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Research Article

"These People Had Taken Advantage of Me": A Grounded Theory of Problematic Consequences of Player Interaction with Mobile Games Perceived as "Designed to Drive Spending"

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Many games which incorporate microtransactions—uncapped, repeated in-game purchases—are described by players as having had their 'dynamics designed to drive spending'. Such games are perceived by players as designed primarily to encourage spending, rather than with the improvement of the player experience in mind. However, it is unknown how playing these games affects players. We addressed the research question of "What consequences might there be of interaction with games perceived as having had their dynamics designed to drive spending?" considering adult players. We conducted semi-structured interviews and used a grounded theory method of analysis. Our findings revealed five life areas of problematic consequences: financial issues, problems at work and education due to distraction and lack of productivity, emotional consequences for self-perception, problems sleeping, and social consequences. These outcomes emerge from the interaction of players with certain vulnerability traits with these game mechanics. We discuss these findings in the context of gaming disorder and the gamblification of games.

1. Introduction

Monetisation models are key to commercial games, influencing the possibility space of their design. A popular example are *microtransactions*: uncapped, repeated in-game purchases that are often present in games which are otherwise free to play. The global microtransaction market was worth $59.49 billion in 2021 and is expected to grow to $67.50 in 2022 [1]. In 2020, microtransactions made up 88% of *all* digital game industry revenues [2].

Although microtransactions bring in large amounts of money for the industry, many developers (e.g., [3]), players (e.g., [4, 5]), researchers (e.g., [6, 7]), and ethicists (e.g., [8–11]) see them negatively. Microtransactions are criticised for being unethical and unfair, and for exploiting players [6] and taking away their control over gameplay.

Previous work with players has shown that certain games are perceived as having had their "game dynamics designed to drive spending" [5]. This describes situations in which the game and the progression of the gameplay feel "designed especially to encourage spending, rather than primarily for the improvement of a player's in-game experience." Players feel these design decisions put them in uncomfortable situations. These include being forced to put an "unpleasantly large amount of time and effort into completing a portion of [a] game" or optionally completing a transaction to avoid this unpleasant "grind," feeling "pressured to spend progressively more and more to have a good gameplay experience," and "given the choice of waiting some time before being able to progress in game or paying some money to skip this wait." The games which are described this way are primarily mobile. Over 50% of the highest grossing mobile games on the Google Play store fit this description [12].

The overarching theme is that players of these games feel they eventually do not have a pleasant alternative to spending money on the game.

In public and media perception, spending on microtransactions is an area of concern. Regular stories of players

spending more than they can afford make an appearance, often with flamboyant descriptions of the negative consequences of such spending for the individual's life. Examples include stories of people who have racked up huge credit card debts and emotional comments on the dangers of microtransactions from the families involved. Journalist Dean Takahashi [13] writes a story of one such player, with the following description: "He never intended to spend any money, and at first he didn't know he could. But he said, "I started getting my ass kicked. I figured I had to spend money real quick. Within two weeks." This is a case of the design of certain games which make players feel like spending money is the only option.

The relationship between a player's wellbeing—particularly financial—and such game design is therefore a high priority for research. However, despite the prevalence of games that are designed in this manner, little prior work has dealt with the consequences of player interaction. Instead, the video game monetisation evidence base largely centres on one specific monetisation technique: loot boxes. Loot boxes are items in video games that may be bought for real world money but contain randomised contents [14]. Researchers have noted some formal similarities between loot boxes and gambling products [15]. This has led to concern regarding one specific consequence of interaction with this one specific monetisation technique: that engagement with loot boxes may either lead to gambling-like financial harm or that they may provide a "gateway" to gambling amongst gamers [16–18].

While research on the problematic consequences and relationships of this one type of microtransaction has been thorough, research on other in-game purchasing is fairly nascent. As far as we are aware, at the time of writing, the consequences of alternative types of microtransactions are unstudied and unknown. (Nonetheless, it is important to note that much excellent work has been carried out on the shift of games into revenue generation and the design implications of this on player psychology, for example, King and Delfabbro [19] in their discussion of predatory monetisation and King et al. [6] in their analysis of game patents.)

Moreover, much of the spotlight in the field focuses on children and adolescents, as being a particularly vulnerable demographic (e.g., [20, 21]). Yet, it is not just children and adolescents who play these games, and vulnerable populations can be defined in many other ways. For example, there is widespread concern regarding the idea that some individuals may play games excessively or in a compulsive manner [22–24]. Whilst prior work has shown that engagement with loot boxes correlates with the presence of gaming disorder symptomatology [25], little work has investigated the interaction between alternative microtransactions and heavy play. Furthermore, if a game has truly been designed to manipulate players to spend (or is at least perceived by the players in question as such), it may also have effects on individuals who do not match any kind of existing criteria for vulnerability and make up the majority of the player demographics.

With this in mind, we conducted interviews with 14 adult players of mobile games which were labelled by previous work as having had their "dynamics designed to drive spending" [12]. These interviews investigated what—if any—consequences players believed playing the games had had for their lives. An outcome was considered problematic if a player believed it to be, no matter how small or nonsignificant it might appear to an observer. We found key problems to fall within five discrete domains: (1) emotional consequences, particularly for self-perception; (2) distraction and inefficiency at work or in education; (3) disruption to sleep; (4) financial consequences; and, in some cases, (5) social consequences. We discuss the situation of these consequences within broader contexts of player traits and contexts of players and their spending to try to understand how such outcomes may arise.

2. Background

2.1. Microtransactions: The Point of Gaming-Gambling Convergence. The demarcations between gaming and gambling are becoming less and less fixed. Play is becoming increasingly more productive and driven by gambling design incentives such as extending player time on the device [26]. Commercial games are ultimately revenue-generating products, and player activity is a mechanism for this, with games being finely tuned for efficiency and control over player behaviour. The above-outlined use of microtransactions is contributing to the "gamblification" of digital games: growing overlap between gaming and gambling mechanics and practices [27].

Examples of this phenomenon include social casino games, esports, and skin betting. There is also the microtransaction technique "loot boxes" or "random reward mechanisms": payment of real world money for a set of randomised real-world items (e.g., [28]). Loot boxes in particular have been described as being structurally and psychologically similar to gambling. This is primarily because of the variable rewards which are part of the so-called "variable ratio reinforcement," meaning people quickly acquire a purchasing behaviour and frequently repeat it in the hopes of receiving another reward. Many implementations of loot boxes even meet Griffiths' 5 gambling criteria [29]: exchange of money or valuable goods, determined by an unknown future event, outcome partly determined by chance, nonparticipation can incur losses, and winners gain at the expense of losers [15].

Purchasing loot boxes has been directly linked to problem gambling outcomes, where higher spending on loot boxes is correlated with severity of problem gambling [30]. However, loot boxes are not the only element of gaming-gambling convergence which shows this link: general engagement with game-related gambling practices, such as real-money video gaming, is significantly linked to problem gambling (rho = 0.23) [25]. Other specific features of free-to-play games have also been examined for their comparison to gambling, such as Larche et al.'s [31] work on how near misses—commonly featured in slot machines to maintain player urge to continue play—have the same effect in the popular mobile game *Candy Crush*. Some microtransactions are perceived by players as sharing similar targets to

gambling machines, like the above discussed ways in which game dynamics are intentionally designed to drive spending [5], which are found in an alarming number of top-grossing mobile games [12].

Given the growing link between gaming and gambling, we can look to established research on gambling-related problems—which is a somewhat more mature field than that of consequences of microtransactions in games—for an understanding of what could be possible outcomes of engagement with games that aim to drive player spend. Gambling is the only human behaviour which is categorised as addictive by the American Psychological Association [24]. Research into consequences of gambling has therefore largely focused on the pathological aspects of the behaviour: what happens when over-engagement occurs. Consequences have been extensively studied in different samples and by use of different methodology, so the picture of the outcomes of problem gambling is rather clear.

Gambling-related harm definitions prioritise clarity and public health strategy, for example, Wardle et al.'s [32] "… the adverse impacts on the health and wellbeing of individuals, families, communities and society." Wardle et al. [32] conceptualise the main domains of gambling harms in terms of *resources*, *health*, and *relationships*, emphasising that it is not only the individual which experiences gambling-related problems but also the society and community they are embedded in.

Gambling is robustly associated with financial, lifestyle, and health consequences (e.g., [33, 34]). The most palpable consequence of problem gambling is financial, being associated with higher financial distress and lower financial planning (e.g., [35]). Other known consequences include social consequences (e.g., [36, 37]), such as tension in family environments, with spouses of gamblers being particularly affected [38], and problems at work and education because of factors like loss of productivity (e.g., [39]). Gambling also has an impact on mental health, such as triggering/worsening symptoms of anxiety and depression (e.g., [36]), and physical health (e.g., [40]), such as bodily pain and physical functioning.

2.2. Time-Money Relationship and Gaming Disorder.
There is one notable difference between microtransactions in games and gambling. Previous work has discovered that often microtransaction-based models also allow players a time-money trade-off; i.e., players can either spend exorbitant amounts of time playing a game and trying to achieve objectives or pay money to skip this time investment. In this way, games frame player time as a valuable resource also. Moreover, there are established links between excessive time investment, microtransactions, and maladaptive outcomes for players. For example, Garea et al. [41] found that in the case of loot boxes, excessive gaming was positively related to loot box spending. Given the growing game design focus of increasing gambling-related priorities, such as player time spent on device, it is no surprise that time investment may be used as a springboard into financial investment.

There are already some known relationships between disordered gaming—excessive investment of time into game-

s—and problems. Known associations cover psychosocial problems, such as loneliness, anxiety, and depression (e.g., [42]); low self-esteem and social conflicts [43]; and certain personality tendencies such as increased impulsivity [44]. They also include health problems, such as eye problems [45], musculoskeletal problems, and obesity [46]. (In fact, one can note some overlap between these consequences and the above listed consequences of problem gambling).

However, studies in the field have been largely correlational, which creates difficulty in understanding the direction of the outlined associations. Work has also been largely externally focused, seeking to establish links between factors of interest in what is perceived as an objective reality, with study designs largely focusing on administration of surveys to large samples. While valuable, this does not allow for much insight into the player experience with games which makes up these excessive gaming patterns with potentially harmful effects. Such insight could be integral to a more nuanced understanding of the underlying processes and foundational to prevention strategies.

2.3. The Current Study.
Our study makes a contribution by firstly considering specifically games which previous work has identified as being perceived by players as having been manipulated to drive player spending, with focus primarily on the mobile domain. In this way, we explore a sample of *games* which we have reason to hypothesise would have directly negative consequences for players, rather than exploring *patterns* of gaming in general, as previous work has done.

We consider in-depth the lived player experience, taking a bottom-up, theory-generating approach with no preconceived notions so as to accumulate new information about how such games affect players. Focusing entirely on the player experience allows us to acquire knowledge which would not have been possible from a purely objective epistemological standpoint.

Although causality strictly cannot be established from qualitative research, our methods of interviewing and the richness of the data which came from this also allows some separation of antecedents and outcomes.

3. Methods

The initial focus of the study was to gain an in-depth understanding of consequences for players of engagement with games the dynamics of which were "designed to drive spending" and how it might affect their lived experience. These games may include the following design techniques (taken from [5]).

Pay or grind: players perceive themselves as being given the binary choice of either investing an unpleasantly large amount of time and effort into completing a portion of the game or completing a transaction to avoid having to invest the same extent of time and effort. Players often reported feeling like a game has specifically been designed in this way to push them into the seemingly easier option of spending to circumvent grind timers.

Pay or wait: a situation where players are given the choice of waiting some time before being able to progress in the game or paying some money to skip this wait.

The nerf cycle: players perceive an item of specific strength or usefulness being sold at a specific price, only for that item to be reduced in strength or general value at a point after the transaction.

Game builds dependency on microtransactions: in some cases, players feel that as they progress through a game, they feel pressured to spend progressively more and more to have a good gameplay experience. This kind of increasing dependency is perceived as sometimes being implemented through providing a resource (e.g., game speed or currency) more freely at the beginning of a game and then reducing the availability of that resource during play.

Unfair matchups: some players who are playing using only free in-game items believe they are consistently matched against opponents who have an advantage from buying items, which makes the game experience unpleasant.

Game experience is underpowered without in-game spending: a related situation occurred when players perceived that a game's core game experience is underpowered so that players will have a worse experience without spending money and occasionally feel driven into purchases.

Payment is needed to avoid negative consequences: this refers to scenarios where a game forces a player to spend not to gain any additional in-game content but so they do not lose something they already have, such as content, progress, or rewards.

The defining factor of these games is that players feel the game environment is created in a way which puts pressure on them to spend.

We took a phenomenological approach, focusing on the subjectivity of the gaming experience and player perception [47].

Our primary research question was "What consequences are there of regularly playing games perceived as having had their dynamics designed to drive spending?" We took a grounded theory approach to explore player experiences of interaction with such games, as well as the contextual factors which surround this interaction. Grounded theory was a fitting methodology for this work as it allows for a structured process to analyse a rich body of data, while acknowledging the exploratory nature of this data and uncovering potentially unexplored phenomena and constructing relationships between concepts.

In particular, we followed the constructivist approach as outlined by Charmaz [48]. This approach views data collection and analysis as constructed by the researcher, with their experiences and preconceptions an important tool in this process—which distinguishes it from other schools of thought in the field. The stages of grounded theory are as follows: definition of research questions, followed by initial recruitment of the desired sample and analysis. Analysis is done through *coding*, which in Charmaz's approach consists of *initial coding* (sticking closely to the data, remaining open to whatever one may find), moving into *focused coding* which is based on most significant initial codes, and finally *theoretical coding*, which involves integration of substantive

codes by the researcher into components of theory and connecting codes and categories together. Analysis and data collection occur in parallel, with *theoretical sampling* being a core aspect of grounded theory methodology, allowing the researcher to be flexible in their recruitment to take on participants who would help them expand understanding regarding specific categories in the data. This process continues until *saturation* in some form is reached—i.e., no more significant new findings are emerging from the analysis. Grounded theory also highlights *memo writing*, which is where the researcher notes their thoughts alongside analysis, and *constant comparison*, whereupon new categories are constantly compared to existing findings and advises synthesising existing literature for a review only *after* the analysis, to remain as open to the data as possible.

A key value in this approach is *reflexivity*: research is a social rather than one-sided process [49], and the researcher's role and influence in shaping the representation of the participant is paramount. Driven by this, Charmaz also emphasises flexibility on the part of the researcher, who can make their own decisions regarding things like at which stage to conduct a literature review and whether to keep constant or alter the research questions.

3.1. Participants.
We had a list of games which had been characterised by players as having had their "dynamics designed to drive spending," and we referred to this list in the recruitment process (from [12]).

We followed the grounded theory method of theoretical sampling, which consists of collecting data once initial categories have been defined with the aim of elaborating and refining these categories. The sampling strategy therefore changes alongside the analysis, mirroring a need to recruit different types of participants to supplement constructed concepts.

Participants were recruited through the online discussion website Reddit, via posts on the sub-Reddits of the above described relevant games (the full list of games which meet these characteristics can be found through [12]).

Interested people were directed to a screening questionnaire, which asked for name/pseudonym if they did not feel comfortable providing a real name, age, gender, ethnicity, occupation, and which mobile games they had played on more than 2 occasions in the past 6 months (to make sure they actually played the relevant game rather than having come across the sub-Reddit by accident and in case of playing multiple games of interest). We wanted to make sure we had a diverse sample of genders, cultural backgrounds, and professions to make our findings as robust as possible. We also wanted to consider specifically adults (over 18), in contrast to a large body of work which scrutinises the impact of microtransactions on children and adolescents as a vulnerable population.

Later on in the study, the question "Do you consider yourself to have invested either more time than you wanted or more money than you wanted (or both) on any of the games you mentioned above?" was added to the screening questionnaire. This was because the recruitment was bringing in a lot of people who had not experienced any consequences, and

TABLE 1: Participant demographics. The asterisks (*) denote participants who did not experience any negative consequences of playing.

ID	Gender	Age	Occupation	Country	Game(s)
1	Female	22	Student	Philippines	Genshin Impact
2*	Male	55	Tech executive	Canada	Star Trek Fleet Command
3*	Female	39	Digital product owner	USA	Merge Dragons, Mighty Party, Covet Fashion, Merge Magic, Rise of Kingdoms, Family Island
4	Female	36	Dispatcher	Canada	Merge Dragons, Township
5*	Male	37	Centre director of tutoring centre	Canada	Star Trek Fleet Command
6*	Female	32	Environmental waste technician	Canada	Township, Merge Dragons
7	Male	43	Handyman	USA	Last Shelter, Mobile Strike
8	Female	23	Teacher	Russia	Harry Potter: Hogwarts Mystery; Harry Potter: Puzzles and Spells; Homescapes
9	Male	27	PhD student	Germany	Harry Potter: Hogwarts Mystery, Animation Throwdown
10	Female	27	Ceramicist/student	Brazil	Harry Potter: Hogwarts Mystery, Love Island the Game, Romance Club, RuPauls Drag Race Superstar, Beatstar, Brawl Stars
11	Female	29	Teacher	Germany	Harry Potter: Hogwarts Mystery, Coin Master
12*	Male	39	Veterinarian	Slovakia	Marvel Strike Force, Star Trek Fleet Command
13	Male	35	Entrepreneur	Canada	Black Desert Mobile, Lord of The Rings: Rise to War, Skyweaver, Diablo Immortal, AFK Arena
14	Female	27	Business analyst	UK	Legend of the Phoenix

we were interested in learning more subtleties about consequences which were experienced by people, rather than their prevalence.

In total, 138 participants completed the screening questionnaire across all stages of recruitment (64 females, 5 nonbinary, 69 males; average age = 33): after the first 50 participants (22 females, 2 nonbinary, 26 males; average age = 33), we changed the recruitment wording as described above to add the additional question. Initially, all participants who completed the questionnaire were scheduled to set up a time, but as we went further through data collection and more participants responded than we had capacity for, we contacted participants with the aim of maintaining occupational, gender, nationality, and game balance. Additionally, many participants who completed the screening form did not reply when contacted further to arrange an interview. The recruitment adverts at all stages of recruitment can be seen in Appendix B.

At this point, we had developed additional research questions of "What is the interaction between an individual's circumstances and the game they play in experiencing problematic outcomes?" and "What are the distinguishing characteristics between players who do and do not experience problematic outcomes of playing these games?"

We therefore included in the analysis the interviewed participants who had not experienced any consequences, to gain a deeper understanding of the difference between people who were and were not problematically affected by games. Because of this additional research question and our aim to understand this difference, no participants were excluded from the analysis, as all information was valuable in delineating the distinguishing characteristics. The comparison of those who were and were not affected is in line with the grounded theory philosophy of "constant comparison," whereupon new units are compared with existing information for a refined theory.

At one point, we tried to recruit participants who had been affected in the same way by playing mobile games outside of this sample, to understand whether the game itself played a role in these problematic outcomes. However, we quickly realised that it was very difficult to separate our games of interest from other games; i.e., respondents were being brought in that played games that technically would have met the "dynamics designed to drive spending" criteria but were not part of the original sample from Petrovskaya et al. [12]. As such, they would not have made a good point of comparison.

In total, 14 people were interviewed for the study. Of those, 6 were male (average age = 39) and 8 were female (average age = 29). The age range of all the participants was 22-55 (average = 34). Full participant demographics can be seen in Table 1.

3.2. Ethics. Ethics for this project was obtained from the University of York Physical Sciences Ethics Committee [5]. Ethical considerations included discussion of potentially sensitive topics, coupled with a lack of anonymity throughout the data collection and analysis process, and the fact that the material would be recorded and stored. We tried to minimise risks by building rapport with the participants in the interviews so they felt safe and comfortable enough to discuss their experiences, assuring them that nobody would have access to the recorded data and that it would be stored securely online. After the analysis was complete,

the data was fully anonymised, so participants were no longer identifiable.

3.3. Procedure. The interviews were semistructured: we constructed a script to ensure that core areas of interest were included, but participants were encouraged to describe all and any relevant experiences at length. Before being asked direct questions about the game, participants were first asked about their jobs and daily routines: this was both to provide context for their game-playing and to relax them and build an initial rapport with the interviewer. Main prompts covered the themes of contexts of beginning to play the game under consideration and how it fit into the participant's routine, their reasons for engaging with it, and then moved onto their time and financial engagement with the game. Consequences were explored in detail. If participants needed prompts to discuss consequences, initially they were provided regarding different life areas—e.g., physical—and in the later stages, based on consequences offered by previous participants.

Interview questions were revised throughout the study to account for our ongoing analysis. Changes were made to explore emerging findings, as analysis was conducted in parallel with data collection. As such, at the start of data collection questions were more broad, asking players about situations in which they played games, when they might invest more time and money than they may want, and what consequences they may have experienced following this. As data collection and analysis progressed and we began to see that people experienced consequences based on some of their life situations and characteristics, we adjusted the questions to also account for this, as well as to continue validating the consequences of such interaction which we had discovered throughout. The full list of interview questions (both at the start of the process and at the end to show their development) can be found in Appendix A.

The interviews were conducted remotely, using online conferencing software, and recorded using OBS. All of the interviews were conducted by the first author and transcribed manually by the same author. Following Charmaz's perspective of reflexivity, we must provide a brief description of the author who conducted the interviews and how their experiences might have shaped the interview process. This researcher is female, in their mid-twenties, who has been in the field of problematic in-game monetisation for several years. She has built up the majority of her work by interacting directly with players of games, and as such, her knowledge has been shaped by player perspectives. As such, she is very aware of player sentiments within the community and used to working directly with players to elicit their experiences.

4. Analysis

The data was coded and analysed using the qualitative data analysis software MAXQDA. We engaged in coding following the stages as proposed by Charmaz: initial coding, focused coding after analytic directions had been established, and, lastly, theoretical coding to weave the developed categories together, to help develop a coherent theoretical narrative. Throughout, we used constant comparison, comparing both within participants and between them. We also wrote memos throughout the research process to have a clear idea of emerging concepts and how to integrate them into future directions.

5. Results

5.1. Vulnerable Traits. Players from vulnerable populations will engage with mobile games which have been designed to drive spending in a different way to players who are not members of such populations. Traits which may make an adult individual particularly vulnerable to such games include (but are not necessarily limited to) mental health problems, stress at work, low self-esteem, poor quality of life, and loneliness. These factors create an offline environment for the individual where they are not experiencing satisfactory feelings of competence and achievement in their daily lives.

It must be noted that the COVID-19 pandemic had some impact on whether or not individuals belonged to a vulnerable population. For example, individuals with previously stable or enjoyable jobs found themselves in situations with less security and simultaneously working from home with less observation, less structure, and more free time to fill. The pandemic also placed people into life circumstances which impacted their self-esteem, life satisfaction, and mental health, being a difficult life experience.

5.2. Feelings of Achievement. They may not necessarily initially turn to games to experience these feelings, but once they are engaged in the gameplay, it becomes important for them to find the feeling of achievement in the online environment, which in turn brings positive affect. Participant 10 says the following:

"It's kind of an achievement, reaching something you thought might be impossible, especially with those player vs player elements, and actually winning at it when I first thought it wouldn't be possible," also noting "I don't want to feel failure in the game, you know."

Likewise, participant 14, when asked what role the game they now considered to be problematic had played in their life, reflects the following:

"It gave me a sense of achievement, because it was a really difficult period of time at work. We just didn't know what we were doing, it was really stressful […] and I couldn't really facilitate it really effectively. […] I couldn't get any answers, but I also couldn't give any answers. And I was really stressed, and I felt like I wasn't achieving anything at work. And every time I had to do something I had to redo it, so having a game where you could just see yourself going up in ranks, and having people that appreciated you as being a stronger player felt really nice."

The need for this feeling of achievement is the primary driver of in-game time and monetary investment, as players seek to maintain this feeling by any means possible.

5.3. Over-Engagement and the Role of Game Elements. This need interacts in a problematic way with elements of games

which have been designed to drive player spending. Such games are often based around initially giving players the full experience—letting them feel progress, achievement, and enjoyment—and then taking it away in some capacity, for example, by introducing wait timers, slowing down progress, or matching against more powerful players which degrades the experience. The option to restore the initial experience exists normally through payment and sometimes through increased investment of time.

"Well, as I remember, when you need some new lives, when you need more money, like in-game money, gems, and anything like that, basically. And I remember playing for days when I couldn't complete a really difficult level, I understand that, well, now I got to use some money, actual money, to progress." (Participant 8).

The contrast between the ease of initial gameplay—which is also achieved through payment—and the difficulty of the game without payment may cause an escalating effect, with players spending progressively more and more money, as explained by participant 7.

"It takes a really long time, so I get these speedups and these resources to help accelerate things, and it, it snowballed, because I'm like well look, that hundred dollar pack that I just bought really helped, why don't I do it again?"

A specific technique which is highlighted by players as targeting them psychologically is pressure from limited time offers. Because such events only provide, true to their name, a limited time in which obtaining certain rewards is possible, they prey on player needs to achieve these rewards, raising the stakes and meaning players are more likely to invest their resources into getting them. The intensity of this pressure often also raises the problems which arise from this, such as disruptions to normal routine and sleeping patterns.

"I think it's because I don't want to feel like I failed. Like, they have a lot of events where you have to earn a lot of points, and the reward that they will give you, it's like only that time you can have that, it will be gone forever if you don't get it." (Participant 10).

"Uh, it was last week. There was this event that's going on, and it's coming to a close, and I figured I spent maybe 50, 60, 70 dollars, and I'm trying to stick to around 20 dollars a week. And I said, well, I'll make an exception this time, because this event is coming to an end, and I wanna make sure I go out with a bang." (Participant 7).

Participant 11 describes the effect this had on her sleep and, relatedly, her daily life:

"It went as far as setting alarms at night. So actually getting up every couple of hours to get stuff done and get some rewards. […] Yeah, cause I'm not that good at working when I didn't sleep enough, so, that was mostly me sabotaging myself if I haven't been sleeping that much and I still had stuff to do."

Another technique which was particularly prevalent in player discussion was the use of social pressures to drive spending. Certain games assign players to teams, whereupon a team's performance is dependent on the achievements of everyone within it—and the achievements are often dependent on spending. Players feel pressured to contribute to the team goals and do not want to let the team down and be seen as the weakest link, leading to increased spending.

"I didn't want to be the reason that our team got demoted, and I was one of the lowest point earners last week, so I was kind of a bit bummed, and that was on me a little bit." (Participant 4).

"I would be more likely to buy a pack if it would help me train my soldiers faster, because I was in my guild." (Participant 3). The same participant also describes how this pressure led to them investing more time into the game: "It felt like if you weren't there, you were letting the group down. And I ended up just stopping it cause I felt like I was committed to this group, and if they were doing something and it was 2 am my time, I would need to be there."

Also of note is the fact that many of the affected individuals were drawn to the games in question to begin with because of personal relationships with the theme of the games. For example, in the case of *Harry Potter: Hogwarts Mystery*, participants discuss how they were originally attracted to the game because they are fans of Harry Potter, in particular in relation to their childhoods.

"I dunno, since for a very long time. It's a novel I grew up with, so kinda like childhood memories, it's great to kinda experience that with a character which isn't actually quite like me cause they are forcing some choices on you, but at the same time it's the Hogwarts experience that I love." (Participant 11).

5.4. Problematic Outcomes. This interaction with vulnerable traits and certain game mechanics begins to cause gaming-related problematic outcomes for players. Such outcomes consist of financial, social, employment/education-related, emotional, and physical.

5.4.1. Financial Consequences. Financial consequences are caused by overspending in the game, which takes away finances from other life areas. Participants talk about how this manifests by them being unable to participate in other hobbies which also require payment, like in the case of participant 1, who was unable to take classes.

"Especially before, when I didn't start, when I hadn't started playing Genshin, I was actually looking into subscriptions, what about this drawing class, or… anything that's skill-based, or something that you can learn from."

Spending in games can also restrict financial independence and in the worst of cases leads to having to ask for help from other people.

5.4.2. Employment/Education. Likewise, consequences for the participant's main life activity—their job or their studies—are caused by overspending of time in the game, which then takes away both time and efficiency from other things. Some participants directly spend time which they believe should be spent on work on playing.

"*Why do you think you could be using that time better?* Cause I could get ahead with work, just do prep work that I should be doing, that I could still do, but if I had more time for it it would be easier." (Participant 11).

For others, reduced performance at work is linked more to being distracted mentally because of thoughts of the game.

"Yes, yes. I think I would, I think that… in my work, my boss is a little bit… he's not okay with me. I cannot say that he is angry, but he sees that I am not focused. He does not know that it is because of the game, but in work it often happens that I am thinking, what character should I use next time, will this be the best tactic for it, things like this. I know if I wouldn't need to think about this game so much, I would think more about my work and I could do my work a little bit better." (Participant 12).

Problems with education are also linked to financial consequences. Younger players may prioritise spending on games over spending on classes or materials that could help with their studies.

"Well, I had to cut other things, like I had to rearrange, I have a few courses I take that I pay each class, I had to not do a few classes to be able to pay that." (Participant 10).

5.4.3. Problems with Sleeping. The overspending of time is also linked to problems with sleep, as players choose to play the game over sleeping. This mostly manifests through the disruption of sleep due to having to complete rewards in limited time offers or in specific cycles because of the way the game is structured. Participants refer specifically to having to set alarms to be up for a specific time.

"Or there's been occasions where I've woken myself up, like there's been a task that needs to finish at, you know, whatever time, it's gonna finish at 4 o'clock in the morning and I wanna finish it before then, so I'll set an alarm for then. It's kinda embarrassing to say this really, you're hearing this from all sorts of people I'm sure. But I'll set an alarm for 4 o'clock in the morning, go in, do whatever I need to do in the game to finish whatever the task is and then go back to sleep." (Participant 4).

Lack of sleep subsequently has negative effects on general player health and is linked to reduced productivity at work.

5.4.4. Emotional Consequences ("the Self"). Emotional consequences are caused by feelings of regret and guilt but simultaneously feeling used and manipulated by the game. Participants also feel negatively about themselves and, in some cases, believe that this spending goes against their perception of the types of people they are.

"But afterwards I felt like a dumbass. Like, these people had taken advantage of me." (Participant 7).

"I feel like the worst person in the world." (Participant 10).

"Very guilty. It was mostly guilt and a fair bit of horror because, as I said, it's not life changing a sum, but it would have been really helpful if I'd spent it on something useful. Yeah, it was just guilt that I spent it, and I didn't actually get all that much out of it." (Participant 14).

5.4.5. Social Consequences. To a lesser extent, people also experience social consequences. Largely, this only manifests through dishonesty and lack of transparency about game playing and spending with close ones, as people do not feel comfortable sharing how much they had spent. For example, participant 10 does not tell their partner about their spending, as they are ashamed of it and believe it is due to their impulsiveness. Participant 1 does not share their gaming habits with their parents and discusses how this feels weird because it is a hobby which takes up a large part of their life.

5.5. The Unaffected. However, it is only people with traits and life circumstances that make them vulnerable to these mechanics that are particularly affected by them to the point of over-engaging and experiencing problematic outcomes. People who do not possess traits which make them more vulnerable—for example, players with low-stress jobs, higher quality of life, or good mental health—are less susceptible to such mechanics. The vulnerable player might encounter a game which has been designed to drive player spending and, driven by their need for feeling of achievement, fall prey to the mechanics, over-engage, and experience problematic outcomes. The nonvulnerable player will interact with the same game and, indeed, sometimes also over-engage. However, they are able to easily recognise the game as a mechanism pushing them into this over-engagement and easily disengage without any consequences (see Figure 1).

6. Discussion

We conducted interviews with 14 players of mobile games to develop a grounded theory of problematic outcomes which arise as a result of such gaming and the processes which led to this. Our results showed that certain mobile games which incorporate design features calculated to drive player spending—in the form of microtransactions—can result in a range of harmful outcomes for players, including financial, education/employment, sleep-related, social, and emotional. Such game design is particularly harmful for certain types of players, which are characterised both by traits, such as low self-esteem, life satisfaction, and psychopathology, and circumstances, such as high job stress. However, it is not only financial over-investment from such games which has potential to lead to harmful consequences. Often, such games drive over-investment of time instead of (or alongside) spending, leading to the above described outcomes because of excessive gaming.

6.1. Links to Gaming Disorder. These findings place our work both in the growing body of literature investigating microtransactions in games and in discussions of disordered gaming. Indeed, our sample demonstrates some behaviours which correspond to the DSM criteria for gaming disorder: for example, preoccupation with gaming, deceiving family members, and giving up other activities. Our findings are also similar to previous explorations of rich data, such as the Kleinman and Das [50] case study of a patient with PTSD and depression, who felt achievement and pride from advancing in Candy Crush via in-game spending, resulting in increasing expenses. The patient experienced emotional consequences (shame and guilt), social (problems in his marriage), and financial. Interestingly, Kleinman and Das

The Player

Low self-esteem
Poor quality of life
General psychopathology
High job stress

Need for achievement

- - - - - - - - - The game - - - - - - - - -

Excessive play

Outcomes

Damage to relationships
Financial stress
Problems sleeping
Altered perceptions of the 'self'
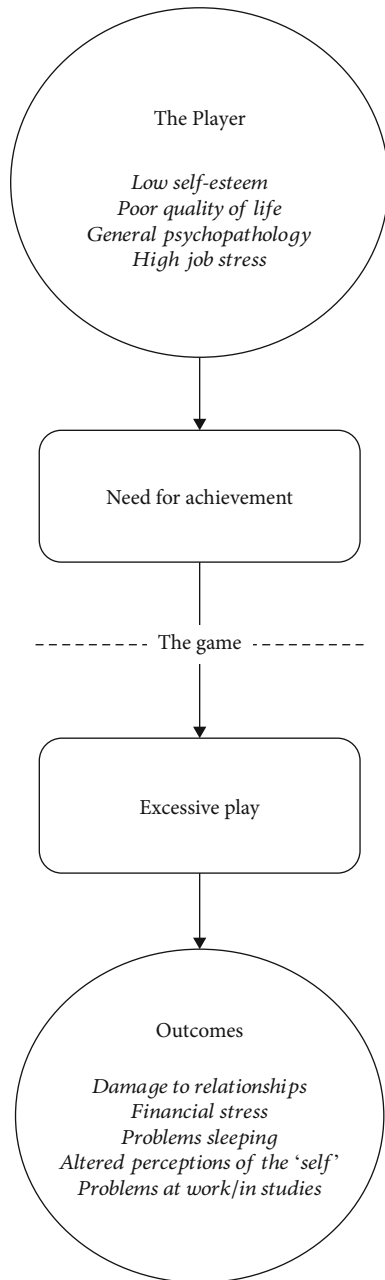*Problems at work/in studies*

FIGURE 1: Diagram of theoretical model.

[50] discuss their beliefs that the patient in question had several features of gaming disorder and links the design of microtransaction-based models to financial consequences particularly for such individuals.

Of particular note is our finding that sleep-related problems are a possible outcome of playing a game which seeks to drive players into spending and time investment. It is interesting that sleep was the only physical-health-related item which emerged, with players directly linking it to game elements, e.g., limited time offers which finished in their normal sleeping period. While lack of sleep has been previously linked to problematic gaming behaviours (e.g. [51]), as far as we are aware, this has referred to excessive gaming

in general, as opposed to specific game design elements which interact with player psychology and prevent them from sleeping. This is worth highlighting, particularly because lack of sleep in our sample was linked to reduced performance at work and education, meaning certain game elements may have far-reaching negative effects.

While we are certainly not attempting a diagnosis, nor are we suggesting one would even be possible, this similarity is important to note—especially given we were studying specifically *games which had had their dynamics manipulated to drive spending*. If games which are directly targeted to manipulate players into spending are playing a role in disordered gaming behaviours and resulting consequences, this is a point of strong concern.

Interestingly, many studies also show that gaming disorder symptoms are more likely to be seen in players who are not experiencing satisfaction in their lives [52–54]. It is well-established that three basic psychological needs are competence, relatedness, and autonomy [55] and that video games have the potential to satisfy these needs [56]. This directly parallels our generated theory that the feeling of achievement is a primary driver of over-engagement with games by vulnerable people and, by extension, problematic consequences of play. The need for achievement can be alternatively conceptualised as "need for competence," and our findings are therefore in line with the established idea that a lack of competence in life may be a factor of trying to satisfy this need in gaming. We did not find any direct evidence for the other two needs, autonomy and relatedness; however, this may be explained by the fact we were only investigating a small facet of gaming, namely, spending.

"Gaming is very popular, but very few individuals will ever experience significant gaming-related problems" is a sentence from the discussion of gaming disorder [22]. And indeed, in our sample too, while everyone interacted with game monetisation elements that to some extent could be said to be problematic, not everyone experienced problematic consequences. A deeper look is consequently warranted at what individuals are vulnerable to over-engaging with games that have such mechanics and experience problematic outcomes. Our study showed that one such vulnerability factor was low self-esteem. This has grounding in previous work on gaming disorder: individuals who feel less certainty in themselves in the real world are more likely to compensate for this by engaging heavily with digital games; for example, Stetina et al. [57] found in an investigation of online gamers that problematic players tended to score higher than others on measures of low self-esteem. Low self-esteem is also linked in the gaming disorder conversation to cognitive symptoms of many mental disorders—and in fact, there is a well-established link between psychopathology and gaming [22]—and mental health problems were cited as an antecedent to disordered gaming and spending in our sample too. Lower life satisfaction, another factor, has also been linked to gaming disorder [58] and can be connected to job stress. The vulnerability factors which emerged from our work appear to be interconnected, possibly drawing on similar cognitive processes or underlying factors—which may suggest the existence of an underlying

"vulnerable personality," which suffers when faced with certain game elements that play on these factors.

Interestingly, traditionally, it is understood that males are more at risk for developing internet gaming disorder than females, playing for longer periods of time, and engaging in riskier games [19]. However, in our sample, it was women who reported being more affected by the games of interest and exhibiting symptoms and consequences of problematic gaming. This could be due to the fact we were investigating *mobile games*: men have historically gravitated more towards big-budget, desktop gaming, whereas women are more likely to engage in casual mobile gaming, due to lifestyles and interests [59]. This difference in findings calls for closer investigation into disordered gaming particularly in relation to mobile games, which are monetised in more intentionally problematic ways [12], and whether it is likely to affect women more disproportionately.

A cynic may also argue that our sample only engaged in excessive gaming in their own subjective perception of what that means, namely, it may not be categorised as "excessive" in more formal categorisations. Indeed, many symptoms of gaming disorder would not be met by our participants, raising the question of whether the discussed behaviours and consequences are truly problematic. However, there are also other levels of excessive gaming which interact with player wellbeing and different characteristics: for example, Carras and Kardefelt-Winther [60] found five classes of gaming time investment—Internet Gaming Disorder, at-risk, concerned, engaged, and normative. Our work brings attention to the fact that even a level of excessive gaming which may not clinically qualify to be Internet Gaming Disorder per se could still lead to problematic outcomes for players within specific contexts.

6.2. *Links to Gambling.* In this study, we considered specifically how *interaction* with a game that had design elements aimed at player spending might cause harmful consequences for players, and we found that such harmful consequences emerged from the interaction of vulnerable traits with such mechanics. This relates to some of the discourse around gambling, and the design of gambling machines to optimise player engagement and investment, and is in alignment with some conceptualisations of gambling addiction: Shaffer [61] discusses the potential for addiction as emerging through repeated interaction with a specific object. Schüll [62] further writes about this relationship, emphasising the importance of the ingenious design of the gambling machines and their role in keeping gamblers invested. Microtransaction-based games share some elements of gambling machines (e.g., [31]), and with game design shifting into gamblification in its goals, it is interesting to see that player interaction with such games yields similar processes to gambling.

Some of the outcomes uncovered in this study are also similar to the known harms of gambling, which have been extensively studied through a variety of methods and populations, and can therefore be perceived as robust, valid research. Our categories can be compared alongside Langham et al.'s [33] dimensions of harm, which incorporate financial, relationship disruption, emotional or psychological distress, decrements to health, and reduced performance at work or study. All of these have a one-to-one mapping with the gaming-related problematic outcomes uncovered in this study (although Langham et al. do identify two additional categories, cultural harm and criminal activity, which were not present in this work). Our findings can also be considered through Wardle et al. [32] framework of resources, relationships, and health and generally support numerous previous research which highlights financial, social, emotional, work/education performance, and physical health as known consequences of gambling.

But what does this mean for our understanding of game design for monetisation and gaming-related problematic outcomes? If aspects of game design are serving the same purpose (e.g., player retention) as gambling interfaces, and having the same consequences for players, this is further evidence of the convergence of games and gambling. This is something which therefore needs more direct attention. To be clear, we are certainly not suggesting that *all* games share similarities to gambling, and are of concern, or even that *all individuals* would be affected by interaction with games that have prioritised driving player spending. However, a subset of games—primarily mobile games which have been identified in previous work as having had their "dynamics designed to drive spending" and have been shown in this current work as being linked to negative outcomes for players—needs close monitoring and regulation.

If such games are leading to problematic consequences for players because of how they generate revenue, there need to be stricter standards for the design of mobile games which do not allow this to happen. Based on this, and building on work into problematic monetisation by Petrovskaya et al. [12], we can recommend—as a starting point—three values of ethical monetisation design in games that developers can refer to if they wish to create ethical products: transparency, equality, and value for money. Transparency would mean both the presence and the purpose of every transaction is made clear, with no hidden costs or deceit. Equality means every player can have the same experience whether or not they pay, and value for money means the outcome of a purchase is worth exactly the money paid, without payment for something that should already be in the game, or similar. The implementation of these three principles from the industry side would be a great starting point for minimising player harm through in-game purchases.

6.3. *Moving Forward.* Moving forward, we therefore believe these games need more careful consideration. Our next step will be to test the generated theory quantitatively, with the aim of establishing also what types of people are most vulnerable to game design elements which are designed to drive spending (https://osf.io/nkc86). This will help with building a solid foundation of the harms associated with such games.

In other work, it would be interesting to explore the relationship between the gaming individual and the world around them: the gambling individual is often conceptualised as a member of an ecosystem—is the gaming individual having just as much impact on the world around them as is the case in gambling?

6.4. *Limitations.* Our sample consisted of players who already had a certain awareness of their behaviour: they reached out to participate in this project and were able to reflect on how playing the game had affected them. In cases where players had experienced consequences, the reflection tended to occur after a certain point—they had already had a realisation regarding their behaviour and had moved away from the game. Because of the nature of our methodology, we were unfortunately unable to interview people who were in a different place in their gaming, yet this may have provided different insights.

Similarly, we were restricted in the sample of games which we considered, limiting ourselves to only the games which in previous research had been already conceptualised as "games designed to drive spending." This meant that perhaps we overlooked some games which also would have fallen into this category. Furthermore, we did not consider the broader ecosystem of games and game production, focusing only on top-grossing mobile games. We did not look at desktop games or at less successful mobile games; we also did not consider indie games, which may have been designed according to different principles.

7. Conclusion

Previous work has considered problematic gaming as patterns of behaviour across games, viewing any negative outcomes as consequences of excessive engagement. We looked at a subset of games which have been specifically targeted to drive player spending and assessed the consequences of engaging with such games, as well as the underlying processes behind these consequences. Problematic outcomes which emerged from player interaction with such games covered financial, social, emotional, physical, and education/employment-related wellbeing. However, these outcomes did not stem from simply playing these games, as only a subset of players experienced such consequences, implying the existence of certain personal characteristics which interact with some game mechanics to lead to excessive engagement and subsequent problems. This model supports existing discourse around gamblification of games, as gamblers exhibit similar processes and outcomes when interacting with gambling machines. It also adds a new layer to gaming disorder research, suggesting that certain game elements can worsen—or possibly even cause—-problematic gaming. We plan to do more confirmatory work into which individuals might be most vulnerable to such games. Generally, it may be the moment for regulatory attention to turn to mobile, microtransaction-based games to ensure they do not cause harm, perhaps implementing design guidelines or quality checks before they are allowed onto the market.

Appendix

A. Appendix

List of interview questions at the start of the interview process.

(1) You self-identified as a player of "X" game—tell me about how and why you first started playing this game…

(2) How often/how long do you play the game?

   (i) What makes you want to play it?

   (ii) What makes you want to stop playing it?

   (iii) Do you ever spend more time on the game than you want to?

      (a) Why?

      (b) How do you feel after this happens?

      (c) Are there any consequences of this?

      (d) What are the consequences?

(3) Have you encountered elements in the game which you believe were trying to get you to spend money?

   (i) Have you ever spent money on this game?

      (a) Do you ever spend more money on the game than you want to?

      (b) Why? How do you feel after this happens?

   (ii) Are there any consequences of this?

   (iii) What are the consequences?

(4) Have there been any significant changes to any area of your life since you started playing game X?

(5) What makes you want to keep playing it?

(6) Is there anything else you'd like to add which you feel will help me better understand the topic?

List of interview questions at the end of the interview process.

(1) What do you do for a living/what's your job like?

(2) You self-identified as a player of "X" game—tell me about **how** and **why** you first started playing this game…

(3) How often/how long do you play the game?

   (i) How does the game fit into your daily routine?

(4) Why do you/did you play the game?

   (i) How did playing it make you feel?

(5) How do you feel when you achieve something in the game?

   (i) Is this difficult to do?

   (ii) Does it happen often?

(6) Are you happy with your life right now?

    (i) What would you change?

(7) Do you ever spend more time or more money on the game than you'd like?

    (i) Why?

(8) How do you feel when this happens?

(9) [Are there aspects of the game that you believe drive you to do this?]

(10) (How do you think the game has affected you? What consequences have there been?—*same questions as before.*)

B. Appendix

B.1. Post at Beginning of Recruitment. Hi everyone,

I'm a researcher at the University of York working on understanding potentially harmful ways in which games are monetised and the effects they may have on players. I have previously worked with players I recruited through Reddit to generate a taxonomy of problematic monetisation in games (see https://psyarxiv.com/cdwhq—some of you may have contributed to this!), which has been used in response to various calls for evidence and has had some practical impact, for example, in in-game advertising.

I am now running a study where I am looking to interview players of mobile games to understand how continued engagement with these games may have affected various aspects of their lives, including financial, social, and mental. If you are able to participate, please fill out this form and I will get in touch with you to set up a time to talk (you must be over 18). Interview should take no more than 30 minutes.

All your information will of course be kept confidential, stored securely, and I will only ask for your name (in case of follow up questions), age, gender and occupation (to contextualise your answers). Once I've finished collecting and analysing the data, it will be anonymised so there is no way to identify you.

Please do participate if you can help—it will have numerous benefits for our understanding of video game effects and how we can better protect players, as well as how games can be designed in an ethical way.

(This post has been approved by moderators!)

B.2. Post after Addition of Recruitment Criterion. Hi everyone,

I'm a PhD researcher looking into how some games may have been specifically designed to drive players into spending either too much time or too much money into them. (An example of my existing work can be found at https://link.springer.com/article/10.1007/s10551-021-04970-6.)

Now, I'm working on a project to understand how such games may affect the lives of their players, and am looking for participants. I'm interested particularly in mobile games.

If you feel mobile gaming has significantly negatively affected your life and would not mind being interviewed about it, please, do take part. The initial part is to fill out this form, and then I will get in touch with you to arrange a time. Interviews will take no longer than 45 minutes (online), and I can reimburse you for your time with an Amazon voucher.

All your information will of course be kept confidential and stored securely. Once I've finished collecting and analysing the data, it will be anonymised so there is no way to identify you. (I do normally collect some identification data during the recruitment process, such as age and gender, so I can make sure to recruit a broad range of participants, but if you do not feel comfortable sharing then it is not essential, just let me know in the form.)

Your participation will have numerous benefits for academic and public understanding of video game effects and how we can better protect players, so if you do not mind sharing your experience, it would be hugely appreciated.

Data Availability

Access to data is restricted given ethical concerns: participants qualitatively disclose distressing elements of their lives in-depth, and some identifying characteristics can be attached to the accounts.

Conflicts of Interest

There is no conflict of interest to be reported.

Acknowledgments

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