience scale (CD-RISC). *Depression and Anxiety*, 18(2), 76–82.
- Delfabbro, P., & King, D. L. (2020). Gaming-gambling convergence: Evaluating evidence for the 'gateway'hypothesis. *International Gambling Studies*, 20(3), 380-392.
- 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.
- Drummond, A., & Sauer, J. D. (2018). Video game loot boxes are psychologically akin to gambling. *Nature human behaviour*, 2(8), 530-532.
- Fletcher, D., & Sarkar, M. (2013). Psychological resilience. *European Psychologist*, 18(1).
- Frank, L., Salo, M., & Toivakka, A. (2015). Why Buy Virtual Helmets and Weapons? Introducing a Typology of Gamers. BLED 2015 Proceedings. 25. <https://aisel.aisnet.org/bled2015/25>
- 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*.
- Hughes, M. E., Waite, L. J., Hawkey, L. C., & Cacioppo, J. T. (2004). A short scale for measuring loneliness in large surveys: results from two population-based studies. *Research on Aging*, 26(6), 655–672.
- Irie, T., Shinkawa, H., Tanaka, M., & Yokomitsu, K. (2022). Online-gaming and mental health: Loot boxes and in-game purchases are related to problematic online gaming and depression in adolescents. *Current Psychology*, 1-12.
- Khazaal, Y., Chatton, A., Achab, S., Monney, G., Thorens, G., Dufour, M., & Rothen, S. (2017). Internet gamblers differ on social variables: a latent class analysis. *Journal of Gambling Studies*, 33(3), 881–897.
- King, D. L., Delfabbro, P. H., Billieux, J., & Potenza, M. N. (2020). Problematic online gaming and the COVID-19 pandemic. *Journal of Behavioral Addictions*, 9(2), 184-186.
- Király, O., Koncz, P., Griffiths, M. D., & Demetrovics, Z. (2023). Gaming disorder: A summary of its characteristics and aetiology. *Comprehensive Psychiatry*, 152376.

- Kliem, S., Mößle, T., Rehbein, F., Hellmann, D. F., Zenger, M., & Brähler, E. (2015). A brief form of the Perceived Social Support Questionnaire (F-SozU) was developed, validated, and standardized. *Journal of Clinical Epidemiology*, 68(5), 551–562.
- Kuss, J. D., Griffiths, M. D., Karila, L., & Billieux, J. (2014). Internet addiction: A systematic review of epidemiological research for the last decade. *Current pharmaceutical design*, 20(25), 4026–4052.
- Lin, M., Hirschfeld, G., & Margraf, J. (2019). Brief form of the Perceived Social Support Questionnaire (F-SozU K-6): validation, norms, and cross-cultural measurement invariance in the USA, Germany, Russia, and China. *Psychological Assessment*, 31(5), 609.
- Lussier, I., Derevensky, J. L., Gupta, R., Bergevin, T., & Ellenbogen, S. (2007). Youth gambling behaviors: an examination of the role of resilience. *Psychology of Addictive Behaviors*, 21(2), 165.
- Mancini, A. D., & Bonanno, G. A. (2009). Predictors and parameters of resilience to loss: toward an individual differences model. *Journal of Personality*, 77(6), 1805–1832.
- Mishra, S., Beshai, S., Wuth, A., & Refaie, N. (2019). Risk and protective factors in problem gambling: an examination of psychological resilience. *International Gambling Studies*, 19(2), 241–264.
- Mónaco, E., Schoeps, K., Valero-Moreno, S., Castro-Calvo, J., Montoya-Castilla, I., Del Rosario, C., & Esparza, N. A. A. (2022). Cross-cultural validation of the worries about COVID-19 and its consequences scale (W-COV) in adolescents and young people. *Archives of Psychiatric Nursing*, 40, 158–166.
- Nordmyr, J., & Forsman, A. K. (2020). A systematic review of psychosocial risks for gambling and problem gambling in the nordic countries. *Health Risk & Society*, 22(3–4), 266–290.
- Oei, T. P., & Goh, Z. (2015). Interactions between risk and protective factors on problem gambling in Asia. *Journal of Gambling Studies*, 31(2), 557–572.
- Okruszek, L., Aniszewska-Stańczuk, A., Piejka, A., Wiśniewska, M., & Żurek, K. (2020). Safe but lonely? Loneliness, anxiety, and depression symptoms and COVID-19. *Frontiers in Psychology*, 11, 579181.
- Ranta, M., Siilinskas, G., & Wilska, T. A. (2020). Young adults' personal concerns during the COVID-19 pandemic in Finland: an issue for social concern. *International Journal of Sociology and Social Policy*, 40, 1201–1219.
- Räsänen, T., Lintonen, T., Tolvanen, A., & Konu, A. (2016). Social support as a mediator between problem behaviour and gambling: a cross-sectional study among 14–16-year-old finnish adolescents. *BMJ Open*, 6(12), e012468.
- Savolainen, I., Sirola, A., Vuorinen, I., Mantere, E., & Oksanen, A. (2022). Online communities and gambling behaviors—A systematic review. *Current Addiction Reports*, 9(4), 400–409.
- Scholes-Balog, K. E., Hemphill, S. A., Toumbourou, J. W., & Dowling, N. A. (2015). Problem gambling and internalising symptoms: a longitudinal analysis of common and specific social environmental protective factors. *Addictive Behaviors*, 46, 86–93.
- Sirola, A., Nyrhinen, J., & Wilska, T. A. (2023). Psychosocial Perspective on Problem Gambling: The role of Social Relationships, Resilience, and COVID-19 Worry. *Journal of gambling studies*, 1–19.
- Sirola, A., Kaakinen, M., Savolainen, I., & Oksanen, A. (2019). Loneliness and online gambling-community participation of young social media users. *Computers in Human Behavior*, 95, 136–145.
- Sirola, A., Savela, N., Savolainen, I., Kaakinen, M., & Oksanen, A. (2021). The role of virtual communities in gambling and gaming behaviors: A systematic review. *Journal of Gambling Studies*, 37(1), 165–187.
- Spicer, S. G., Nicklin, L. L., Uther, M., Lloyd, J., Lloyd, H., & Close, J. (2022). Loot boxes, problem gambling and problem video gaming: A systematic review and meta-synthesis. *New Media & Society*, 24(4), 1001–1022.
- Vuorinen, I., Oksanen, A., Savolainen, I., Sirola, A., Kaakinen, M., Paek, H. J., & Zych, I. (2021). The mediating role of psychological distress in excessive gambling among young people: a four-

- country study. *International Journal of Environmental Research and Public Health*, 18(13), 6973.
- Yokomitsu, K., Irie, T., Shinkawa, H., & Tanaka, M. (2021). Characteristics of gamers who purchase loot box: a systematic literature review. *Current Addiction Reports*, 8, 481-493.
- Yücel, M., Whittle, S., Youssef, G. J., Kashyap, H., Simmons, J. G., Schwartz, O., & Allen, N. B. (2015). The influence of sex, temperament, risk-taking and mental health on the emergence of gambling: a longitudinal study of young people. *International Gambling Studies*, 15(1), 108–123.
- Zendle, D., Meyer, R., & Over, H. (2019). Adolescents and loot boxes: Links with problem gambling and motivations for purchase. *Royal Society Open Science*, 6(6), 190049.
- Zhang, N., Yang, S., & Jia, P. (2022). Cultivating resilience during the COVID-19 pandemic: A socioecological perspective. *Annual Review of Psychology*, 73.

Appendix 1 Sample Characteristics

| FINLAND | | | SWEDEN | | | GREAT BRITAIN | | |
|---------|------|------|--------------------------|------|------|-------------------------|------|------|
| Gend. | Smp | Pop. | Gend. | Smp | Pop. | Gend. | Smp | Pop. |
| Man | 50 % | 50 % | Man | 50 % | 50 % | Man | 49 % | 49 % |
| Woman | 50 % | 50 % | Woman | 50 % | 50 % | Woman | 51 % | 51 % |
| Age | Smp | Pop. | Age | Smp | Pop. | Age | Smp | Age |
| 18–22 | 8 % | 8 % | 18–22 | 8 % | 8 % | 18–22 | 6 % | 8 % |
| 23–35 | 26 % | 23 % | 23–35 | 24 % | 25 % | 23–35 | 30 % | 24 % |
| 36–55 | 38 % | 34 % | 36–55 | 40 % | 36 % | 36–55 | 38 % | 37 % |
| 56–75 | 29 % | 36 % | 56–75 | 28 % | 31 % | 56–75 | 26 % | 30 % |
| Region | Smp | Pop. | Region | Smp | Pop | Region | Smp | Pop |
| S.Fin. | 46 % | 52 % | Mid-Nrdlnd | 4 % | 4 % | East England | 9 % | 11 % |
| E.Fin. | 11 % | 11 % | NCentral Sweden | 9 % | 8 % | London | 14 % | 15 % |
| W.Fin | 31 % | 25 % | Småland islands incl. | 9 % | 8 % | Midlands | 16 % | 10 % |
| N.Fin | 12 % | 12 % | Stockholm | 21 % | 23 % | Yorkshire and Humber | 12 % | 9 % |
| | | | S. Swe | 15 % | 15 % | Northwestern | 11 % | 12 % |
| | | | W.Swe | 19 % | 20 % | N.Ireland | 3 % | 3 % |
| | | | E.Central Sweden | 17 % | 17 % | Scotland | 8 % | 9 % |
| | | | Uppr. Norland | 6 % | 5 % | SE.England | 15 % | 16 % |
| | | | | | | SW.England | 8 % | 9 % |
| | | | | | | Wales | 5 % | 5 % |

Appendix 2 The Heterotrait-Monotrait Ratio

| | Age (1) | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-------------------------|---------|-----|-----|-----|-----|-----|-----|-----|
| COVID-19 Worry (2) | .19 | | | | | | | |
| Education (3) | .07 | .04 | | | | | | |
| Gender (4) | .17 | .18 | .04 | | | | | |
| Indebtedness (5) | .12 | .10 | .16 | .05 | | | | |
| Loneliness (6) | .35 | .35 | .01 | .15 | .25 | | | |
| Loot box purchasing (7) | .34 | .10 | .01 | .11 | .17 | .22 | | |
| Resilience (8) | .16 | .13 | .14 | .03 | .20 | .36 | .07 | |
| Social support (9) | .03 | .13 | .12 | .06 | .19 | .35 | .04 | .51 |