WHICH GAMES WITH MICROTRANSACTIONS ARE MOST PREDICTIVE FOR GAMBLING SCORES?

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Final Thesis

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1. Introduction

Video-games have been growing in popularity for decades now, and with its rise in popularity it has caught the eye of many other industries from movies, music and gambling. While there are many misconceptions about video-games and their impact on mental health, they actually offer a variety of benefits such as promoting social interaction and developing complex problem-solving skills. Some of the numerous benefits it can have on mental health are: mental stimulation, social interaction, the feeling of accomplishment, emotional resilience and mental health recovery (Bhandari, 2024). They do that through making players think, strategize, and quickly analyze situations, give them have goals and objectives to reach and provides a low-stakes environment to test out talking to and forming relationships with others. A very important aspect a video-game can teach you is emotional resilience, by helping you learn how to cope with failure and keep trying (Bhandari, 2024). Some genres like Soulslike and Roguelike games have taken that and turned into a core part of their existence, having players fall down and rise again until they finally achieve victory. A previous meta-analysis (Uttal et al., 2013) had concluded that the spatial skills improvements acquired from playing commercially available shooter video-games can be comparable to the effects of formal (high school, university level) courses that aim at enhancing those very same skills. This meta-analysis had also shown that spatial skills can be trained with video-games in a relatively short amount of time, and the benefits last over an extended period of time, but most importantly these skills also transfer to other spatial tasks outside the video-games. While there are benefits, there are also drawbacks to video-games. Problem gaming is gaming behavior that leads to functional impairments which are harmful to social, educational, occupational and psychological functioning (Gentile et al. 2011).“Internet gaming disorder (IGD)“ is included in the Section III (Conditions for further study), indicating that more research is needed on this topic (APA, 2013), while „gaming disorder“ is included in the International Classification of Diseases (ICD-11; WHO, 2019), under category Disorders Due to Addictive Behaviors. An important thing to keep in mind is that gamers can play a significant number of hours without adverse consequences (Razum & Huić, 2023; Billieux et al., 2019), but problematic gamers do still tend to play for longer periods of time (Pontes et al., 2024).

1.1 Gacha and microtransactions

In recent years, one genre of video-games has been growing larger and larger, and it goes by the name of Gacha games. Those games are in most cases free to play (F2P), but come with a variety of ways to make the player spend money. Some of the biggest ones such as Genshin Impact (2020, miHoYo) and Honkai Starrail (2023, miHoYo) have earned over 60 million dollars in June 2024 respectively. The gacha game model started being widely used in the early 2010s, particularly in Japan. Since then, gacha mechanics have become a core part of Japanese mobile game culture. Following Japan, the game mechanism is now also increasingly used in Chinese and Korean games, as well as European and American games. The companies behind those games make money by having people spend their money on microtransactions, and the most popular model being opening „lootcrates“, „boxes“ or whatever the game decides to call them. Loot boxes are a consumable item which can be used to receive a randomized selection of further virtual items, or loot, ranging from simple customization options to game changing items which help the player. Gacha are similar to “loot boxes” but the difference is that they have a “pity” system which accumulates the amount of times a gacha has been opened and gives a guaranteed item at a certain number of pulls, and they are mostly present in free to play video games. They offer the player limited items and characters which can only be obtained at that certain period of time, with the chance of obtaining such items being almost impossible to achieve if the player refuses to pay for a better chance at pulling for them. In some games, these rewards may also be transferable between players and in doing so gain real-world monetary value. Some video-games such as Counter Strike 2 (2023, Valve), previously known as Counter Strike: Global Offensive, have created whole isolated eco-systems for gambling where people use in-game skins that they've gotten from lootboxes and bet in a virtual casino. The activities vary from betting on outcomes of Counter Strike 2 matches, to virtual roulette, with the minimum bet being $0.03 (lowest price for an in-game item). Counter-Strike 2 is a 2023 free-to-play tactical first-person shooter game developed and published by Valve, and it is the fifth entry in the Counter-Strike series. It was developed as an updated version of the previous entry, Counter-Strike: Global Offensive.

The origin of the loot box mechanic can be traced back to the collectible and tradable sports cards of the mid-20th century or gachapon machines (a type of vending machine that dispenses toys and collectibles in Japan). Loot boxes were possibly also inspired by the successful monetization of Magic: The Gathering (1993,Wizards of the Coast), a tabletop trading card game, in which instead of selling a complete collection of all available cards to its

players, they sold blind sealed packages of randomized cards that have varying power and value, which forces players to purchase duplicate cards, and in doing so, spend more money than they otherwise would have to, to obtain a complete collection. That same model is still alive and flourishing to this very day. Loot boxes are currently prevalent in video games. They are purchased by a significant percentage of players and are deemed suitable for purchase by children (Xiao, 2018). That poses several issues with how easily accessible it is to children, and the effects it can have. Some implementations of loot boxes may be seen as „predatory" due to them 'disguising or withholding the true long-term cost of the activity until players are already financially and psychologically committed (King & Delfabbro, 2018). Building on what King & Delfabbro have found in 2018, Brooks & Clark have provided empirical evidence of associations between loot boxes (risky use, expenditure) and problem gambling, as well as problem internet gaming. As for cross-sectional data, these associations could indicate that individuals with risky gambling behaviours and beliefs are more vulnerable to loot box features in gaming (Brooks & Clark, 2019).

Previous research has been done on how in-game items such as "loot boxes" and "gacha" have shown to increase spending habits of players, and that has led to some countries such as Belgium and the Netherlands banning them. The EU Internal Market and Consumer Protection committee report (2020 Report) had suggested that loot boxes should be tackled through existing consumer protection laws that focus on addressing problematic game designs, and since then Belgium, the Netherlands, and Slovakia have qualified loot boxes as gambling (and therefore they require a licence). An interesting article has shown that in UK, of the 93% of children who play video games, up to 40% have opened loot boxes and how many games use a "psychological nudge" to encourage people to buy said loot boxes - such as the fear of missing out on limited-time items or special deals (James Close & Joanne Lloyd, 2021). Another study done with 1100 participants has revealed that a significant proportion (18.5%) of the participants had engaged in some behavior that related to both gaming and gambling, such as playing a social casino game or spending money on loot boxes (Zendle, 2020). Montiel et al. have confirmed that the use of loot boxes is prevalent among both adults and adolescents, and that results suggest that the purchase of loot boxes is a frequent practice among minors in their scoping review. Moreover, available data also suggested a significant relationship between engagement with loot boxes and gambling and gaming problems (Montiel et al., 2022).

1.2 Gambling

Gambling Disorder, also known as problematic, pathological, disordered, impulsive or compulsive gambling, is a mental disorder characterized by persistent and recurrent maladaptive gambling behavior that disrupts personal, family, and/or vocational pursuits. It is the only non-substance addictive disorder endorsed as a diagnosis in the DSM-5 (American Psychiatric Association, 2013). In other words, problem gambling is gambling behavior that disrupts, damages or compromises personal and family relationships (e.g., divorce, relationship problems), as well as educational/occupational activities (e.g. poor academic performance, job loss) (Griffiths, 2004). Griffiths and Kuss (2015) have reviewed existing studies on pathological online gambling and have suggested that the prevalence rate of problem gambling is significantly higher among those who gamble online (Internet gamblers) compared to those who do not. Their finding is supported by earlier research done by Griffiths, Wardle, Orford, Sproston, and Erens (2009), which has also indicated that Internet gamblers are at a greater risk for developing gambling problems. The inclusion of gambling disorder within DSM-5 reflects research findings that show how gambling disorder is similar to substance-related disorders in clinical expression, comorbidity, treatment, physiology, and brain origin.

The DSM-5 diagnostic criteria for gambling disorder are persistent and recurrent problematic gambling behavior leading to clinically significant impairment or distress, as indicated by the individual exhibiting four (or more) of the following in a 12-month period;

a) A preoccupation with gambling, such as constantly thinking about gambling activities, planning the next gambling venture, or contemplating ways to obtain money for gambling.

b) The need to gamble with increasing amounts of money to achieve the desired level of excitement.

c) Repeated unsuccessful efforts to control, cut back, or stop gambling.

d) Feeling restless or irritable when attempting to reduce or stop gambling.

e) Using gambling as a way to escape from problems or to relieve feelings of helplessness, guilt, anxiety, or depression.

f) Chasing losses, which involves returning to gambling after losing money in an attempt to break even.

g) Lying to conceal the extent of involvement with gambling.

h) Jeopardizing or losing significant relationships, jobs, or educational or career opportunities because of gambling.

i) Relying on others to provide money to relieve desperate financial situations caused by gambling.

As well as the behavior not being better explained by a manic episode.

1.3 Evidence gap and rationale for this study

The goal of this research is to fill in the gaps of previous literature regarding association between people who score high on gambling questionnaires and people who spend money in video games. Since previous research has already shown a positive association between the two, this study will go more specifically into which videogames are the best predictors of higher gambling scores. Seeing which video games are most prevalent in this topic might provide further insight into potential risks of allowing in-game microtransactions and their gambling risks, as well as shining a light on areas that might need better regulations (for example there being no minimal age restrictions for buying loot boxes, crates and similar purchase options).

Aims (As) and hypotheses (Hs)

A1: To identify which games with microtransactions are most predictive for gambling scores.

A2: To see if spending habits on microtransactions in video-games are predictive for gambling scores.

H1: Video-games with gacha systems such as Genshin Impact will be more predictive than those just having loot boxes.

H2: Participants who have, on average, higher gambling expenditure on microtransactions in video-games will have higher scores on the SOGS Ra gambling questionnaire.

2. Methods

2.1 Study Design:

This was a cross-sectional study with a survey approach using the SOGS Ra Gambling questionnaire and questions about the participant's video-game routines that include playtime, money spent and which video-games. The study has been conducted online. It has been preregistered on Open Science Framework: https://doi.org/10.17605/OSF.IO/TRSD6

2.2 Survey description

The survey consisted of 3 sections (*Informed consent*, *Demographic characteristics and spending behaviors* and *SORS Ra questionnaire*, with 30 questions.

Informed consent

The participants are given an informed consent form, outlining the purpose of the study, what they must do to complete the survey, as well as the risks and possible benefits of doing so. Information about confidentiality and data security, as well as the ethical committee approval number and the contact details of the researchers, is included. At the end the participants are given a choice of either agreeing to, or declining participation in the research.

Demographic characteristics

The second section was made of 18 questions assessing the demographic data, participant's videogame addiction and how much money they spend on microtransactions.

Demographics variables assessed were:

a) Age; open-ended question: possible answer between 18 and 99 years of age.

b) Sex was measured as a multiple-choice question: *male, female, prefer not to say.*

c) Nationality was measured as an open ended question.

d) Employment status was binary option: *employed, unemployed.*

e) The current studying status (highschool, university…): *yes, no.*

f) The number of people in their household; open-ended questions: answer must be a whole number.

g) Three most frequently played video games in the last three months; open-ended question.

h) Average daily time spent on video games with microtransactions in the last 3 months (in minutes); open-ended question: possible answer must be a number.

i) Having used sick days or vacation days or skipped work/class for playing video games: *yes, no.*

j) Do you play videogames competitively? (as in ranked game modes): *yes, no.*

k) Do you set rules or limits with gaming and then break them, playing longer or more frequently than intended?: *yes, no.*

l) Neglecting responsibilities, work, school, or your family when gaming: *yes, no*.

m) Lying about or hiding how much you play videogames to others: *yes, no.*

Spending behaviors

a) The number of times participants have purchased microtransactions in the past three months was measured by an open-ended question.

b) The amount of euros spent on videogames with microtransactions in the last three months was measured by an open-ended question.

c) Most money they have spent on microtransactions in a single day was measured by an open-ended question.

d) Going over the budget limit while spending money on microtransactions was measured by a multiple-choice question, with single choice option between: *yes, no*

e) The influence of being given a free lootbox (crate, wish or similar option) while playing videogames on them being more likely to spend money on more of them was measured by a multiple-choice question, with single choice option between: *yes, no*

Questionnaire description

South Oaks Gambling Screen: revised for adolescents (SOGS-Ra) was used to assess their gambling problems. It is a twelve-item questionnaire developed by Winters, K.C., Stinchfield R.D. & Fulkerson, J. (1993). Each item is scored either 1 (affirmative) or 0 (nonaffirmative). In the questionnaire, only the first question (a) had a multiple-choice answer, them being; *every time, most of the time, some of the time, never*, while the remaining 11 questions had a binary answer; *yes, no*. Examples questions: "*Have you ever felt bad about the amount of money you bet, or about what happens when you bet money*?" and "*Has your betting money ever caused any problems for you such as arguments with family and friends, or problems at school or work?*".

The calculation of the narrow rates results in levels 0 to 3, that we get by summing the total score. A total score of 0 gives the result of Level 0, no past year gambling. A total score of 1 gives the result of Level 1, less than weekly gambling. If any of the questions were answered with "Yes", a total score will be a minimum of Level 1. A total score of 2 or 3 gives level 2, at least weekly gambling, and a total score of 4 or above gives the result of Level 3, daily gambling.

2.3 Sample characteristics:

The eligibility criteria for participant inclusion in the survey was that they were 18 years of age or older and that they have played video games in the past. The exclusion criteria were if the participants were below the age of 18 or have not played video games in the past 3 months, as well as not completing the whole survey. The sampling techniques used were convenience and snowball sampling.

2.4 Data collection procedure

Survey development and refinement.

The pretesting of the questionnaire was done by 10 participants, who were all students on the Faculty of Humanities and Social Sciences in Split, with all of them completing it twice; once before any changes were made, and once on the version of the questionnaire that would be used for the actual sampling. All the participants who were part of the pretesting were above

the age of 18 and have played video games in the past 3 months, so they closely resemble the target population. They were picked via convenience sampling. As for the preparation process before conducting the survey, we have asked the Discord servers for approval in advertising the survey, as well as prepared the invitational letter when sending them.

2.5 Survey administration:

The questionnaire was administered in 4 Discord servers: (*Tower Of Fantasy, Salty Sweet Squad, Overwatch 2, Honkai: Starrail Official*) and subreddits (*DokkanBattleCommunity, psychologystudents, gachagaming, leagueoflegends, psychology, samplesize, TowerofFantasy, Genshin_Impact, NarakaBladePoint*).

Discord is a voice, video and text chat app that's used by tens of millions of people ages 13+ to talk and hang out with their communities and friends. Most servers are private, invite-only spaces for groups of friends and communities to stay in touch and spend time together. There are also larger, more open communities, generally centered around specific topics such as popular games like Minecraft and Fortnite.

Subreddits are a forum dedicated to a specific topic on the website Reddit (https://www.reddit.com/). They allow users to focus on a specific interest or topic in posting content that gets voted up or down by relevance and user preference.

All the participants have taken questionnaire between the 13th of February and 13th of March.

2.6 Ethical considerations:

The ethical approval has been given by The Ethics Committee of the Faculty of Philosophy in Split on the 8th of January 2024. Ethical committee approval number: 2181-190-24-00005.

The survey participation was completely anonymous and no IP addresses were collected.

2.7 Statistical analysis

All statistical analyses were performed using JASP software (Version 0.18.3; JASP team, 2024). Shapiro-Wilk test was used to check the normality of the distribution. The reliability calculation was done by calculating Cronbach's alpha. Descriptive statistics were used to see the frequency of each item, as well as the median and interquartile range. Spearman's

Correlation was used to see the association between variables and SOGS Ra scores. Lastly, Linear Regression was used to see if any of the variables were predictive of SOGS Ra scores.

3. Results

Reliability calculation

Cronbach's alpha was 0.497, with the lower bound of 95% CI being 0.438 and the upper bound being 0.554.

Descriptive statistics

Majority of the participants were employed males around the age of 26 with the highest amount of them being from USA (Table 1). Less than half of the participants have answered „Yes“ to negative questions about daily routines regarding video-games, such as neglecting responsibilities or lying about how much time they spend playing (Table 1). Out of the five most frequently stated video-games with microtransactions, the highest number of players was seen in Genshin Impact, and the lowest Tower of Fantasy (Table 1).

Table 1

Frequencies for demographic characteristics

Variable	Levels	N (%)
Age (in years)[a]		26 (21-29)
Sex [b]		
	Male	145 (70.7)
	Female	51 (24.5)
	Prefer not to say	9 (4.3)
Employment status		
	Employed	131 (63.9)
	Unemployed	74 (36.1)
Where are you from?		
	USA	57 (27.8)
	Germany	12 (5.9)
	Croatia	11 (5.4)
	Italy	7 (3.4)
	United Kingdom	6 (2.9)
	Other	112 (54.6)
Currently studying (Yes)		117 (57.1)
Have you ever used sick days or vacation days or skipped work/class just for gaming? (Yes)		84 (40.1)
Have you ever gone over your budget limit while spending money on microtransactions? (Yes)		59 (28.8)
Do you play videogames competitively? (Yes)		102 (49.8)
Do you set rules or limits with gaming and then break them, playing longer or more frequently than intended? (Yes)		100 (48.8)
Do you neglect responsibilities, work, school or your family when gaming? (Yes)		76 (37.1)
Do you lie about or hide how much you play videogames to others? (Yes)		59 (28.8)
Has being given a free lootbox (crate, wish…etc) while playing videogames made you more likely to spend money on more of them? (Yes)		68 (33.2)
Have they played videogames with microtransactions (last 3 months) (Yes)		180 (87.8)
Most frequently played games with microtransactions*		
	Genshin Impact	72 (35.1)
	Honkai Starrail	44 (21.5)
	League of Legends	28 (13.7)
	CS2[b]	25 (12.2)
	Tower of Fantasy	19 (9.3)
	Other	48 (26.6)

[a] Median and IQR.

[b] Counter Strike 2

* Players could state they play multiple games with microtransactions.

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The average time spent playing video-games per day was just shy of three hours (Table 2). As for the spending habits, the median amount of time microtransactions have been purchased was 8, with the median amount of Euros spent being 136 (Table 2). The median for the most amount of Euros spent in a single day on microtransactions was 117 Euro (Table 2).

Table 2

Numerical variables about habits in video-games with microtransactions

Variable	Median (IQR)
People in the household	3 (2-4)
Avg. daily time spent on videogames in minutes	173 (60-200)
Amount of time purchasing a microtransaction in the last 3 months	8 (0-9)
Amount of Euros spent on videogames with microtransactions in the last 3 months	30 (0-120)
Most amount of Euros spent in one day on microtransactions	50 (14-113)

Majority of the participants have not answered “Yes” on items from the SOGS Ra questionnaire (Table 3). Each item was written as a percentage of the total answers on the questionnaire. Out of all the items, most of the participants have not gone back another day to try and win back money they’ve lost (Table 3). Less than a third of the participants have felt bad about the amount of money they’ve bet, or what happens while they bet money (Table 3.) Only a fourth of the participants have gambled more than they had planned to (Table 3). Just barely more than a tenth of the participants have felt like they wanted to stop betting, but were unable to (Table 3).

Table 3

Items from SOGS Ra questionnaire

Item	Levels	Yes (%)
How often have you gone back another day to try and win back money you lost gambling?		
	Every time	1 (0.5)
	Most of the time	5 (2.4)
	Some of the time	24 (11.7)
	Never	175 (85.4)
When you were betting, have you ever told others you were winning money when you weren’t?		21 (10.2)
Has your betting money ever caused any problems for you such as arguments with family and friends, or problems at school or work?		7 (3.4)
Have you ever gambled more than you had planned to?		52 (25.4)
Has anyone criticized your betting, or told you that you had a gambling problem whether you thought it true or not?		17 (8.3)
Have you ever felt bad about the amount of money you bet, or about what happens when you bet money?		59 (28.8)
Have you ever felt like you would like to stop betting, but didn’t think you could?		24 (11.7)
Have you ever hidden from your family or friends any betting slips, IOUs, lottery tickets, money that you won, or any signs of gambling?		17 (8.2)
Have you had money arguments with family or friends that centered on gambling?		12 (5.9)
Have you borrowed money to bet and not paid it back?		1 (0.5)
Have you ever skipped or been absent from school or work due to betting activities?		9 (4.4)
Have you borrowed money or stolen something in order to bet or to cover gambling activities?		3 (1.5)
Total score (Md, IQR)		0 (0-2)

The number of times participants purchased microtransactions as well as the amount of Euros spent on video-games with microtransactions in the last 3 months have both had a very low positive association with the score on SOGS Ra (Table 4). Moreover, the most amount of Euros spent in one day on microtransactions has also shown a very low positive association with the score on SOGS Ra (Table 4).

Table 4.

Correlation for spending behaviors

Item	Avg. daily time spent on videogames in minutes (A)	Amount of time purchasing a microtransaction in the last 3 months (B)	Amount of Euros spent on videogames with microtransactions in the last 3 months (C)	Most amount of Euros spent in one day on microtransactions (D)	Score SOGS Ra (E)
Item A	—				
Item B	0.280**	—			
Item C	0.304**	0.881**	—		
Item D	0.224*	0.519**	0.633**	—	
Item E	-0.005	0.252**	0.264**	0.174*	—

*p < .05. **p < .01.

None of the five most frequently stated video-games with microtransactions had a significant association with scores on the SOGS Ra questionnaire (Table 5). However, there was significant associations between different games (Table 5). Those who have played Genshin Impact had a positive association with also playing Honkai Starrail, but a negative association with playing CS2 (Table 5). Participants who have played Honkai Starrail had a negative association with playing CS2 and League of Legends, and those who played League of Legends had a positive association with playing CS2 (Table 5). Although all the associations were low, with the highest being 0.362, they are something to keep in mind (Table 5).

Table 5.

Correlation for most often stated video-games and the scores on the SOGS Ra questionnaire

Item	Genshin Impact (A)	Honkai Starrail (B)	League of Legends (C)	CS2 (D)	Tower of Fantasy (E)	Score SOGS Ra (F)
Item A	—					
Item B	0.362**	—				
Item C	-0.055	-0.139*	—			
Item D	-0.243**	-0.159*	0.199**	—		
Item E	-0.129	-0.044	-0.029	-0.068	—	
Item F	-0.010	-0.067	0.108	0.126	-0.028	—

*p < .05. **p < .01.

None of the games selected significantly predicted the SOGS Ra scores (Table 6).

Table 6.

Linear regression table of predictors on Score SOGS Ra (N=205)

Predictor	Estimate	95% CI		Standardized β	SE	t-value	p-value
		LL	UL				
Genshin Impact	0.145	-0.303	0.592	—	0.227	0.637	0.525
Honkai Starrail	-0.164	-0.671	0.342	—	0.257	-0.639	0.524
League of Legends	0.494	-0.084	1.071	—	0.293	1.686	0.093
CS2	0.427	-0.198	1.051	—	0.317	1.347	0.180
Tower of Fantasy	-0.080	-0.775	0.616	—	0.353	-0.226	0.822
Avg. daily time spent on videogames in minutes	-0.001	-0.002	0.001	-0.079	0.001	-1.063	0.289
Amount of time purchasing a microtransaction in the last 3 months	0.004	-0.006	0.015	0.064	0.005	0.789	0.431
Amount of Euros spent on videogames with microtransactions in the last 3 months	-0.000	−0.746	0.536	-0.034	0.000	-0.324	0.747
Most amount of Euros spent in one day on microtransactions	0.001	-0.000	0.002	0.134	0.001	1.404	0.162

4. Discussion

The results have not confirmed the hypothesis that participants who have spent money on video-game microtransactions will show a positive association with a higher score on the gambling questionnaire. The spending habits in video-games with microtransactions have not shown significant association with the SOGS Ra Scores. The number of times they have purchased a microtransaction and the amount of Euros spent on videogames with microtransactions in the last 3 months, as well as the most amount of Euros spent have not shown significant association with a higher SOGS Ra Score. However, average daily time spent playing video-games has had a low negative association with a higher SOGS Ra Score. Interestingly, none of the five most popular video-games we have observed have had a significant effect on the SOGS Ra scores. On the other hand, few video-games have had significant associations with one another. Participants who play Genshin Impact have had a weak positive association with playing Honkai Starrail, but a weak negative association with playing CS2. Participants who have played Honkai Starrail had a weak negative association with playing League of Legends and CS2. Lastly, those who play League of Legends have had a weak positive association with playing CS2. Looking at the linear regression results, none of the variables were significant predictors of SOGS Ra scores.

Majority of the participants were male, with the average age being 26. More than half of them were employed and still studying. Regarding their self-reported gaming habits, majority of them have not used sick days just to play video-games, or neglected their family, friends and responsibilities because of video-games. Almost all of the participants have played video-games with microtransactions in the last three months. Genshin Impact was the most played video-game, while Tower of Fantasy was the least played video-game out of the 5 most notable ones. Interestingly, less than a third (28.8%) of them have gone over the budget limit while spending on microtransactions. Being given a loot box in video-games has not made the majority of the participants get the urge to spend more money on the game. These results are not in line with previous research, as they have suggested that there is a significant relationship between engagement with loot boxes and gambling and gaming problems (Montiel et al., 2022).

The median time spent playing video-games daily was 173 minutes. A study has found that the effects of playing video-games are negligible due to them being very unlikely to be large enough to be subjectively noticed (Vuorre et al., 2022). Furthermore, an average gamer

would have to play 10 or more hours per day than typical to notice significant changes in well-being (Vuorre et al., 2022). Since the median time spent playing was just shy of 3 hours, it doesn't fall into the category of having any significant changes on well-being.

The median amount of purchases of microtransactions in the last three months was 8, ranging from 0 to 9. Multiple purchases of microtransactions could lead to players increasing their time playing and become at a higher risk of developing a gaming disorder (King & Delfabbro, 2020). For example, CS2 encourages more frequent purchases by allowing its players to believe they can "earn back" money they've spent by selling their items, even if the amount recovered is less than the original microtransaction cost. That in turn reduces the sense of loss, making players more inclined to spend repeatedly. Similar as in casinos, only a small percentage of people ever actually win any substantial amount of money, and most end up losing more than they've gained.

The median number of Euros spent on microtransactions in the last three months was 30 Euro. Furthermore, the median of the highest amount spent on microtransactions in one single day was 50 Euro. Gambling expenditure is significant factor in moderate-risk and problem gambling (Currie et al., 2010). Pathological and problem gamblers on average spend more money than they intend to, lose control over their gambling and often find themselves in a losing cycle (APA, 2013). The use of digital money, like credit cards, e-wallets and electronic bank transfers, appears to encourage more intense gambling behavior and results in greater losses, predominantly in the cases of problem gamblers, as they seem to feel that they are not spending any "real" money (Gainsbury, 2015). These findings highlight the need for greater awareness and better regulation of microtransactions, given their potential to worsen problem gambling behaviors.

Looking at the items from the SOGS Ra questionnaire most of the participants (85.4%) have never gone back another day to win back the money they have lost while gambling. A very small percentage of participants have answered "Yes" to any of the questions on the SOGS Ra questionnaire, with the highest percentage being 28.8% when asked if they had ever felt bad about the money they've bet or what happens when they bet money.

Some limitations of this study were the fact that there was a potential bias since the survey had a significant number of participants coming from Discord servers or Reddit forums for video-games that use microtransactions. If the study potentially included more participants

who either have not previously spent money on microtransactions or ones that have spent it in other video-games, the results might have been different. We've only been able to closely examine 5 video-games, but there are many more that were not included in this study. As for future research, replication of the study with a significantly bigger sample could potentially bring different results and is something to think about. Furthermore, a study taking multiple potential risks for gambling, as well as their video-game counterparts could shine more light on the question of what exactly the trigger is. The key to fully understanding why loot-boxes, crates and other microtransactions have a significant relationship with gambling could not be just one aspect, but many of them combined.

The main purpose of this study was to see if video-games with microtransactions can be good predictors of scoring higher on a gambling questionnaire, and if so, which ones. Previous research had provided empirical evidence of associations between loot boxes (risky use, expenditure) and problem gambling, as well as problem internet gaming (Brooks & Clark, 2019), suggesting a significant relationship between engagement with loot boxes and gambling and gaming problems (Montiel et al., 2022). With that in mind, it seems that the problem connecting video-games and gambling is not a specific video-game itself, but related to factors not covered in this study, and which need to be explored in future research.

5. Conclusion

This study aimed to investigate the relationship between video-games and gambling addiction, specifically in identifying which games are most predictive of higher gambling scores. The findings did not show a significant association between spending on video-game microtransactions and higher scores on the SOGS Ra gambling questionnaire. The results indicate that the connection between video-game microtransactions and gambling behavior is not straightforward or directly tied to a specific game, but that these behaviors may be influenced by a broader range of variables that were not fully explored in this study. Future studies should aim to examine a broader variety of games, as well as additional social and psychological factors to better understand the complex relationship between gaming and gambling.

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6. Abstract

Loot boxes are a consumable item which can be used to receive a randomized selection of further virtual items, or loot, ranging from simple customization options to game changing items which help the player. Gacha are like “loot boxes” but the difference is that they have a “pity” system which accumulates the number of times a gacha has been opened and gives a guaranteed item at a certain number of pulls, and they are mostly present in free to play video games. They offer the player limited items and characters which can only be obtained at that certain period, with the chance of obtaining such items being almost impossible to achieve if the player refuses to pay for a better chance at pulling for them. The main purpose of this study was to see if video-games with microtransactions can be good predictors of scoring higher on the SOGS Ra gambling questionnaire, and if so, which ones. An online questionnaire was completed by 208 participants, with 3 of them being deemed invalid. Out of all of them, 180 have played video-games with microtransactions. The findings have shown that none of the most frequently mentioned video-games have had a significant impact on the scores on the SOGS Ra questionnaire, and seems to point towards the problem connecting video-games and gambling not being a specific video-game itself, but something else. For future research, a study taking multiple potential risks for gambling, as well as their video-game counterparts could shine more light on the question of what exactly the trigger is.

7. Sažetak

Loot boxes su predmeti u igricama koji se koriste za dobivanje nasumično odabranih virtualnih predmeta u rasponu od jednostavnih opcija promjene izgleda do predmeta koji mijenjaju igru i pomažu igraču. Gacha su slični "loot boxovima", ali razlika je u tome što imaju takozvani "pity" sustav koji akumulira broj puta kada je gacha otvorena i daje zajamčeni predmet nakon određenog broja pokušaja, a uglavnom su prisutni u besplatnim videoigrama. Oni igraču nude ograničene predmete i likove koji se mogu dobiti samo u određenom razdoblju, pri čemu je šansa za dobivanje takvih predmeta gotovo nemoguća ako igrač odbije platiti za bolju šansu da ih dobije. Glavna svrha ovog istraživanja bila je ispitati mogu li igrice s mikrotransakcijama biti dobri prediktori za postizanje viših rezultata na SOGS Ra upitniku za kockanje, i ako mogu, koje igrice. Internetski upitnik ispunilo je 208 sudionika, od kojih su 3 procijenjena kao nevažećima (N=208). Od svih njih, 180 je igralo igrice s mikrotransakcijama. Rezultati su pokazali da nijedna od najčešće spomenutih igrica nije bila povezana rezultatima na SOGS Ra upitniku, što upućuje na to da problem povezivanja videoigara i kockanja nije u određenoj videoigri, već u nečem drugom. Za buduće istraživanje treba uzeti u obzir više potencijalnih rizika za kockanje, kao i njihove ekvivalente u videoigrama, što bi pobliže odgovoriti na pitanje što točno povezuje videoigre i kockanje.

8. Supplement

8.1 First part of the questionnaire used for this research

1. Please enter your age:
2. Sex: Male, female, prefer not to say
3. Where are you from?:
4. Employment status: Employed, unemployed
5. Are you currently studying? (highschool, university...): Yes, no
6. How many people are in your household?(enter the number)
7. State three most frequently played videogames in the last 3 months (please divide them with a ",")
8. Average daily time spent on video games with microtransactions in the last 3 months (in minutes). If you haven't played, enter 0
9. How many times have you purchased microtransactions in the past three month (approximately)?
10. Amount of euros spent in videogames with microtransactions in the last 3 months (approximately)
11. What is the most money you have spent on microtransactions in a single day? (approximately in euros)
12. Have you ever used sick days or vacation days or skipped work/class just for gaming?: Yes, no
13. Have you ever gone over your budget limit while spending money on microtransactions?: Yes, no
14. Do you play videogames competitively? (as in ranked game modes): Yes, no
15. Do you set rules or limits with gaming and then break them, playing longer or more frequently than intended?: Yes, no
16. Do you neglect responsibilities, work, school or your family when gaming?: Yes, no
17. Do you lie about or hide how much you play videogames to others?: Yes, no
18. Has being given a free lootbox (crate, wish...etc) while playing videogames made you more likely to spend money on more of them?: Yes, no

8.2 Second part of questionnaire, items from the SOGS Ra questionnaire

1. How often have you gone back another day to try and win back money you lost gambling?: Every time, most of the time, some of the time, never

2. When you were betting, have you ever told others you were winning money when you weren't?: Yes, no

3. Has your betting money ever caused any problems for you such as arguments with family and friends, or problems at school or work?: Yes, no

4. Have you ever gambled more than you had planned to?: Yes, no

5. Has anyone criticized your betting, or told you that you had a gambling problem whether you thought it true or not?: Yes, no

6. Have you ever felt bad about the amount of money you bet, or about what happens when you bet money?: Yes, no

7. Have you ever felt like you would like to stop betting, but didn't think you could?: Yes, no

8. Have you ever hidden from family or friends any betting slips, IOUs, lottery tickets, money that you won, or any signs of gambling?: Yes, no

9. Have you had money arguments with family or friends that centered on gambling?: Yes, no

10. Have you borrowed money to bet and not paid it back?: Yes, no

11. Have you ever skipped or been absent from school or work due to betting activities?: Yes, no

12. Have you borrowed money or stolen something in order to bet or to cover gambling activities?: Yes, no

Form A.

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