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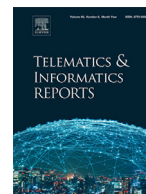
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## Play or pay to win: Loot boxes and gaming disorder in FIFA ultimate team

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### A B S T R A C T

The aim of this study was to examine the relevant characteristics and motivations of 1144 international players of FIFA Ultimate Team for spending money on player packs (i.e., loot boxes). Loot boxes have been compared to gambling mechanics as they may both reinforce problematic behavior. Results showed employment status and sensitivity for rewards predicted spending on loot boxes, and that this behavior was motivated by the need for competence, autonomy and relatedness. Severity of gaming disorder also positively predicted spending behavior, both directly and indirectly through players' need for autonomy. Although time spent playing was the strongest predictor of in-game success, the amount of money spent on loot boxes also improved players' in-game ranking. Combined, gaming disorder and the perceived benefits to players' ranking, competence, autonomy and relatedness contribute to the financial success of this monetization mechanic.

### Play or pay to win: Loot boxes and gaming disorder in FIFA ultimate team

Over the last decade, the monetization strategy of the game industry has drastically changed. The sale of physical or digital video games is no longer the main source of revenue. Instead, the implementation of in-game microtransactions has become the dominant revenue model [1,2]. Microtransactions allow players to spend real money on in-game currency, attributes or features. Within incentives for microtransactions, *loot boxes* have emerged as one of the most effective and profitable forms of enticing players to spend money on (free) games [3].

A loot box is a collective name for different types of packs, chests, or boxes, containing a selection of random items (i.e., loot) that may enhance the gameplay experience [4,5]. Loot boxes are typically earned intermittently through in-game achievements, or can be bought through microtransactions. Loot boxes were first introduced in the Korean game *MapleStory* in 2003. In 2008, Electronic Arts (EA) was the first major game developer to implement loot boxes with the introduction of a new online-only game mode in *FIFA 09* [6], called *FIFA Ultimate Team* (FUT). In FUT, players can collect professional footballers in the form of virtual tickets, through opening *player packs* [7]. These player packs (i.e., loot boxes) have proven to be an increasingly lucrative monetization mechanic for EA, with microtransactions now quadrupling yearly revenues from FIFA game sales [8]. The revenue from FUT alone was appraised at \$1.6 billion in 2021 [9].

Despite the high revenue potential, loot boxes have earned a bad reputation due to their similarities with gambling. The essence of loot boxes is that users generally do not know its contents prior to purchasing and opening them [10]. In FUT, player packs provide players a small chance of acquiring rare or legendary footballers that can be used to strengthen their team or traded for coins [11]. Player packs, like all loot boxes, provide bigger rewards at irregular intervals, thereby pro-

moting repeated behavior through intermittent reinforcement schedules [12]. According to Drummond and Sauer [13] the psychological and structural similarities with gambling accentuate the motivational nature of loot boxes, which may result in increased engagement. Others have argued that their gambling-related content promotes perceived efficacy for gambling, likely leading to habituation of gambling behavior [14]. In fact, the mechanisms underlying the effectiveness of loot boxes are considered similar, if not identical, to the reward schedules that are used in the design of slot machines, making them addictive by design [15]. According to [16,22] loot boxes are “predatory monetization schemes” (p. 1967) that contribute to potential financial harm for those with Internet gaming disorder. These presumed negative effects of loot boxes are considered especially problematic for the younger generation of players [17,18] because younger players are more at risk of developing gambling-related problems [19]. Moreover, younger players with signs of gaming disorder spent more time playing online matches in FIFA than any other group [20].

Research on loot boxes has mainly focused on its relationship with problematic gambling, generally indicating that either problem gamblers spend significantly more on loot boxes than non-problem gamblers, or that loot box purchasing was associated with increased severity of problem gambling ([4,18,21–23]). Several studies have examined the relation between loot box spending and Internet Gaming Disorder (IGD) [14,24], also finding positive associations between these constructs. When measures for gambling problems and IGD were included, loot box engagement showed a stronger relation to problem gambling measures than to IGD. This suggests that problematic loot box use may emerge from financial risk-taking and cognitive distortions associated with problem gambling [24]. Loot box mechanisms appeal disproportionately to people who display problematic conventional gambling behavior [23]. The problematic gambling activities reported by these individuals presumably occur independently from the game where the loot

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box purchases take place. By contrast, gaming disorder can manifest itself within games that include loot boxes. In fact, adding a variable-ratio reinforcement in the form of a loot box, will likely amplify excessive gaming, resulting in a further escalation of intensity and frequency of play [14]. Thus, the aim of this study is to examine the relation between gaming disorder and spending on loot boxes (player packs) specifically among players of FUT.

Virtual items obtained from loot boxes can increase players' chances of in-game success [3]. Considering the highly competitive nature of FUT, players may spend money on player packs because these may contain footballers who can provide them with a competitive advantage over others. Spending money in order to obtain an advantage over other players is often referred to as the *pay-to-win* mechanic [25]. However, loot boxes can also be acquired through effort, rather than microtransactions alone [10]. Similar to monetary investments, such as microtransactions, the labor invested in games can produce durable economic assets with observable market values [63]. In FUT, player packs can be earned by completing objectives and gaining XP. Since player packs can also be acquired through (extensive) playing, an exploratory analysis was performed to determine whether paying or playing was the better predictor of success in FUT.

Thus, the main aims of this study are fourfold: 1) to examine which characteristics of FUT players are related to spending on loot boxes; 2) to determine whether opening loot boxes fulfills innate and universal psychological needs; 3) to examine the relation between spending on loot boxes and gaming disorder; and 4) to determine whether paying or playing is the better predictor of success in FUT. To meet these aims, a survey was held among an international sample of 1144 FUT players.

## Theory

### *Loot boxes and character traits*

In order to determine which character traits drive players' spending on loot boxes, findings from studies on persistent gamblers were examined. Two traits appeared to be valid predictors of gambling behavior: *competitiveness* [26] and *reward sensitivity* [27]. Trait competitiveness can be defined as having a strong desire to compete and be more successful than others [28]. Competitiveness is considered a risk factor for developing problematic gambling behavior due to the fact that competitive individuals are sensitive to upward social comparison, especially with regards to performing tasks and achieving goals [26,29]. Items that afford players a distinct advantage might add to the perceived value of the loot box [10]. In FUT, player packs can provide a competitive advantage in the form of statistically superior footballers. Therefore, it is expected that players who show higher trait competitiveness will spend more money on player packs because of the value its content has in competition with other players. Furthermore, a recent study found that stronger inherent competitive tendencies increase the risk of problematic participation in competition-centered online video games [30]. Thus, trait competitiveness is expected to be related to gaming disorder and a predictor of spending behavior.

Reward sensitivity describes individual differences in detecting, pursuing, and deriving pleasure from reward cues [31]. Greater sensitivity to rewards is associated with decreased resistance to impulsively perform potentially rewarding behavior because the urge to obtain a reward is difficult to temper [32]. Since a higher sensitivity to rewards has been shown to increase spending on microtransactions [33], it is expected that an individual's reward sensitivity will influence the likelihood of purchasing loot boxes for the chance to receive a reward. Furthermore, research by Rahi et al. [34] has shown that reward sensitivity is associated with Internet Gaming Disorder. In fact, reward deficiencies might even be core components of excessive and obsessive gaming [35]. Reward sensitivity is thereby not only likely to influence spending behavior on player packs, it may also be related to gaming disorder.

### *Motivations for Spending*

Within research on video games, the *Self Determination Theory* (SDT) is one of the most widely used approaches to understanding player motivations [36]. According to the SDT, three intrinsic human needs motivate player engagement with video games: 1) *Competence*, the need to control the outcome and experience mastery; 2) *Autonomy*, an individual's perceived volition or control; 3) *Relatedness*, the need to experience interaction and connection with others [37]. Studies have shown that the manner in which a player experiences satisfaction of these three needs predicts their enjoyment of a game [38] and their overall time spent playing games [39]. Other conceptualizations of measuring gamer motivations have often either focused on specific genres (e.g., [40]) or on all genres and types of play (e.g., [41]) and therefore seem less suited for measuring motivations in the football game under investigation. Since the three SDT motivations are generally considered the most important predictors of playing video games, they may also drive purchase behavior of player packs in FUT.

The need for competence describes the desire for challenge, mastery and the need for achievements. From a gaming perspective, this need is mainly fulfilled by games that offer optimal challenges and opportunities for obtaining positive feedback [36]. Within FUT, feedback can come from a player's *ranking* and *skill rating*, motivating players to purchase player packs in order to have a greater chance of improving their ranking and/or rating. The need for autonomy refers to the urge to perform an activity based on personal interest, without being influenced by someone else [42]. The design of a game can contribute to the sense of autonomy experienced by the player by allowing players to make relevant choices [36]. Within FUT, players can experience autonomy when freely composing their football team. Purchasing loot boxes could meet the need for autonomy because even unwanted players can be sold, providing more financial freedom to acquire desired players on the in-game transfer market. Finally, the need for relatedness describes the experience of meaningful connections with others, which are often experienced through a supportive social environment (La [37,43]). Relatedness within FUT could come from feeling part of a community. The purchase of player packs could strengthen the bond with other players because of the prestige they may provide within the community [44].

### *Loot Boxes and Gaming Disorder*

In 2013, the American Psychiatric Association included Internet gaming disorder as a tentative disorder in the appendix of the DSM-5 (APA, 2013). Five years later, Gaming Disorder was included in the World Health Organization's 11th International Classification of Diseases, the ICD-11 [45]. The world's two leading mental health organizations thereby (tentatively) acknowledge that (Internet) Gaming Disorder poses a health risk to a subset of players. However, these two organizations show strong differences in their approaches to formally diagnose the disorder. The DSM-5 proposes nine criteria for IGD, with a recommended threshold of experiencing five or more criteria in the last six months for a positive diagnosis. This diagnostic cut-off point was reportedly conservatively chosen because lower thresholds would inflate diagnoses [46]. In contrast, the ICD-11 [45] provides three clearly demarcated criteria that describe gaming disorder as: 1) a pattern of gaming behavior characterized by impaired control over gaming; 2) increasing priority given to gaming over other activities, and; 3) continuation of gaming despite the occurrence of negative consequences. Prior to the inclusion of gaming disorder in the ICD-11 there was some debate about the potential stigmatization of highly engaged gamers: A group that may experience excessive and obsessive use of games, but fails to experience significant life impairment as a consequence of their gaming [47]. Indeed, it seems pertinent that any measure of gaming disorder includes significant life impairment as a necessary component for its validation. In the current study, gaming disorder is defined and measured in line

with the three requisite WHO-criteria, which will be labeled as *excessive*, *obsessive* and *problematic* gaming patterns.

Research has shown that players who met the criteria for Internet Gaming Disorder spend more time playing online games than offline games [48]. Specifically, these researchers found that time spent playing FIFA online, but not offline, was positively correlated with IGD. Since FUT can only be played online, it seems likely that its players may show signs gaming disorder. Similarly, players who show more signs of gaming disorder may also spend more money on loot boxes. A study by Dreier et al. [49] found that the biggest spenders (i.e., *Whales*) also showed the most signs of IGD. More recently, survey studies have consistently shown that players who spend more on loot boxes show more gaming disorder symptoms ([22,24]). Considering the presumed tendency for loot boxes to cause habituation to [14], it seems plausible that they may reinforce existing signs of gaming disorder. Thus, gaming disorder among FUT players is considered a predictor of spending behavior.

Players who displayed signs of Internet gaming disorder were more likely motivated by a need for competence and relatedness to play games [50]. The need for relatedness specifically, was found to be strongly related to Internet gaming disorder [51]. Gaming disorder may drive motivations that lead to spending on loot boxes, similar to how actions that satisfy specific needs may urge an individual, through the brain's dopamine system, to perform those actions again [52]. Behavioral patterns typically associated with addiction have been known to characterize SDT-related motivated behaviors, such as seeking self-esteem, companionship, or intrinsic rewards [53]. Conversely, when drug addicts perceive a greater satisfaction of psychological needs in their lives, they will become intrinsically motivated to move towards healthy behavioral patterns ([64]). Thus, existing signs of gaming disorder among players of FUT are expected to motivate these players to open player packs in order to experience competence, autonomy and relatedness, causing further spending on player packs.

## Method

### Sample

A cross-sectional online questionnaire was distributed among players of [65]. In total, 1312 respondents started the online questionnaire. Several respondents indicated that they not did not play FUT ( $n = 50$ ) and an even larger group stopped responding at the third question about their gender ( $n = 118$ ). These respondents were removed from the dataset, leaving 1144 FUT players to be included in the analyses. Age ranged from 16 to 65 ( $M = 24.00$ ,  $SD = 7.29$ ). The sample was predominantly male ( $n = 1073$ ; 93.8%), with a small group of female players ( $n = 64$ ; 5.6%) and a few respondents who selected non-binary, other gender, or did not want to indicate a gender ( $n = 7$ ; 0.6%). More than half of the sample had completed the English version of the questionnaire ( $n = 612$ ; 53.5%). Age of respondents who completed the English questionnaire ( $M = 25.79$ ,  $SD = 7.51$ ) was slightly higher than the age of respondents who completed the Dutch version of the questionnaire ( $M = 22.40$ ,  $SD = 6.83$ ),  $t(1140) 7.92$ ,  $p < .001$ . There were no differences between Dutch and English versions of the questionnaire on trait competitiveness, reward sensitivity, gaming disorder or spending behavior. However, there were differences in weekly time spent playing FUT between the Dutch questionnaire ( $M = 14.32$ ,  $SD = 10.72$ ) and the English questionnaire ( $M = 19.19$ ,  $SD = 15.65$ ),  $t(1074.46) 6.20$ ,  $p < .001$ . Most of the respondents resided in Europe ( $n = 797$ ; 69.7%), followed by North America ( $n = 275$ , 24.0%), Asia ( $n = 50$ , 4.4%) or another continent ( $n = 22$ ; 1.9%). The majority of the sample was employed, either full time ( $n = 454$ ; 39.7%) or part-time ( $n = 365$ ; 31.9%). Almost half of the sample consisted of students ( $n = 470$ ; 41.1%) and a relatively small group was neither student nor employed ( $n = 95$ ; 8.3%).

### Procedure

In May 2021, an online questionnaire was distributed among several regional and international Facebook groups, Discord servers and other online forums dedicated to FIFA Ultimate Team. All FUT 21 players of 16 years or older were invited to participate. No incentives were provided. The survey was approved by the ethical committee from the department of Communication at the University [REDACTED FOR REVIEW]. Respondents could select their preferred language (Dutch or English). The questionnaire consisted of approximately 60 items measuring player demographics, characteristics, motivations, FUT playtime and achievements, microtransactions, and gaming disorder. Specifically, the questionnaire included measures for age, gender, competitiveness, reward sensitivity, SDT-motivations, usage metrics, achievements, and gaming disorder. All included measures are further explained below. Several other questions were included (e.g., Who is your best player? What is your favorite team?) for the sole purpose of stimulating respondents. These questions were not used in the analyses. Forced response was disabled for all items on the questionnaire. Most respondents completed the survey within five minutes after which they were thanked for their participation.

### Measures

#### FIFA Ultimate Team (FUT)

Player's use of FUT was measured through the weekly hours spent playing. We asked respondents how many days in an average week they played FUT 21 over the last three months (*range* 0-7,  $M = 4.57$ ,  $SD = 1.70$ ) and multiplied this with the average number of hours each respondent played the game on a regular day, measured through a slider (*range* 0-14 hours,  $M = 3.60$ ,  $SD = 2.23$ ), thereby generating a measure for the mean hours per week spent playing FUT ( $M = 16.92$ ,  $SD = 13.78$ ). Players' achievements in the game were measured using two items: (1) the current *division ranking* (*range* 1-10),  $M = 3.38$ ,  $SD = 2.14$  ( $n = 1119$ ), and (2) the highest *weekend league ranking* (*range* 1-18),  $M = 8.56$ ,  $SD = 2.40$  ( $n = 1075$ ). In both cases, higher scores indicate better performance.

#### Reward sensitivity

Each respondent's reward sensitivity was measured using a modified version of the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ) developed by Torrubia et al. [31]. The SPSRQ is an index consisting of 48 items, 24 items of which focus on reward sensitivity. In the current study, only the 24 items that measure reward sensitivity were considered. From these 24 items, 5 items were selected that best matched the aim of this study. In addition, instead of yes/no responses, Likert scale response options were used, ranging from strongly disagree (1) to strongly agree (7), with higher scores indicating a higher degree of reward sensitivity. Exploratory factor analysis indicated that the 5-item scale was unidimensional, explaining 46% of the variance ( $M = 4.80$ ,  $SD = 1.01$ ). Reliability analysis yielded a Cronbach's alpha of 0.70, which can be considered reliable.

#### Competitiveness

To measure the enjoyment of interpersonal competition and the desire to be better than others, a shortened version of the Competitiveness Index (CI) was used [28]. This index consists of 20 items and is divided into three different categories; emotion, discussion, and games. The current study applied five items from the subcategory games. Each item was measured using a Likert scale, ranging from strongly disagree (1) to strongly agree (7), with higher scores indicating higher degrees of competitiveness. An exploratory factor analysis showed that the 5 items were unidimensional, explaining 48% of the variance ( $M = 4.87$ ,  $SD = 1.08$ ). Reliability analysis yielded a Cronbach's alpha of 0.71, which can be considered reliable.



### SDT-motivations for opening packs

According to the Self Determination Theory, three essential innate universal psychological needs motivate individuals to initiate behavior: the need for autonomy, competence and relatedness [37]. Four items were created for each motivational need based on the Player Experience of Need Satisfaction Scale (PENS) developed by Ryan et al. [36]. The items were not indicators of the motivation to play FUT, but indicators of the three motivations to open player packs. Exploratory factor analysis on the twelve items indicated three distinct dimensions explaining 66% of the variance. The dimension with four competence items explained 39% of the variance, the dimension with four autonomy items explained an additional 17% of the variance, and the four items from relatedness explained another 10% of the variance in the data.

*Competence* describes the need to control the outcome and experience mastery [42]. Competence as a motivator for opening player packs in FUT was measured using four items, all preceded by 'I open player packs...'. These four items are: 1) to stand a better chance against other players; 2) to have an advantage during a match; 3) to be more successful; 4) to reach a higher division. Response categories ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). The items were averaged to create the scale scores. Cronbach's alpha for this scale was .84, indicating strong reliability ( $M = 4.46$ ,  $SD = 1.45$ ).

*Autonomy* describes the desire to be causal agents of one's own life and act in harmony with one's integrated self [37]. Autonomy as a motivator for opening player packs in FUT was measured using four items, with response categories ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). All items were preceded by 'I open player packs...': 1) because they give me more freedom to put together my team the way I want; 2) because it generates coins; 3) so I can buy players more easily in the future; 4) to have more freedom of choice within the game. The items were averaged to create the scale scores. Cronbach's alpha for this scale was .79, indicating acceptable reliability ( $M = 5.22$ ,  $SD = 1.19$ ).

*Relatedness* describes the need to experience interaction and be connected to others [37]. Relatedness as a motivator for opening player packs in FUT was measured using four items, with response categories ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). All items were preceded by 'I open player packs...': 1) to impress others with the players I received; 2) because it earns me prestige; 3) to be part of the FIFA community; 4) because everyone else does it. The items were averaged to create the scale scores. Cronbach's alpha for this scale was .83, indicating strong reliability ( $M = 3.27$ ,  $SD = 1.52$ ).

### Microtransactions

Money spent on microtransactions was measured by asking respondents ( $N = 1128$ ) how much money they had spent over the last year on FUT, including any possible spending on the previous installment in the franchise (i.e., FUT season 20). Eight answer options with increments of \$50 (€50 for the Dutch version) were provided (range \$0-\$350,  $M = 3.36$ ,  $SD = 2.30$ ). A ninth option was offered where they could indicate any amount higher than \$350, but this option was not selected by any of the respondents. About one third of FUT players had not spent any money on player packs. Based on a categorization of spending patterns by Dreier et al. [49], these could be categorized as so-called *Freeloaders* ( $n = 357$ , 32%). Conversely, approximately one in five respondents fell into the category of players who spent more than \$200 annually on FUT, the *Whales*, ( $n = 240$ , 21%). Although these categories are insightful, they were considered too broad for our analyses. For that purpose, the 8-increment spending scale was used.

### Gaming Disorder

As described in the 11<sup>th</sup> edition of the International Classification of Diseases ([66]), Gaming Disorder is characterized by a pattern of persistent or recurrent gaming behavior that involves 1) *Excessive behavior*: Impaired control over gaming (e.g., onset, frequency, intensity, duration, termination, context), 2) *Obsessive behavior*: Increasing priority given to

gaming to the extent that gaming takes precedence over other life interests and daily activities, and 3) *Problematic behavior*: Continuation or escalation of gaming despite the occurrence of negative consequences. In the current study, these three concepts were measured by adapting items from the IGD scale [48]. Three dichotomous items for each of the three behavioral categories were created. Respondents ( $N = 1130$ ) were asked for the applicability of the experiences over the past year, including any experiences with FIFA 20 (FUT season 20).

Excessive behavior was measured using three items 1) 'Have you experienced moments when you could not stop playing FIFA, even though others had repeatedly told you to play less?' ( $n = 341$ , 25%), 2) 'Have you had arguments with others about the time you spent on FIFA?' ( $n = 322$ , 24%), 3) 'Have you experienced moments when you could not restrain yourself from starting FIFA even when you knew you should do other things?' ( $n = 520$ , 39%). If confirmatory answers were given to any two of these three questions, this was considered as an indication of excessive behavior and impaired control over playing ( $n = 345$ , 25.6%). Obsessive behavior was measured using three items: 'Have you lost interest in other hobbies or activities because you only wanted to play FIFA?' ( $n = 302$ , 22%), 2) 'Have you experienced moments when you could think about nothing else than FIFA?' ( $n = 332$ , 25%), 3) 'Have you felt bad when you couldn't play FIFA?' ( $n = 420$ , 31%). If confirmatory answers were given to any two of these questions, this was considered an indication of impaired and obsessive thoughts over playing FIFA ( $n = 326$ , 24.2%).

Problematic behavior was measured using three items: 1) 'Have you experienced problems with your work, relationship or studies due to how much time you spend on FIFA?', ( $n = 295$ , 22%), 2) 'Have you had serious conflicts with your family or partner because you play FIFA?', ( $n = 204$ , 15%), 3) 'Have you gotten into trouble because you spent too much money of FIFA?' ( $n = 182$ , 14%). If confirmatory answers were given to any two of these questions, this was considered an indication of problematic consequences from playing FIFA ( $n = 188$ , 13.9%). Respondents were considered 'players with gaming disorder' if they answered affirmatively to at least two items from each category. Out of 1127 respondents who had submitted responses to all nine gaming disorder items, 106 (9.4%) could be classified as players with gaming disorder due to experiencing multiple types of FIFA-related excessive, and obsessive, and problematic behavior over the past 12 months.

## Results

### Predictors of Playing

Bivariate correlations between weekly time spent on FUT and its potential predictors were examined (see Table 1). Three player characteristics showed a significant correlation with time spent playing: age ( $r = .09$ ,  $p = .002$ ), trait competitiveness ( $r = .08$ ,  $p = .001$ ), and despite women representing a minority of the players ( $n = 66$ , 5.8%), they reported significantly more time playing FUT per week ( $M = 26.36$ ,  $SD = 21.43$ ) than men ( $M = 16.28$ ,  $SD = 12.91$ ),  $t(67.95) = -3.78$ ,  $p < .001$ . The two personality traits, competitiveness and reward sensitivity, were strongly correlated ( $r = .56$ ,  $p < .001$ ), and both predicted spending and gaming disorder. Although there were significant correlations between time spent playing FUT and the motivational need for relatedness ( $r = .22$ ,  $p < .001$ ) and the need for competence ( $r = .08$ ,  $p = .006$ ), these motivations should not be considered valid predictors of playtime because the items for these three SDT motivational needs were operationalized as gratifications obtained from player packs (i.e., *I open player packs to...*), not as motivations for playing. Gaming disorder can be considered a valid predictor of time spent on FUT as the sum score of gaming disorder showed a significant correlation with weekly playtime ( $r = .36$ ,  $p < .001$ ), as did confirmatory answers to each of the individual gaming disorder dimensions; excessive ( $r = .30$ ,  $p < .001$ ), obsessive ( $r = .28$ ,  $p < .001$ ), and problematic ( $r = .31$ ,  $p < .001$ ).

**Table 1**  
Correlations with time spent playing FUT, money spent on packs, and gaming disorder.

	Weekly Time on FUT( $M = 16.92$ , $SD = 13.78$ ) $N = 1136$	Money Spent on Packs( $M = 3.36$ , $SD = 2.30$ ) $N = 1128$	Gaming Disorder( $M = 2.58$ , $SD = 2.49$ ) $N = 1126$
Age	.09**	.19**	.19**
Gender ( $m = 1, f = 2$ )	.17***	.12**	.22**
Employment	-.02	.29**	.02
Reward Sensitivity	.05	.21**	.16**
Competitiveness	.08**	.17**	.17**
SDT - Competence	.08**	.18**	.25**
SDT - Autonomy	.00	.20**	.08*
SDT - Relatedness	.22**	.16**	.39**
Gaming Disorder	.36**	.14**	-
Money Spent on Packs	.07*	-	-

Note

- \*  $p < .05$ ,
- \*\*  $p < .01$ ,
- \*\*\*  $p < .001$

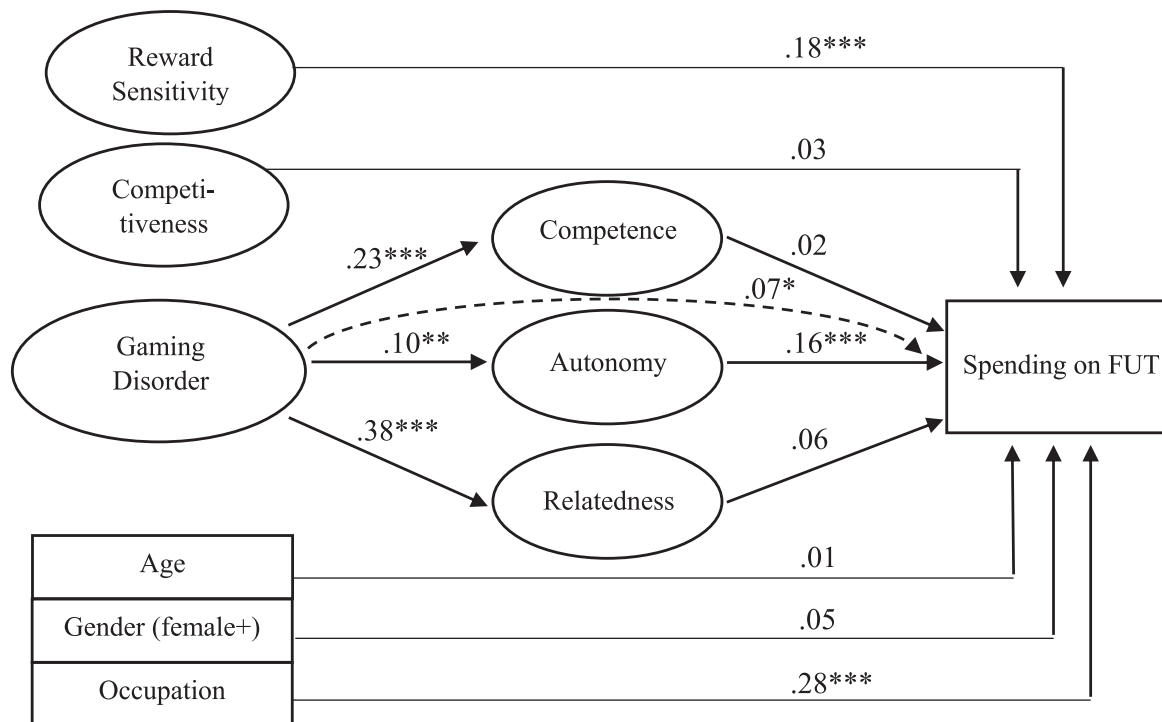
*Characteristics of Paying Players*

As shown in Table 1, the annual amount of money spent on FUT was correlated with all variables included in this study. The strongest predictor was employment status, with unemployed respondents spending less ( $M = 2.48, SD = 2.02$ ) than part-time employed respondents ( $M = 3.17, SD = 2.12$ ),  $t(664) -4.32, p < .001$ , and part-time employed respondents spent less than full-time employed respondents ( $M = 4.10, SD = 2.35$ ),  $t(791.30) -5.87, p < .001$ . This translates into an average difference of about \$80 between spending patterns of unemployed and employed players. Players that were either unemployed or working part-time ( $n = 674$ ) were much younger ( $M = 20.69, SD = 5.39$ ) than those who were employed fulltime ( $n = 453, M = 29.42, SD = 6.76$ ),  $t = -24.02, p < .001$ . Next, a regression model with demographic indicators (age, gender, and employment) and personality traits (reward sensitivity and competitiveness) as predictors of money spent on FUT was tested.

This model proved significant,  $F(5, 1105) 35.86, p < .001, R^2 = .14$ . All variables except trait competitiveness ( $b = .05, t = 1.37, p = .171$ ) were significant predictors of spending behavior: age:  $b = .09, p = .008$ ; gender:  $b = .08, p = .007$ ; employment status:  $b = .23, p < .001$ ; and reward sensitivity:  $b = .08, p < .001$ . The demographic variables and traits were used as covariates in a mediation model (see Fig. 1) that tested the effects of gaming disorder through SDT motivations on spending.

*Gaming Disorder and Spending on FUT*

Table 1 shows the correlations between relevant variables and the sum score of gaming disorder items. Most players reported only few symptoms of FIFA-related gaming disorder ( $M = 2.58, SD = 2.49$ ) with the majority of the players reported experiencing two or less of the nine symptoms ( $n = 648, 57.3\%$ ). However, a substantial group of 106 FUT players (9.4%) could be classified players with gaming disorder for ex-



**Fig. 1.** Loot Box Motivations within the Effect of Gaming Disorder and Covariates on Spending.  
Note: All coefficients are standardized effect sizes within the model; \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

perceiving at least two out of three symptoms of excessive gaming, two out of three symptoms of obsessive gaming, and two out of three symptoms of problematic gaming behavior ( $M = 7.70$ ,  $SD = 0.99$ ). This group of players with gaming disorder spent more hours per week playing FUT ( $M = 27.37$ ,  $SD = 18.02$ ) than non-gaming disordered players did ( $M = 15.85$ ,  $SD = 12.83$ ),  $t(116.28) = -6.42$ ,  $p < .001$ . The group of players with gaming disorder was also slightly older ( $M = 28.36$ ,  $SD = 8.06$ ) than non-disordered players ( $M = 23.78$ ,  $SD = 7.19$ ),  $t(1126) = -6.15$ ,  $p < .001$ . This group also spent more on player packs ( $M = 4.12$ ,  $SD = 1.84$ ) than non-disordered players ( $M = 3.28$ ,  $SD = 2.32$ ),  $t(140.579) = -4.36$ ,  $p < .001$ . Interestingly, 20 of the 66 female players were categorized as gaming disordered (30.3% of female players) which is much more than the percentage of male disordered players (8.1% of male players,  $n = 86$ ),  $\chi^2 = 35.71$ ,  $p < .001$ . Considering the relatively small group of female players, these results should be interpreted with caution.

To test whether there was an indirect relationship between gaming disorder symptoms via loot box opening motivations (competence, autonomy, and relatedness) on the yearly amount of money spent on FUT, the PROCESS macro for SPSS ([67]) was used to conduct a parallel mediation analysis using 5,000 bootstrap samples. The model, including demographic and personality covariates, is shown in Fig. 1 with corresponding standardized effect sizes, and significance levels. This model was significant:  $R = .33$ ,  $R^2 = .11$ ,  $F(4,1096) = 33.85$ ,  $p < .001$ . The sum score of gaming disorder symptoms had a significant total effect on money spent on FUT ( $b^* = .11$ ,  $t = 4.11$ ,  $p < .001$ ) [LLCI: .0593, ULCI: .1678], and also a direct effect ( $b^* = .07$ ,  $t = 2.47$ ,  $p = .015$ ) [LLCI: .0148, ULCI: .1301], indicating that gaming disorder directly affected spending behavior and indirectly through loot box opening motivations. Gaming disorder significantly influenced all opening motivations: need for competence ( $b^* = .13$ ,  $\beta = .23$ ,  $t = 7.55$ ,  $p < .001$ ), need for autonomy ( $b^* = .05$ ,  $\beta = .10$ ,  $t = 3.08$ ,  $p = .002$ ), and need for relatedness ( $b^* = .23$ ,  $\beta = .38$ ,  $t = 7.77$ ,  $p < .001$ ). However, only the need for autonomy ( $b^* = .30$ ,  $\beta = .16$ ,  $t = 4.85$ ,  $p < .001$ ) predicted spending behavior, whereas neither the need for competence ( $b^* = .04$ ,  $\beta = .02$ ,  $t = 0.66$ ,  $p = .510$ ) nor the need for relatedness ( $b^* = .09$ ,  $\beta = .06$ ,  $t = 1.90$ ,  $p = .058$ ) showed significant effects on spending behavior. Autonomy also provided a small mediated (or indirect) effect of gaming disorder on spending ( $\beta = .02$ , LLCI: .0058, ULCI: .0275).

Regarding the two personality traits included in the model, reward sensitivity was a significant predictor of spending behavior ( $b^* = .42$ ,  $\beta = .18$ ,  $t = 5.37$ ,  $p < .001$ ), whereas trait competitiveness showed no effect ( $b^* = .07$ ,  $\beta = .03$ ,  $t = 0.96$ ,  $p = .337$ ). Employment status (i.e., unemployed, part-time, or full-time employed) proved the strongest predictor of spending ( $b^* = .78$ ,  $\beta = .28$ ,  $t = 8.05$ ,  $p < .001$ ), whereas neither age ( $b^* = .01$ ,  $\beta = .01$ ,  $t = 0.66$ ,  $p = .509$ ) nor gender ( $b^* = .54$ ,  $\beta = .05$ ,  $t = 1.86$ ,  $p = .06$ ), showed significant effects. The standardized effect sizes shown in Fig. 1 indicate that gaming disorder had both a direct effect on spending behavior and an indirect effect through players' need for autonomy. It also shows that respondents' employment status and reward sensitivity are the most important factors influencing the amount of money that is spent on player packs.

### Pay or Play to Win?

In order to determine whether practice (play) or spending (pay) is a better predictor of success in FUT, two regression models were run with the main predictors of achievement in FUT: *Weekend League ranking* and *Division Rivals ranking*. Weekend league is a weekly league consisting of 30 games being played between Friday and Sunday. In Division Rivals, players are pitched against opposing teams of comparable skill throughout a season, with their ranking reflecting their progress within one of 10 divisions. First, a regression model with players' highest reported tier ranking in the *Weekend League* (range 1-18,  $M = 8.56$ ,  $SD = 2.40$ ) as dependent variable and money spent on FUT, time spent on FUT, and player age as independent variables. This model proved to be a small but significant predictor of success in FUT,  $F(3, 1064) = 29.21$ ,  $p < .001$ ,

$R^2 = .08$ . Although time spent playing FUT was a much stronger indicator ( $b = .24$ ,  $t = 8.10$ ,  $p < .001$ ) of their ranking in the Weekend League, the amount of money spent on player packs also contributed to the highest achieved ranking ( $b = .12$ ,  $t = 3.85$ ,  $p < .001$ ). Age did not influence players' achievements in the Weekend league ( $b = .01$ ,  $t = 0.36$ ,  $p = .717$ ). Next, a similar regression model with players' highest reported *Division Rivals Ranking* was performed, (range 1-10,  $M = 3.38$ ,  $SD = 2.14$ ). This model also proved significant,  $F(3, 1108) = 15.57$ ,  $p < .001$ ,  $R^2 = .04$ . Time spent playing FUT was a significant predictor of *Division Ranking* ( $b = .08$ ,  $t = 2.75$ ,  $p = .006$ ). Players' age also significantly influenced their ranking, with older players performing slightly better ( $b = .18$ ,  $t = 5.98$ ,  $p < .001$ ), whereas money spent on FUT did not significantly improve players' division ranking ( $b = -.05$ ,  $t = -1.76$ ,  $p = .078$ ). These results indicate that investing time is more important than investing money for achieving success in FUT.

### Discussion

The aim of this study was to examine the relevant characteristics and motivations of 1144 international players of FIFA Ultimate Team 21 for spending money on *player packs* (i.e., loot boxes). Regarding character traits, players' competitiveness predicted spending on player packs, likely because its contents can provide a competitive advantage over other players [25]. However, as a covariate in the mediation model, the effect of trait competitiveness on spending fell below statistical significance. This mediation model showed that an individual's sensitivity to rewards is an important trait for predicting spending on FUT, thereby underscoring similar findings by Zendle et al. [54] on the relevance of reward sensitivity for spending on loot boxes. Sensitivity to gaining pleasure from acquiring rare players in packs leads to the pursuit of opening even more packs because the urge to obtain their content is difficult to resist. Both trait competitiveness and reward sensitivity were positively related to gaming disorder, in accordance with previous conclusions that players with IGD were more sensitive to wins and less sensitive to losses [34]. Sensitivity to rewards may be an even more prominent motivator for spending in FUT since a player pack always provides at least some basic rewards, which is unlikely to demotivate as it never equates to a loss.

Despite the current focus on gaming disorder and SDT motivations, the strongest predictor of spending behavior was players' employment status. Those who are employed full-time spend more money on player packs in FUT than those who were employed part-time or unemployed. Similarly, Garrett et al. [23] concluded that although problem gamblers were consistently the highest spenders on loot boxes regardless of income bracket, game companies profit most from problem gamblers with greater disposable incomes. Although it seems logical that (full-time) employment allows more financial freedom to spend money on FUT, it contradicts findings from studies on the influence of income on gambling expenditure. Specifically, these studies indicated that lower incomes contribute proportionally more of their income to gambling compared with middle- and high-income groups [55]. This discrepancy in findings regarding spending on gambling among income groups is perhaps due to the anticipated monetary rewards that come from gambling in contrast to the play-enhancing rewards offered in FUT loot boxes. Since the current study measured employment status and not income levels, future studies should perhaps look more closely at the full spectrum of socio-economic status of players when examining spending behavior on loot boxes.

Three inherent human motivations from the Self-determination theory [36] were applied to the opening of player packs. Gratification of the motivational needs for competence, autonomy and relatedness that came from opening player packs were all individual predictors of spending behavior. The mediation model with covariates indicated that gaming disorder predicted all three of these motivational needs to open loot boxes. The relations between SDT motivations and gaming disorder thereby mirror findings from similar studies on the motivations for

problematic gaming (e.g., [39,50]). However, the need for autonomy was the only predictor of spending behavior in the mediation model. This effect of players' need for autonomy is interesting because this motivational need generally does not show the strongest relation with problematic gaming [56]. In the current study, autonomy as a motivation for opening player packs was operationalized as the desire for freedom to compose a team based on individual preferences. Even the common experience of opening packs without exceptional players can therefore be rewarding because the revenue from selling these footballers allows players more freedom to buy the desired players on the in-game transfer market. For players with gaming disorder, a deficit of experiencing these motivational needs in real-life [56] may motivate them to compensate for these shortcomings by opening player packs. For instance, winning (or buying) famous footballers can provide players with a sense of relatedness within the FUT community, and since these famous footballers subsequently help to improve the player's ranking, opening packs may also provide them with a sense of competence. When a person experiences deficiencies in their need satisfaction in daily life combined with needs satisfaction while playing video games, the more likely this player will exhibit problematic gaming behavior [39]. Signs of gaming disorder among players of FUT may therefore be maintained through the motivational needs of autonomy, competence and relatedness provided by the contents of loot boxes.

Loot boxes have been compared to gambling mechanics that reinforce addictive behavior ([15,22]). Although the current cross-sectional study does not provide empirical evidence that loot boxes cause gaming disorder, the results do indicate that severity of gaming disorder positively predicts spending on loot boxes, both directly and indirectly through players' need to experience autonomy from its contents. These direct and indirect effects of gaming disorder on spending support a recent meta-analysis of 7 studies by [68] on the relationships between loot box spending and excessive gaming. Although their correlations between loot box spending and excessive gaming were considerably higher ( $r = 0.25$ ) than the correlation found between gaming disorder and spending in the current study ( $r = 0.14$ ). This discrepancy could be attributed to differences in measurement of 'excessive gaming' versus the current measure of gaming disorder based on the definition from the ICD-11 [45]. It may also be related to differences in measurements of spending on loot boxes.

Previous studies measured loot box spending in money spent in the past month (e.g., [22,24]) or opted for a dichotomous assessment of loot box expenditure (yes/no) disregarding the frequency or the amount of money spent on loot box purchases [14]. The current study among predominantly European gamers found that players with gaming disorder spent around €150 per year on player packs in FUT. This is significantly more than non-disordered players, and similar to loot box spending differences between problem gamblers and non-problem gamblers [24]. Spending patterns are also similar to those from a US-Australasian study which indicated that individuals with problem gambling spent approximately \$13 USD per month on loot boxes [22]. For the vast majority of players, the financial investment in loot boxes may not pose severe financial harm. However, heavy spending can become problematic among vulnerable populations of players, such as those with limited financial reserves, and/or adolescents with gaming disorder. Furthermore, spending in FUT may also indicate a tendency to spend more on loot boxes in other domains. Future studies should examine the relations between gaming disorder and spending patterns longitudinally to determine whether spending and problems fluctuate or increase over time.

Because the footballers obtained from player packs can increase players' chances of in-game success, it is unsurprising that the need to open loot boxes for a sense of competence was related to spending on loot boxes. Spending money in order to acquire an advantage over other players is often referred to as the *pay-to-win* mechanic [25]. Playing (i.e., labor investment) provides players with assets (e.g., footballers) with observable market values (Castronova, 2008) [63]. Since loot boxes can

be acquired both through effort and microtransactions [10], the current study examined whether effort (play) or spending (pay) is a better predictor of success in FUT. For both types of FUT rankings, time spent playing proved a stronger predictor of success than money spent on player packs. Nevertheless, money spent on player packs contributed to higher rankings in *Weekend league*, a relatively short-term investment in playtime compared to the effort it takes to improve the *Division ranking* across a season. The differences in required time investment between rankings provides a possible explanation for the different effects of *pay* and *play* on success in these rankings. Although the excessive time investment that defines players with gaming disorder (nearly 4 hours of FUT every single day) may negate some of the need for financial investments to acquire player packs, gaming disorder presents an inherently problematic condition and the associated excessive time investment is likely to exacerbate existing problems even if the monetary investments do not.

It is important to recognize that the majority of players did not report serious signs of excessive, obsessive and problematic use of FUT. However, there is a substantial group of players (9.4%) who provided confirmatory answers to at least two indicators of each criterion (excessive, obsessive, problematic). This group of players with gaming disorder is thereby considerably larger than prevalence estimates of 3% that were extracted from 53 studies [57]. Perhaps the current relatively large group of players with self-reported gaming disorder can be partly attributed to the global coronavirus pandemic that took place during data collection. This may have aggravated psychological distress through self-isolation or quarantine, causing an increase in excessive, obsessive and problematic gaming as a coping mechanism. Nevertheless, a recent study under similar circumstances found no evidence that self-isolation resulted in greater excessive gameplay or expenditure on loot boxes [58]. Another possible explanation for the considerable amount of players with gaming disorder is that respondents in the current study were contacted through FIFA fan sites and discord pages, meaning that the sample likely consisted of many 'core' players, a term used among gamers who want to express the strongest identification possible with gaming ([69]). Moreover, in line with a previous study that showed that men are much more likely to play FIFA than women do [48], the current group of core FUT players consisted mostly of younger men (85% were males under 30). Thus, the prevalence of gaming disorder could seem further inflated when considering that this disorder is generally more prevalent among male players [57].

## Conclusion

The FIFA games franchise has been implementing loot boxes as a monetization mechanic for over a decade, providing a strong contribution to its enormous worldwide financial success [1,8]. Although FIFA 21 is considered appropriate for ages 3 and up based on its inoffensive content ([70]), EA insists that players must be over the age of 13 to play FUT and acquire player packs. The player packs in FUT provide repetitive experiences of excitement on interval ratio reinforcement schedules, that potentially expose young players to gambling-related content which promotes perceived-efficacy for gambling, and likely leads to habituation of gambling behavior [14]. In June 2021, a few months after this data was collected, EA introduced some changes to their loot box mechanics [59]. Each day, one 'preview pack' allows players to view its contents before purchasing. After 24 hours, a new preview pack appears in the store. Although this transparency seems to reduce the gambling element of the transaction, it also poses new dilemmas related to artificial scarcity ([71]) and players' fear of missing out on these time-limited offers [60]. Regardless of this preview-gesture, numerous regular player packs of differing quality and prices remain available for purchase in the FUT store.

Although the findings from this study pertain to FUT, its conclusions may also pertain to loot box mechanics that are implemented in many other successful sport game franchises, such as Madden and NBA 2K



[61]. Sport games are among the most successful products of the game industry, yet relatively little is still known about their monetization mechanics [62] or the role of gaming disorder among its players. The current study contributed to this field by showing that severity of gaming disorder positively predicted spending behavior, both directly and indirectly through players' need for autonomy. Although time spent playing was the strongest predictor of in-game success, the amount of money spent on loot boxes also improved players' reported ranking. Combined, gaming disorder and the perceived benefits to players' ranking, competence, autonomy and relatedness contribute to the financial success of this monetization mechanic.

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## References

- [1] N. Chen, A.N. Elmachtoub, M.L. Hamilton, X. Lei, Loot box pricing and design, *Manag. Sci.* 67 (8) (2021) 4809–4825.
- [2] Newzoo. (2021) *Global Games Market Report 2021*. Accessed March 2, 2022 at: <https://newzoo.com/insights/trend-reports/newzoo-global-games-market-report-2021-free-version/>
- [3] D. Zendle, R. Meyer, N. Ballou, The changing face of desktop video game monetisation: An exploration of trends in loot boxes, pay to win, and cosmetic microtransactions in the most played steam games of 2010–2019, *PLoS One* 15 (5) (2020) 1–14.
- [4] J. Macey, J. Hamari, eSports, skins and loot boxes: Participants, practices and problematic behaviour associated with emergent forms of gambling, *New Media Soc.* 21 (1) (2019) 20–41.
- [5] M. McCaffrey, The macro problem of microtransactions: The self-regulatory challenges of video game loot boxes, *Bus. Horiz.* 62 (4) (2019) 483–495.
- [6] FIFA 09, (PlayStation 2, PlayStation 3, Nintendo Wii) [Video game] (2008) Electronic Arts.
- [7] A. Thomas, *FIFA 09 Ultimate Team DLC - first look*. GamesRadar (2009) <https://www.gamesradar.com/fifa-09-ultimate-team-dlc-first-look/>.
- [8] P. Siuda, Sports gamers practices as a form of subversiveness—the example of the FIFA ultimate team, *Crit. Stud. Media Commun.* 38 (1) (2021) 75–89.
- [9] J. Clement, Electronic Arts (EA) Ultimate Team revenue 2018–2021 (2021) Accessed January 2022 at: <https://www.statista.com/statistics/217474/electronic-arts-ea-ultimate-team-revenue>.
- [10] D. Zendle, P. Cairns, H. Barnett, C. McCall, Paying for loot boxes is linked to problem gambling, regardless of specific features like cash-out and pay-to-win, *Comput. Hum. Behav.* 102 (2020) 181–191.
- [11] T. Tregel, M.C. Schwab, T.T.L. Nguyen, P.N. Müller, S. Göbel, Costs to Compete—Analyzing Pay to Win Aspects in Current Games, in: *Joint International Conference on Serious Games*, Springer, Cham, 2020, pp. 177–192.
- [12] D. Brevers, X. Noël, Pathological gambling and the loss of willpower: a neurocognitive perspective, *Socioaffect. Neurosci. Psychol.* 3 (2013) 21592.
- [13] A. Drummond, J.D. Sauer, Video game loot boxes are psychologically akin to gambling, *Nat. Hum. Behav.* 2 (2018) 530–532.
- [14] W. Li, D. Mills, L. Nower, The relationship of loot box purchases to problem video gaming and problem gambling, *Addict. Behav.* 97 (2019) 27–34.
- [15] M.D. Griffiths, Is the buying of loot boxes in video games a form of gambling or gaming? *Gaming Law Review* 22 (1) (2018) 52–54.
- [16] D.L. King, P.H. Delfabbro, Predatory monetization schemes in video games (eg 'loot boxes') and internet gaming disorder, *Addiction* 113 (2018) 1967–1969.
- [17] A. Drummond, J.D. Sauer, C. Hall, Loot box limit-setting: a potential policy to protect video game users with gambling problems? *Addiction* 5 (2019) 935–936.
- [18] D. Zendle, P. Cairns, Correction: Video game loot boxes are linked to problem gambling: Results of a large-scale survey, *PLoS One* 14 (3) (2019).
- [19] T. Hayer, J. Kalke, G. Meyer, T. Brosowski, Do simulated gambling activities predict gambling with real money during adolescence? Empirical findings from a longitudinal study, *J. Gambl. Stud.* 34 (3) (2018) 929–947.
- [20] J.S. Lemmens, S.J. Hendriks, Addictive online games: examining the relationship between game genres and Internet gaming disorder, *Cyberpsychol. Behav. Soc. Netw.* 19 (2016) 270–276.
- [21] J. Close, S.G. Spicer, L.L. Nicklin, M. Uther, J. Lloyd, H. Lloyd, Secondary analysis of loot box data: Are high-spending “whales” wealthy gamers or problem gamblers? *Addict. Behav.* 117 (2021) 106851.
- [22] A. Drummond, J.D. Sauer, C.J. Ferguson, L.C. Hall, The relationship between problem gambling, excessive gaming, psychological distress and spending on loot boxes in Aotearoa New Zealand, Australia, and the United States—a cross-national survey, *PLoS One* 15 (3) (2020) e0230378.
- [23] E.P. Garrett, J.D. Sauer, A. Drummond, E. Lowe-Calverley, Problem gambling and income as predictors of loot box spending, *Int. Gambl. Stud.* (2022) 1–12.
- [24] G.A. Brooks, L. Clark, Associations between loot box use, problematic gaming and gambling, and gambling-related cognitions, *Addict. Behav.* 96 (2019) 26–34.
- [25] L. Gong, S.N. Rodda, An exploratory study of individual and parental techniques for limiting loot box consumption, *Int. J. Ment. Health Addict.* (2020) 1–28.
- [26] A. Parke, M. Griffiths, P. Irwing, Personality traits in pathological gambling: Sensation seeking, deferment of gratification and competitiveness as risk factors, *Addict. Res. Theory* 12 (3) (2004) 201–212.
- [27] T. Sztainert, M.J. Wohl, J.F. McManus, J.D. Stead, On being attracted to the possibility of a win: Reward sensitivity (via gambling motives) undermines treatment seeking among pathological gamblers, *J. Gambl. Stud.* 30 (4) (2014) 901–911.
- [28] R.D. Smither, J.M. Houston, The nature of competitiveness: The development and validation of the competitiveness index, *Educ. Psychol. Meas.* 52 (2) (1992) 407–418.
- [29] J.A. Epstein, J.M. Harackiewicz, Winning is not enough: The effects of competition and achievement orientation on intrinsic interest, *Personal. Soc. Psychol. Bull.* 18 (2) (1992) 128–138.
- [30] N. Harris, K.B. Hollett, J. Remedios, Facets of competitiveness as predictors of problem video gaming among players of massively multiplayer online first-person shooter games, *Curr. Psychol.* (2020) 1–10.
- [31] R. Torrubia, C. Ávila, J. Moltó, X. Caseras, The sensitivity to punishment and sensitivity to reward questionnaire (SPSRQ) as a measure of Gray's anxiety and impulsivity dimensions, *Pers. Individ. Dif.* 31 (6) (2001) 837–862, doi:10.1016/S0191-8869(00)00183-5.
- [32] L.D. Smillie, C.J. Jackson, The appetitive motivation scale and other BAS measures in the prediction of approach and active avoidance, *Pers. Individ. Dif.* 38 (4) (2005) 981–994.
- [33] H.S. Kim, S. Hollingshead, M.J. Wohl, Who spends money to play for free? Identifying who makes micro-transactions on social casino games (and why), *J. Gambl. Stud.* 33 (2) (2017) 525–538, doi:10.1007/s10899-016-9626-6.
- [34] S. Raiha, G. Yang, L. Wang, W. Dai, H. Wu, G. Meng, X. Liu, Altered reward processing system in internet gaming disorder, *Front. Psychiatry* (2020) 1378.
- [35] M.C. Legault, H.Z. Liu, I.M. Balodis, Neuropsychological constructs in gaming disorders: a systematic review, *Curr. Behav. Neurosci. Rep.* (2021) 1–18.
- [36] R.M. Ryan, C.S. Rigby, A. Przybylski, The motivational pull of video games: a self-determination theory approach, *Motiv. Emot.* 30 (4) (2006) 344–360.
- [37] R.M. Ryan, E.L. Deci, Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being, *Am. Psychol.* 55 (1) (2000) 68–78.
- [38] A.K. Przybylski, C.S. Rigby, R.M. Ryan, A motivational model of video game engagement, *Rev. Gen. Psychol.* 14 (2) (2010) 154–166.
- [39] D.J. Mills, M. Mil'yavskaya, J. Mettler, N.L. Heath, Exploring the pull and push underlying problem video game use: a Self-Determination Theory approach, *Pers. Individ. Dif.* 135 (2018) 176–181.
- [40] R. Bartle, Hearts, clubs, diamonds, spades: Players who suit MUDs, *J. MUD Res.* 1 (1) (1996) 19.
- [41] N. Yee, The gamer motivation profile: what we learned from 250,000 gamers, in: *Proceedings of the 2016 Annual Symposium on Computer-Human Interaction in Play*, 2016, pp. 1–2.
- [42] E.L. Deci, R.M. Ryan, Self-determination theory: a macrotheory of human motivation, development, and health, *Canad. Psychol.* 49 (2008) 182–185.
- [43] J.G. La Guardia, R.M. Ryan, C.E. Couchman, E.L. Deci, Within-person variation in security of attachment: a self-determination theory perspective on attachment, need fulfillment, and well-being, *J. Pers. Soc. Psychol.* 79 (3) (2000) 367–384, doi:10.1037/0022-3514.79.3.367.
- [44] R. Hulaj, M.B. Nyström, D.E. Sörman, C. Backlund, S. Röhlcke, B. Jonsson, A motivational model explaining performance in video games, *Front. Psychol.* 11 (2020) 1510.
- [45] WHO: World Health Organization, International classification of diseases for mortality and morbidity statistics(11th Revision) (2018) Retrieved from <https://icd.who.int/browse11/l-m/en>.
- [46] N.M. Petry, F. Rehbein, D.A. Gentile, J.S. Lemmens, H.J. Rumpf, T. Mößle, C.P. O'Brien, An international consensus for assessing Internet gaming disorder using the new DSM-5 approach, *Addiction* 109 (2014) 1399–1406.
- [47] A.J. Van Rooij, C.J. Ferguson, M. Colder Carras, D. Kardefelt-Winther, J. Shi, E. Aarseth, A.K. Przybylski, A weak scientific basis for gaming disorder: let us err on the side of caution, *J. Behav. Addict.* 7 (2018) 1–9.
- [48] J.S. Lemmens, P.M. Valkenburg, D.A. Gentile, The Internet gaming disorder scale, *Psychol. Assess.* 27 (2) (2015) 567–582.
- [49] M. Dreier, K. Wölfling, E. Duven, S. Giralt, M.E. Beutel, K.W. Müller, Free-to-play: about addicted whales, at risk dolphins and healthy minnows. monetarization design and internet gaming disorder, *Addict. Behav.* 64 (2017) 328–333.
- [50] C.L. Beard, R.E. Wickham, Gaming-contingent self-worth, gaming motivation, and internet gaming disorder, *Comput. Hum. Behav.* 61 (2016) 507–515.
- [51] B.P.H. Hui, A. Wu, N.Y. Siu, M.L. Chung, N. Pun, The effects of need satisfaction and dissatisfaction on flourishing among young Chinese gamers: the mediating role of internet gaming disorder, *Int. J. Environ. Res. Public Health* 16 (22) (2019) 4367.
- [52] R.N. Cardinal, J.A. Parkinson, J. Hall, B.J. Everitt, Emotion and motivation: the role of the amygdala, ventral striatum, and prefrontal cortex, *Neurosci. Biobehav. Rev.* 26 (3) (2002) 321–352.
- [53] C.E. Köpertz, C.W. Lejuez, R.W. Wiers, A.W. Kruglanski, Motivation and self-regulation in addiction: a call for convergence, *Perspect. Psychol. Sci.* 8 (1) (2013) 3–24.
- [54] D. Zendle, R. Meyer, H. Over, Adolescents and loot boxes: links with problem gambling and motivations for purchase, *R. Soc. Open Sci.* 6 (6) (2019) 190049.
- [55] T. Davidson, B. Rodgers, F. Markham, E. Taylor-Rodgers, Gambling expenditure in the ACT (2014): By level of problem gambling, type of activity, and socioeconomic and demographic characteristics, Australian Capital Territory Gambl. Rac. Commis. (2016) Accessed 4 November 2021 at: [https://www.gamblingandracetrack.act.gov.au/\\_data/assets/pdf\\_file/0010/982774/2014-Gambling-Expenditure.pdf](https://www.gamblingandracetrack.act.gov.au/_data/assets/pdf_file/0010/982774/2014-Gambling-Expenditure.pdf).
- [56] D.J. Mills, J.J. Allen, Self-determination theory, internet gaming disorder, and the mediating role of self-control, *Comput. Hum. Behav.* 105 (2020) 106209.

- [57] M.W. Stevens, D. Dorstyn, P.H. Delfabbro, D.L. King, Global prevalence of gaming disorder: A systematic review and meta-analysis, *Australian New Zealand J. Psychiatry* 55 (6) (2021) 553–568.
- [58] L.C. Hall, A. Drummond, J.D. Sauer, C.J. Ferguson, Effects of self-isolation and quarantine on loot box spending and excessive gaming—results of a natural experiment, *PeerJ* 9 (2021) e10705.
- [59] EA, Electronic Arts, Pitch Notes: Preview Packs (2021) Retrieved March 04 2022 from <https://www.ea.com/games/fifa/fifa-21/news/pitch-notes-fifa21-preview-packs>.
- [60] Close, J. & Lloyd, J. (2021). Lifting the lid on loot-boxes chance-based purchases in video games and the convergence of gaming and gambling. Retrieved March 04 2022 from [https://www.begambleaware.org/sites/default/files/2021-03/Gaming\\_and\\_Gambling\\_Report\\_Final.pdf](https://www.begambleaware.org/sites/default/files/2021-03/Gaming_and_Gambling_Report_Final.pdf).
- [61] D.L. King, P.H. Delfabbro, S.M. Gainsbury, M. Dreier, N. Greer, J. Billieux, Unfair play? Video games as exploitative monetized services: An examination of game patents from a consumer protection perspective, *Comput. Hum. Behav.* 101 (2019) 131–143.
- [62] A. Stein, K. Mitgutsch, M. Consalvo, Who are sports gamers? A large scale study of sports video game players, *Convergence* 19 (3) (2013) 345–363.
- [63] E. Castronova, *Synthetic worlds*, Synthetic Worlds, University of Chicago press, 2008.
- [64] H. Patrick, G.C. Williams, Self-determination theory: its application to health behavior and complementarity with motivational interviewing, *International Journal of Behavioral Nutrition and Physical Activity* 9 (1) (2012) 1–12.
- [65] FIFA 21 (PlayStation 4, Xbox One, Xbox Series X and Series S, PlayStation 5, Nintendo Switch, Microsoft Windows, Google Stadia) [Video game], Electronic Arts, 2020.
- [66] World Health Organization International classification of diseases for mortality and morbidity statistics (11th Revision), 2018 Retrieved from <https://icd.who.int/browse11/l-m/en>.
- [67] A.F. Hayes, PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling, *Psychology* 2012 (2012) 4–6.
- [68] S.S. Garea, A. Drummond, J.D. Sauer, L.C. Hall, M.N. Williams, Meta-analysis of the relationship between problem gambling, excessive gaming and loot box spending, *International Gambling Studies* 21 (3) (2021) 460–479.
- [69] J.L. Neys, J. Jansz, E.S. Tan, Exploring persistence in gaming: The role of self-determination and social identity, *Computers in Human Behavior* 37 (2014) 196–209.
- [70] PEGI, Pan European Game Information [Review of the video game FIFA 21, produced by Electronic Arts, 2020]. (n.d.) <https://pegi.info/>.
- [71] S. Worchel, J. Lee, A. Adewole, Effects of supply and demand on ratings of object value, *Journal of personality and social psychology* 32 (5) (1975) 906.