Conceptualising problematic in-game microtransactions and their effects through a player-centric perspective.

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Abstract

This thesis leverages player perspectives to understand problematic microtransactions in video games. Microtransactions are uncapped, repeated in-game purchases, and their conceptualisation as being problematic refers to instances where they have the potential to have a negative effect on players in any way[1]. Their inclusion in games has raised concerns around whether they might be linked to harm for players who interact with them. However, there is no comprehensive evidence base which works with players to understand the landscape of problematic microtransactions and their prevalence. Likewise, there is no understanding of possible effects of microtransactions beyond loot boxes.

The first study, a large-scale survey, asks players about problematic microtransactions which they have encountered in mobile and desktop games. The result is a categorisation of 35 types of microtransactions. The second study analyses player reviews of top-grossing games for mentions of these microtransactions to assess their prevalence, and finds they are present in 88% of mobile games and 28% of desktop games. The following two chapters aim to understand whether there could be links between playing games that include certain types of microtransactions and problems for player wellbeing. The third chapter is an interview study to define what such problems could be and who could experience them. The fourth chapter statistically tests the findings of chapter 3. I find no significant links between player psychological or environmental traits, game type, investment of time or money into the game.

The work presented contributes by showing the breadth of problematic microtransactions and their concerning prevalence in top-grossing games. It also indicates there are possible harms linked to playing such games, although they may not be a cause for concern when it comes to an average player. Taken together, it points to a need to incorporate player perspectives when studying microtransactions further.

[1] These definitions are to be used wherever the terms ‘microtransaction’ or ‘problematic’ are mentioned throughout the thesis, unless otherwise stated.

Table of Contents

Control games	240

List of Tables

List of Figures

Declaration

I declare that this thesis is a presentation of original work and I am the sole author. This work has not previously been presented for an award at this, or any other, University. All sources are acknowledged as References.

Some of the material in this thesis has been previously published in the following journal and conference papers:

Petrovskaya, E., & Zendle, D. (2021). Predatory monetisation? A categorisation of unfair, misleading and aggressive monetisation techniques in digital games from the player perspective. *Journal of Business Ethics*, 1-17.

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To my grandad, the most intelligent person I've ever known.

Foreword

In the spring of 2020, I, like many other people at the time, was spending my evenings playing a game online with my friends. My game of choice was *Dota 2.* Because of our otherwise lack of social contact and activities given the national lockdown in place at the time, we were pretty invested in the game. A popular topic of conversation was something called the 'Battle Pass', which, I learned, was a limited time game feature which came out once a year and contained a lot of cool content. The Battle Pass could be bought at level 1 for 9.99 USD, at level 50 for 29.35 USD, and at level 100 - which would unlock all the features - for 44.99 USD. I bought the level 1 pass, as did many of my friends.

As a few days passed, I started noticing something strange. The mood in our group had shifted. Rather than gathering every evening and playing for fun and to spend time together, people started playing for objectives. They played as if it was a chore, completing several games and tasks a day, trying to gather levels and progress to acquire rewards which came with the Battle Pass. I watched my friends grind, playing considerably more hours to reach their goals. Playing stopped being fun.

I didn't like what I saw. So, I decided to use my research skill set to look into it. And that took me down a path.

At the time, the discourse was very much about loot boxes - randomised rewards in games, purchased for real money, which had proven links with problem gambling. But it turns out that many things - like the Battle Pass - are just flying under the radar. And there are many, many other microtransactions out there. I started noticing them everywhere. Whenever I told people what I worked on, they'd *always* have a story about a game they were playing that had blocked their progress with a paywall, or about a time that they had spent more than they wanted.

Many of them are unethical. They're also ubiquitous. But yet, they're left pretty much unattended. Everyone has a phone, and most people have a game on their phone. And most of

these games have microtransactions in them. Yet there's no regulation, no safeguarding, no solutions. Some of these games are marked as appropriate for ages 4+, even though they contain gambling elements.

This thesis is the result of several years of work which helps fill that space. I wanted to expose and shed light on problematic monetisation practices. I wanted to show that there is more problematic monetisation than loot boxes, and to not let people brush it off by saying 'but it's just games'. I wanted to show that playing microtransaction-based games can be part of a complex process which may lead to some people experiencing harm.

This thesis is for everyone who has ever felt manipulated, or exploited by a game into spending their money or their time. I hope what I have created is useful to you.

Introduction

"The most important question in video game development has nothing to do with making video games. It's a simple question that has stymied artists for centuries and put an end to countless creative endeavors: ***how are we gonna pay for this thing?****"*

Jason Schreier, *Blood, Sweat, and Pixels,* 2017 [1].

Contemporary video games are often monetized by continuous, repeated in-game purchases rather than flat fees for the indefinite acquisition of the game. These purchases are commonly referred to as *microtransactions* [2]. Microtransactions are diverse, including payment for things that are part of the narrative, affect aesthetics in the game, give additional content, or even influence in-game progression. They are most commonly found in the freemium (or free-to-play) business model, in which a game is available for free upfront and most of the revenue comes from microtransactions [3].

The popular discourse around microtransactions is broadly negative. This is despite free-to-play games dominating the market. In 2022, free-to-play games generated 78.7 billion dollars [4]. Given that free-to-play games are available for free upfront, there is extra onus for in-game purchases to generate revenue. This means more pressure to design games in a way which encourages consumer spending, because player activity becomes value generation [5]. This parallels the design incentives seen in gambling, where the more time a player spends at a machine, the more money they are likely to spend.

Microtransactions could therefore be seen as symptom of the *gamblification* of games: "a process that utilises the affordances of gambling as a means of promoting consumer uptake, whether these be in respect to the exciting qualities of the games themselves or their potentially life-changing outcomes'' [6]. Gamblification describes the broader trend of the spread of gambling into adjacent fields, and specifically in the context of gaming is commonly

labelled as ‘gaming-gambling convergence’. Such convergence is happening *effectively*, through the addition of gambling elements into games, like near misses in *Candy Crush* [7] [8]. It is also, however, happening *affectively*, whereupon the focus is on emotional responses of the player, and the normalisation of gambling content [6].

If forms of microtransactions are points of gaming-gambling convergence, there is a possibility they could have links to harm in the same way that gambling does. Indeed, this is already being demonstrated with loot boxes, which are random rewards in games purchased with real money [9]–[11]. This attention is due to the links being established between loot box engagement and problem gambling [12], [13]. Longitudinal research is even beginning to show migration from loot boxes to problem gambling, implying a causal relationship [14].

Besides gambling, microtransactions are also often linked to so-called *dark patterns*: design elements used to make a user do something they may not want to do [15], [16]. Certain microtransactions are also criticised for being unethical, with common problems being raised including deception/lack of transparency about costs and rewards, coercive or even addicting design techniques, and negative impacts on player wellbeing [17]–[19]. If microtransactions *are* manifestations of dark patterns and/or unethical design, and are therefore contributing to players acting in specific ways against their will, the implications of this for player wellbeing ought to be considered.

To date, work on categorising microtransactions as ‘problematic’ has been top-down and led by researchers, based on existing ethical and regulatory frameworks. Some researchers have taxonomised in-game purchases along several dimensions in which they may be problematic. For example, King et al. [20] analysed video game patents through a consumer rights framework. Windleharth and Lee [21] generated two taxonomies: the types of transactions between game players and companies that ‘transfer or create value for the game owner’, and a ‘taxonomy of methods companies use to drive engagement and retention with mobile games’. Ballou et al. [22] categorised loot boxes across different dimensions.

Notably, all of the above were conceptualised and executed by academic researchers, without calling on the players as a resource. Work with players was done by Hamari et al. [23], who taxonomised in-game purchase motivations based on a survey of 519 people. However, this considered player motivations around microtransactions, rather than microtransactions themselves.

While top-down analyses can inform the evaluation of microtransactions, it is vital to consider player experiences and opinions in understanding the landscape and impacts. Players as the primary stakeholder are most closely connected to microtransactions, and can offer the most accurate perspectives.

Furthermore, although evidence is shaping that engagement with loot boxes may be connected to problems for wellbeing [24], and spending on microtransactions may also be linked to dysregulated gaming patterns [25], there is a gap in evidence around whether and what problems interaction with other specific microtransactions may be linked to. With gaming-gambling convergence in mind, there are also more complex links being developed between financial and time investment into games [26]–[28], and player wellbeing. Bottom-up player insight is needed to understand the nuances of these links and who might be affected by game design.

Open questions

There is a lack of work which has used the player perspective to understand what microtransactions could be labelled as problematic, given that research so far has consisted of top-down approaches, driven by researcher questions. Relatedly, there is also minimal understanding around whether such alternative problematic microtransactions, besides loot boxes, could be linked to harms for players, which stems from there being no comprehensive classification of problematic microtransactions as they are seen by players. Finally, there is a

lack of cohesion around how one could assess and define whether a microtransaction could be problematic, which could be translated into actionable guidelines for industry and regulators.

Research questions

This thesis addresses key research questions to begin filling these gaps. These questions are as follows:

RQ1) What forms of problematic microtransactions exist?

RQ2) What is the prevalence of these types of microtransactions across top-grossing mobile and desktop games?

RQ3) What problems are linked to interaction with games which have microtransactions designed to drive player spending?

RQ4) Are certain types of people more likely to experience problems linked to these games?

The research questions were developed sequentially as the work was conducted for the thesis. Each was driven by the previous, and shaped by the emerging needs and perspectives of the players which came about from the results.

Methodology

Throughout the methods used in this thesis, a core thread is the use of the player perspective. In every study, the data used to answer the research question came directly from the players. Players are the main people interacting with microtransactions, and they also hold the highest stake in the conversation. If microtransactions have the potential for causing harm l, this is best studied from the player point of view. If the harms are real and measurable, players will be the stakeholders that will need to be protected from these harms. They are also the stakeholders

who have the greatest interaction with microtransactions and therefore have the best understanding of how these design elements function in practice.

I took a mixed-methods approach. The merits of such an approach are that they allow the exploration of both the breadth and depth of a topic of interest. Because I was using the player perspective, studies 1-2 use qualitative data from a survey and game reviews respectively to understand types and prevalence of microtransactions that players encountered in their own words. Study 3 goes deeper, taking an interview approach to understand the complex relationship between players, games, and outcomes. Study 4 builds on the findings of study 3, attempting to understand the scale of the findings by using quantitative survey methods.

Outline of Research

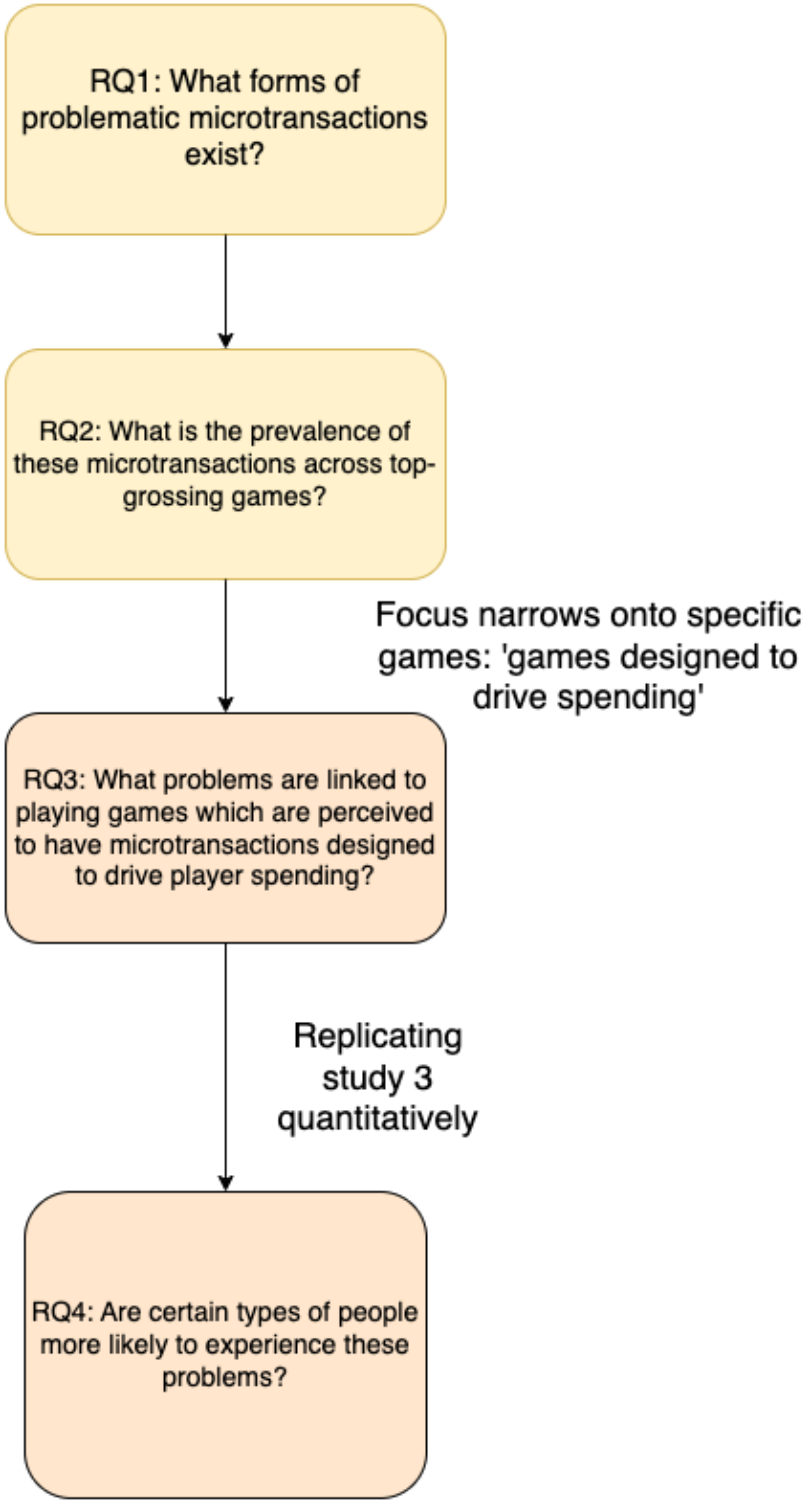

Figure 1. A visual illustration of the flow of the thesis.

In order to address the research questions, I conducted 4 studies. The studies map one-to-one to the research questions: study 1 answers RQ1, and so on. The flow of the thesis structure can be seen in Figure 1.

In study 1, I administered a qualitative survey to 1104 players of mobile and desktop games. The survey asked players what microtransactions in games they had encountered which they had found to be unfair, misleading, or aggressive. Their answers were analysed by thematic analysis. The result was 35 types of player-perceived problematic microtransactions, grouped across 8 domains. Some microtransactions were concrete and observable design elements, such as in-game currency and battle passes. Others related more to player perceptions of developer intent, and the effect of monetisation on their experience.

For study 2, the focus was on assessing the prevalence of the 35 problematic microtransactions from study 1 across top-grossing 50 mobile and 50 desktop games. Negative reviews of the games were used, scraped from the Google Play store for mobile games and Steam for desktop games. There were a total of 801 reviews. These were searched for the microtransactions of interest. Mobile games seemingly featured more problematic microtransactions than desktop games, and many mobile games - 52% - were characterised by players as “games designed to drive spending”. Players raised issues of fairness, transparency, social equality, and the player experience in their discussions of microtransactions.

Given the prevalence of mobile games being characterised as “designed to drive spending”, studies 3 and 4 focus specifically on this subsample of games. Such games were defined as “situations where players feel game dynamics - the ways in which the game patterns and players evolve over time - have been designed especially to encourage spending, rather than primarily for the improvement of a player’s in-game experience.” In study 2, specific games which are perceived by players as such were identified. These games serve as the basis for studies 3 and 4.

In study 3, the aim was to begin to understand whether interaction with games designed to drive player spending - and thus possibly being examples of gamblification - could result in harm for players. Given the lack of research around harms as a result of player interaction with microtransactions (besides loot boxes), resulting in a lack of knowledge of what *possible* harms players may experience, I took a bottom-up, grounded theory approach. I interviewed 14 players of games classed as designed to drive spending and other mobile games (according to the constant comparison philosophy of grounded theory). The result showed that players of such games can and do experience a range of harms connected to their play: financial harm, reduced quality of social relationships, problems sleeping, emotional harm, and reduced educational or vocational achievements. However, only certain players were affected by playing these games. These were people who were experiencing a reduced quality of life, which included factors such as high levels of stress, mental health problems, and low self-esteem.

These harms parallel the known harms of gambling, and overlap with the symptoms of internet gaming disorder. As such, if they are a widely-spread result of playing games monetised in a certain way, this is cause for regulatory concern. Moreover, it would be evidence for the gamblification of games. If players in difficult circumstances are playing games with a certain design and experiencing harm following interaction with such design, it implies addiction by design.

With this in mind, in study 4 I set out to quantitatively validate the theory of harms established in study 3. I administered a battery of measures to 295 players which included psycho-environmental measures to assess their quality of life and mental state, and then wellbeing measures across the harms identified in study 3. I also used player-donated, objective screenshot measures of how much time and money they had spent on the games as a mediator. This was included to make sure the game was actually having an effect, if a link was found between player characteristics and wellbeing.

However, to my surprise, no relationships were significant, meaning the sample provided no evidence for a relationship between player psycho-environmental characteristics and wellbeing as a result of investing time and money into games designed to drive spending. There was not even a significant difference in wellbeing levels between players of the games of interest and a control sample of alternative games. This was an unexpected result, but there are several possible explanations (discussed in detail in Chapter 4).

Contributions

The work conducted for this thesis delivers by addressing the open questions described above. I present a comprehensive categorisation of what problematic microtransactions exist, developed from the player perspective. I also present the frequencies of occurrence of these microtransactions across high-grossing games, which were also obtained from the player point of view.

I show evidence that there is a sample of players which may experience harms linked to interaction with certain problematic microtransactions which parallel the harms of gambling. However, based on the work presented in this thesis, I can tentatively suggest that a player sampled from an average population may not experience these harms.

I present a discussion of how a problematic microtransaction may be distinguished from a frustrating one, and lay out some criteria for how this can be done practically.

Taken together, this thesis moves the field towards a deeper and more nuanced understanding of the player experience around problematic monetisation, and the effects of such monetisation.

Scope

In study 4, a significant effect was not found for a relationship between games designed to drive player spending and any player harms. It must be said, however, that it is outside of the scope of this thesis to claim that this lack of effect means there is *no* effect. To do so, further statistical tests would need to be conducted. What's more, to generalise this conclusion comfortably across all players, a much larger and more representative sample would need to be surveyed - a much greater one than I had access to or resources for over the work being conducted for this thesis.

Moreover, although studies 1-2 build a broad picture of problematic microtransactions and their prevalence, studies 3-4 zoom into a specific subtype of games, which constituted 26 mobile games. It is the effects of those games which are considered. Therefore, the remaining 7 domains of microtransactions and their effects are not studied. This is a hopeful priority for future work.

Finally, working with players to understand their perspectives on game monetisation, while providing a valuable data source also has some limitations. The foremost of these is subjectivity. Player opinions stem from their own experiences and backgrounds. As such, although several players expressing an opinion or an experience with the same microtransaction gives the finding weight, it will never be fully objective. It is outside of the scope of this thesis, therefore, to make claims regarding objectivity and generalisability - as already mentioned - across all players and all games.

Ethical statement

The research conducted for this thesis was guided by ethical principles. Ethical approval for every study conducted which included human participants was granted from the University of York Physical Sciences Ethics committee.

All participants were aged over 18. They were fully briefed about the nature of the research, and were aware that they had the right to withdraw at any point. They were explained what will happen to their data, who will have access to it and how it will be stored. All participants provided informed consent for participation.

The topic under study was possibly of a difficult nature to some participants. This was particularly relevant in study 3, where participants were asked to describe in detail how gaming may have affected their lives in a negative way. Participants were told no questions were mandatory and it was always made clear that they did not have to answer anything that made them uncomfortable. They were also given information about where they could access additional support if needed after the study, such as phone numbers of mental health charities.

Data collected in all of the research was anonymised, and participants were not identifiable. It was stored confidentially and securely.

Literature Review

The study of microtransactions is interdisciplinary. It spans human-computer interaction, gambling, media effects, game studies, gaming disorder, and legal perspectives. This literature review will consider all of these existing areas of research to situate the current thesis.

I begin with an overview of the history of game monetisation more broadly and microtransactions specifically, to provide context for the implementation and success of microtransactions. Then, I move onto the current largest perceived issue (at least in the UK, where this thesis has been conducted) around microtransactions, which are their possible links with gambling, particularly in the case of loot boxes.

However, there are other issues also, which span human-computer interaction perspectives on so-called 'dark design', the player experience and how it links to monetisation, and ethical issues with such design. I also discuss existing literature on microtransactions in the context of dysregulated gaming, and their links to playtime and excessive spending, which naturally ties into gaming disorder. Then, I cover the regulation around microtransactions and the gaps in this regulation, which in part informs the need for this thesis. Finally, I describe the method of using the player, the main stakeholder in this research, as a resource for data, given that this is one of the contributions of the thesis.

A brief history of game monetisation & microtransactions

To understand player perspectives on microtransactions in games, one must first understand the history of game monetisation. This history has influenced the tradition of monetisation and subsequently player expectations. Moreover, one must also understand the very role that games play in society, and how the introduction of economic concerns into this experience may be received.

Games within computer science

Before delving into the commercialisation of games, it is useful to present a brief overview of digital games and their position in computer science as a discipline, given that this thesis is being examined within a Computer Science department. Amongst others, the study of digital games can be situated in human-computer interaction (HCI), which is a subfield of computer science that looks at how people interact with technology, and the design of interfaces which facilitate this interaction [29]. HCI is conceptualised as moving through three waves of research focus [30]. The first wave focused on building systems and interfaces that were easy to use. The second focused on cognitive psychology and how people make decisions when interacting with these interfaces. The third, and most recent, is the most holistic. It draws attention to socio-cultural context, the user experience, and meaning-making of a technological system [31].

Games, being complex technological systems, provide fruitful grounds for studying user experience [32] and how to design these experiences to be engaging [33], [34]. The engaging and immersive properties of games have also led to a research direction in HCI regarding how games can be applied to improve other areas of user lives, such as post-work recovery [35] and learning new skills [36]. The properties of games have also been applied to other technologies in a phenomenon known as ‘gamification’ [37], [38]. Gamification has been demonstrated to be effective in settings such as exercise motivation [39] and learning [40].

To summarise, games research within HCI often focuses on player experience and game design, and how the positive characteristics of games can be applied to other contexts. The discussion of player experience and design naturally intersects with monetisation. It brings to light questions of whether monetisation impacts experience positively or negatively, and how to design monetisation in games in a way which maximises this experience. This, fundamentally, is the purpose of this thesis.

Sociocultural perspectives on gaming and culture

Games are reciprocally embedded in the fabric of societal development and its economy, and are not always the straightforward manifestations of 'play' which some may assume them to be. The quote which opens the introduction, by Jason Schreier, is the first sentence of the opening chapter of his book *Blood, Sweat, and Pixels* [1]. It is a series of stories about the development and production process of several commercial games, based on interviews with people who were involved in the process. Although there are many dimensions to these stories, including passion for the craft and wanting to deliver a wonderful experience and product, they are never fully separate from monetary concerns. The consensus across all the interviews is that without funding - both for the product and for those who make it - most games would simply not exist.

In 2009, Nick Dyer-Witherford and Greg de Peuter released *Games of Empire,* which is lauded as 'a seminal book in videogame cultural criticism', to the extent that its 10 year anniversary was marked with a special edition in its honour in the journal *Games and Culture* [41]. Dyer-Witherford and de Peuter argued that video game production and study processes are symptomatic of global social and economic forces; that game-making blurs the boundaries between work, play, production, consumption, and voluntary activity and exploitation [42]. This sentiment is consistently echoed as technological development advances through phenomena such as platformisation [43]: the rise of platforms owned by large tech companies which enable more widespread distribution and consumption of digital games.

Giddings and Harvey [44] write that 'the study of digital games should be applied as a primary heuristic in understanding the cultural economy of neoliberal late capitalism and vice versa'. Game studies scholars have consistently applied this philosophy in analyses of modern games and how they exemplify the philosophy of capitalism. For example, Jin [45] discusses how *Pokémon Go* creates value for the industry by the players engaging in labour by playing the game, and Joseph [46], focusing on a monetised aspect of digital games, the battle pass, concludes that 'battle pass capitalism shows in a sense how games are now shops.'

In essence, all commercial games are designed to be successful, and being successful is, in this context, bringing in revenue. Although it is true that developers in different cultures in the industry focus on monetisation to different extents - for example, indie developers emphasise artistic freedom over maximum revenue [47] - no game development is entirely free from economic concerns. Even an indie game costs between $250,000 and $500,000 to develop (for a team of five people working for two years on a game) [48].

Having established how integral monetisation is to digital games, let us consider the origins of this and how they developed into the hugely successful monetisation systems we see today.

The commercialisation of digital games

The core of early video game development was exploration, creation, and the pushing of boundaries. Games were made for fun, and because their makers wanted to try out new things using previously unavailable technologies. Examples include the 1958 game *Tennis for Two* [49], the point of which was for two players to literally bounce a dot around a screen, and *SpaceWar!* [50]. Soon after came *Computer Space!* [51], credited as the first commercial video game, and *Pong* [52], which brought such games into the mainstream [53]. *Pong* was coin-operated, and brought in four times more revenue than other coin-operated machines, ensuring its success [53].

Prior to the integration of coin-operated games into the arcade, this environment had been very gambling-focused, to the extent that in 1942 pinball was banned in New York City and thousands of machines were confiscated, because the government was worried about its effects on children given its resemblance to gambling and its role in organised crime [54]. As such, the period between 1942 and 1970 was controversial for arcade machines [55]. In the 70s, pinball was reintroduced as its makers were able to prove that it was a game of skill rather than chance [56], and other video games, following *Pong's* lead, were steadily dominating the market. A key example is *Pac-Man* [57], which brought gaming into the mainstream and allowed 'hardcore'

gamers to mingle with ‘casual’ gamers. The list goes on. All commercially successful and widely loved, they were the industry’s taste of how powerful pay-per-play revenue can be.

Collectively, the period of 1977-1993 is known as ‘the Golden Age’ of arcade video games. It saw an incredible worldwide spread of the market, and in 1982, the arcade industry’s revenue (in quarters) came in at around $8 billion. (For comparison, Hollywood films brought in $3 billion that year [58]).

The success of *Pong* allowed for subsequent expansion into the home, with a console that would connect to televisions - Atari followed Magnavox, the company behind the first home console, to release a domestic version of *Pong* [59]. *Home Pong* became a success (150,000 units were sold during the 1975 Christmas season [60, p. 2]) and led the way for the expansion of the console market. Atari then launched the Atari 2600 (Figure 2). They were followed by the second generation of consoles, which used cartridges, introduced by Fairchild [59].

Figure 2. A Magnavox Odyssey console (from [61]

This facilitated ownership of games in the home by individuals and pioneered a system of payment where players would pay for the console and for subsequent games [62]. Unfortunately, in 1983, due to the rise of personal computers and the US recession, the home console market crashed [63]. However, its legacy continues into the modern days. This was the first time where people were able to take digital games into their homes, which is now ubiquitous.

In parallel, the industry was witnessing the rise of games played on computers, facilitated by the growing accessibility of personal computers in the mid-seventies. In fact, “it may be most reasonable to see this as a history of mutual influences, where technology can inspire (or enable) cultural developments, and cultural developments can inspire new technology” [64] (p.7) . In the 90s, the Internet also became progressively more accessible to users for leisure, which facilitated the birth of multiplayer games. Seminal examples of these are multi-user dungeons (MUD), which developed into multiplayer online games (MMOs). In these, vast amounts of players could simultaneously play in equally vast worlds [65]. Possibly the most popular example of such games is Blizzard’s *World of Warcraft* [66], which even in 2022 had 4.6 million subscribers [67]. MMOs were (and many still are) often monetised via subscription models, which allows access to the game hosted on a server, rather than direct ownership (which would have been difficult given slow Internet d for most people at the time). *World of Warcraft* has grossed over $9.23 billion through this model, which in 2017 made it the fourth highest-grossing digital game of all time [68]. (The top two were *Space Invaders* [69] and *PacMan* - both arcade games, which goes to show just how successful the era and monetisation model was for the industry).

WIth MMOs came virtual economies. These are economies which exist in virtual worlds, allowing the purchase and trading of goods for virtual (or, less often, real) currencies [70]. Through the development of virtual worlds, virtual economies also became more advanced. For example, by 2008, real banks were offering services with an interest rate in the game *Second Life* [71], and crime and fraud was also going on within this game [72]. Virtual economies have

also spilt out into the real world - in-game currency to be used on virtual goods can now be purchased for real money on third-party websites. Already in 2004, the turnover for virtual good sales outside of games was estimated to be around $100 million [73].

The advance of technology also meant more interesting, complicated, and aesthetically pleasing games could be produced, which warranted a fairly high upfront purchase price. This type of monetisation meant the player paid a one-time fee, and then had unlimited access and playtime on the game. Originally, games as products were purchased from stores in physical copies, after which point the purchaser owned the copy. This has now progressed into payment for digital downloads. It is worth noting that the rise of *platformisation* - platforms like Steam, which distribute and hold a large proportion of games - has shifted ownership in gaming, meaning players don't own the game the way they would own a physical copy, but fundamentally still do have unlimited access to the game on their machine [3].

In the discussion of game monetisation, one must not fail to overlook DLCs: downloadable content. DLCs are viewed by some as the industry's stepping stone from upfront priced content to extending a game's profitability via additional in-game purchases [74]. The extreme end of this spectrum is *microtransactions*: uncapped, repeated in-game purchases [2]. DLCs were particularly prominent during the successful era of consoles, which began with the release of the Sega Dreamcast, shortly followed by the Nintendo GameCube and the Xbox in 2002 [75]. The reason behind this is believed to be that consoles relied on software to make profit, which called for continuous updates to said software [42], [74]. After this initial implementation, DLCs spread across other technologies, like personal computers. They are particularly prominent in musical games, which give players the option to download additional songs [76].

Mobile gaming and free-to-play games

In parallel, smartphones, also with Internet connectivity, were gaining popularity. This has led to the inevitable rise of mobile gaming, hailed by some as "the contemporary, dominant site[s] for digital play" [77]. It has also led to the main topic of this thesis - microtransactions. It is

therefore natural that we next explore mobile gaming - and its associated monetisation models - further.

Mobile gaming as a form can be said to have its roots from two distinct formats of gaming which came together into one: the above described video games and physical card, board, and other types of games [77]. Aided by the development of Wireless Application Protocol (WAP) technology, which enabled mobile devices to connect to the internet and inspired the development of simple games like Connect 4. Although such games were basic and slow as compared to their computer counterparts, they provided the opportunity for something new, exciting, and innovative. Professor Frans Mäyrä, a specialist in the relationship of culture and technology, particularly within gaming, writes about the medium: “Thanks to miniaturisation and the possibility to implement mobile video games, today’s mobile games are an increasingly notable and growing area of game business and culture. [...] The expansion of mobile gaming is noteworthy also in terms of quality, as mobile games have become a site for innovative, new play and game design practices.” [78].

It is widely acknowledged that the development of the iPhone by Apple in 2007, was a turning point for mobile gaming (and indeed for all mobile apps in general and for how we use mobile phones today). iPhones had a larger RAM size than other smartphones at the time, a more powerful operating system, and a touchscreen. Moreover, the introduction of the App Store, which allowed easy digital distribution and access for users to applications, opened completely new doors regarding what could be done on a mobile device.

Initially, the App Store only allowed single-time purchase app models, so the upfront purchase model was adapted by mobile games also. However, in October 2009, ‘in-app purchases’ were introduced; this meant that apps could now include microtransactions. A key example of this being adapted in a successful game is that of Rovio Entertainment and *Angry Birds* [79], a game which involves launching birds at structures occupied by pigs. When Rovio ported the game to Android, they released a free version with adverts. Users could pay to remove the ads, which

meant that Rovio was simultaneously getting revenue from the adverts and from users paying [80]. This was one of the first case studies of a free mobile game being monetised successfully by additional purchases.

In parallel, many Asian countries also had a fast-expanding mobile, free-to-play scene. Although apps developed in different countries would not always be available internationally, given regional restrictions of app stores, important influences can still be traced. The Chinese market became the most valuable mobile gaming market in the world in 2016, without having much of a similar history previously with desktop or console gaming. Chinese games focused much more on social mechanics, such as guilds, co-operative tasks, and spectator mode than Western games at the time [81]. China is credited with creating social-network games, which serve as direct inspiration for similar games, such as *FarmVille* [82] in the Western world.

The next big development for mobile gaming was through the popularisation of social media platforms like Facebook. The model of Facebook games was largely dependent on user-to-user communication and promotion of game-related content. This was incentivised by giving players rewards for inviting their friends into the games [3]. For example, *FarmVille*, a farm management simulation game, only afforded players a limited amount of actions per day. Players could ask their Facebook friends for extra actions. While the game was highly successful, it attracted criticism from 'traditional' game designers for its use of 'compulsion' and 'destroyed time', to the extent that when the game won an award at the Game Developers' Conference in 2010, the accepting executive was booed [83]).

These criticisms are summarised aptly by Ian Bogost, a game developer and game studies scholar, who designed *Cow Clicker,* a satirical copy of *FarmVille*. In his discussion of *Cow Clicker,* Bogost wrote, "Social games so covet our time that they abuse us while we are away from them, through obligation, worry, and dread over missed opportunities. The compulsive destruction of time in social games does not merely affect players, but also developers. As we are so often reminded, these games are "not products but services." They are ongoing,

never-ending affairs that must extract time and money from players in the most efficient way possible" [84]. (This is a foreshadowing of the criticisms which are almost as integral to free-to-play games as microtransactions themselves).

Seeing the success of Facebook games, other developers, such as King, decided to incorporate some of Facebook's ideas into their own design. King released *Bubble Witch Saga* [85], which distinguished itself from *FarmVille* by introducing levels. *Bubble Witch Saga* became the fastest growing game on Facebook, and King followed this with the *Candy Crush Saga* [7], which employed similar principles. King expanded further by releasing these games on the App Store as stand-alone games, eventually removing advertising and generating their revenue based on in-app purchases [86]. This strategy was extremely profitable, and served as the blueprint to show how profitable the free-to-play, microtransaction-based model could be. Currently, the majority of the top grossing apps on the App Store use the free-to-play model.

In-app purchases

Across strategies adopted in free-to-play games, players generally have the ability to make purchases during play in a game which was at first free to take up. The type of purchases vary greatly across games, and are placed on many spectrums of the extent to which they influence the gameplay and how they are perceived by players - which is the core subject of this thesis. Based on industry handbooks, free-to-play models can be split into several types of strategies: freemium, free-to-play, and pay-to-win [87], [88].

These are often described interchangeably, and are referred to collectively in this thesis as 'free-to-play'. The main distinction is that the free-to-play model encourages purchases for players to help them in the game, whereas the freemium model locks content without payment. Free-to-play models also incorporate ad-based revenue, where players must watch ads to progress. In pay-to-win models, payment is tied specifically to progression, where payment is tied to success or a competitive advantage.

It is also possible to categorise in-app purchases within these models. Firstly, some scholars split in-app purchases into functional - those which affect the gameplay itself, or cosmetic - those which affect appearances of objects or players in game [89]. Functional purchases can be further split. For example, Luton [90] describes them as content, convenience, and competitive advantage (with another C being for customisation, which relates to cosmetic purchases).

Alha [3] places particular attention on the time a purchase takes to have an effect, arguing for three categories: consumable, subscription, and permanent content. She builds on the work of Luton to ultimately divide paid content into five attributes: cosmetic, convenience, advancement, power, and social content. The distinction between *power* and *advancement* exists in the former being an advantage over non-paying players, and the latter being easier progress through the game. Examples of Alha's categories can be seen in Figure 3.

	Consumable	Subscription	Permanent
Cosmetic	Limited time costume	Premium portrait	Permanent costume
Convenience	Easier harvesting	Premium inventory	Inventory upgrade
Advancement	Energy refill	Premium XP	Level unlock
Power	Booster	Premium ammo	Weapon upgrade
Social	Shared booster	Premium chat	Guild upgrade

Figure 3. Categories of in-app purchases, from Alha (2020).

Some in-app purchases have already been considered further. Lelonek-Kuletta [91] studied players who spent on pay-to-win mechanics in games (classified as 'power' according to Alha), with the aim of understanding if this mechanic is linked to problem gaming. In their sample, 20% were spending on such microtransactions. Joseph [46] carried out an app walk-through of *Apex Legends* [92], trying to understand how in-game commodities were structured. Researchers are beginning to pay attention to microtransactions, and ask how they are designed into games and how they may be affecting player engagement.

This section has provided an overview of what microtransactions are, and given some context for their integration into the gaming business model. I will now guide the reader through literature that will aid understanding on why it is important to study microtransactions, and why they might have potential for negative effects for players and the player experience.

Gaming-gambling convergence

One prominent strand of discourse around microtransaction has been their role in an increasing convergence between gaming and gambling. This has caused concern especially because of the availability of games with microtransactions to children and adolescents, and the lack of equivalent regulation that is necessary for gambling around such practices.

Freemium games, being available for free up front, rely on in-game spending to drive revenue generation. This means that on the industry side of the production of these games, player activity becomes value generation, and consequently becomes used as a mechanism for control over player behaviour [93]. As free-to-play games translate player effort, personal information, and needs into revenue streams, games are being designed to increase time-on-device, player retention, and conversion from free to paid play [5]. Technological developments have also made it easier to incorporate gambling elements into digital games, primarily through in-app purchases of things like skins and in-game currency which can be used for gambling simulation [94]. Furthermore, this has facilitated a growing market of skins betting in external platforms for gambling activities [95], [96, p. 201].

Structural parallels

As incentives of game design shift in the ways described above due to the demands of the industry, it begins to parallel player experiences with gambling-related design. One clear parallel can be seen by turning to *Addiction by Design* [97], an iconic piece of work which emphasises the importance of the design of gambling machines and their role in keeping players involved. Engineered experiences, programmed chance, interior design of casinos are all designed to keep

players invested, present in the so-called ‘machine zone’. Feedback is also carefully curated and players are surveyed, tracked, and guided through the activity to ensure their engagement is maximised.

Let us also consider structural characteristics of gambling compiled by Weinstein and Deitch [98] and their application to fruit machines by Griffiths [99]. In fruit machines, *pay out intervals* are very short. *Bettor involvement* is high - a player has to be involved in making consistent decisions while engaging with the machine - and according to Griffiths, ’the more actively involved a person is with a gambling activity the more likely they are to believe that their actions can affect gambling outcome’, leading to a warped perception that more *skill is required* than is true. Specialist buttons lead to an exacerbation of this illusion. Griffiths also discusses how light and sound effects used in such machines are psycho structural: they create an atmosphere of fun, and suggest big money wins are just around the corner (they are also effective in keeping gamblers trapped in the *machine zone,* as Dow-Schüll writes). Naming conventions are also highlighted and have psychological effects on players. Griffiths found that many names of such machines are money-related or skill-related, contributing to the idea of big wins or using skill to win.

Certain free-to-play mobile games parallel the design of fruit machines, and the techniques employed by such games have been likened to gambling. For example, Larche et al’s [8] work shows how near misses - commonly featured in slot machines to maintain player urge to continue play - have a similar effect in the popular mobile game *Candy Crush* (see Figure 4).

Figure 4. A near miss in *Candy Crush.*

To provide the reader with a concrete example, consider the game *Coin Master* [100] (at the time of writing, the highest grossing game on the Google Play store). *Coin Master* presents itself as an 'adventure' game, but includes mechanics such as shown in Figure 5, which both visually and structurally are found in slot machines. The fundamental mechanics are essentially to build a village using cash which is acquired from playing a slot machine, and several techniques are employed to make players engage with this spinning as much as possible, such as push notifications and signing in with Facebook. This has been flagged by players and critics online. For example, game journalist Ric Cowley [101] writes, in his evaluation of the game:

"It's the feel of spinning the wheel, even on auto-spin. It's the tiny, slow turns of the last drum as it lands on your third pig. And it's the bombardment of notifications reminding you that you could be playing right now. That's why people are still playing Coin Master."

This description of the gameplay directly parallels written experiences of gambling and of how it feels to play actual slot machines (e.g. [102]) - tiny interactions which keep the player hooked. Clearly, *Coin Master* is an example of gamblification[2].

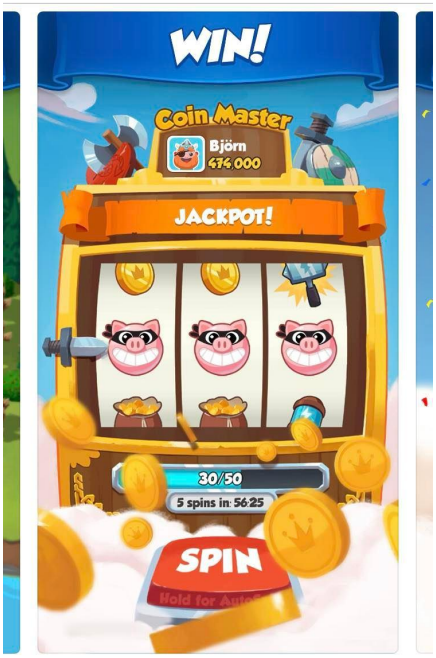

Figure 5. A slot machine mechanic in *Coin Master.*

A case study: loot boxes

One focal point of this convergence is *loot boxes,* which in particular have been described as being structurally and psychologically similar to gambling. Loot boxes are defined as in-game payment of real world money for a set of randomised real-world items (e.g. [103]).

Loot boxes are perceived as a point of concern because of the variable rewards which are part of so-called 'variable ratio reinforcement', meaning people quickly acquire a purchasing behaviour and frequently repeat it in the hopes of receiving another reward. Many

[2] It is worth noting at this point that the term gamblification is used throughout this thesis in a way which delineates the above: a growing shift of gambling into gaming through how it influences player psychology. This term uses as a foundation the definition of affective gambling by Macey and Hamari [6] - as employing signifiers of gambling - while simultaneously extending and expanding on this definition. Thus, ironically, the current definition becomes one of the many different uses of the word gamblification that Macey and Hamari discuss.

implementations of loot boxes even meet Griffiths' 5 gambling criteria [104]: exchange of money or valuable goods, determined by an unknown future event, outcome partly determined by chance, non-participation can incur losses, and winners gain at the expense of losers [10].

Furthermore, purchasing loot boxes has been directly linked to problem gambling outcomes, where higher spending on loot boxes is consistently correlated with severity of problem gambling [12], [13]. There is particular concern amongst regulators given this relationship holds even in adolescent populations: Kristiansen & Severin [105] found in a representative sample (n = 1137) of 12-16 year olds that 45.6% had 'engaged in loot box activities at some level', and Zendle et al [106] found in a survey of 16-18 year olds (n = 1155) a link of ($\eta 2 = 0.120$) between loot box purchasing and problem gambling, with motivations for purchase overlapping with those for gambling. A recent longitudinal study by Brooks and Clark [14] also provided empirical evidence for migration from loot boxes to gambling. This suggests that individuals who first encounter loot boxes in games may then go on to become gamblers.

Loot boxes are also highly prevalent. In the UK, 58% of games on the Google Play store and 36% of games on the Steam store contained loot boxes as of 2020 [107]. In Australia, 62% of sampled 'best-selling' games contained loot boxes [108], and in China, the number was 91% in 100 highest-grossing games on the Apple Store [109].

Although the related harms consistently emerge throughout the literature, loot boxes do remain a controversial topic. Firstly, some authors propose that there are different categories of loot box implementation. Nielsen and Grabarczyk [103] sort loot boxes into four categories, based on whether the cost to purchase the loot box in the game is transferable into real money outside of the in-game economy, and likewise whether the reward is valuable outside of the game. The four categories are as follows:

- Embedded-Embedded: real money to engage, real money reward.

- Embedded-Isolated: real money to engage ('embedded' in the real world economy), in-game reward ('isolated' from the world outside of games) only.
- Isolated-Embedded: in-game cost to engage, real money reward.
- Isolated-Isolated: both the cost to engage and reward are in-game only.

Currently, regulation favours the embedded-embedded category. However, Xiao [110] argues that the three other types are also harmful and should be considered by regulators, given their implications for things like criminal risks of cashing out (isolated-embedded), gambling for perceived value (embedded-isolated), and simulation of gambling behaviour (isolated-isolated).

Loot box categorisation does not end there, and can be broken down even further. For example, Ballou, Gbadamosi and Zendle [22] identify 33 features of loot box-like mechanics that might be expected to influence player behaviour or player spending, which they group into 6 domains: point of purchase, pulling procedure, contents, audiovisual presentation, salience, and social. These features are likely to have varying effects on players, and possibly varying levels of harm also.

Other examples

Loot boxes are not the only element of gaming-gambling convergence which shows the link with problem gambling. General engagement with game-related gambling practices, such as token wagering and real money video gaming (wagering real money on outcomes of in-game efforts [111], is significantly linked to problem gambling (*rho* = 0.23) [112].

One example of such gambling practices is that of social casinos. These are games which replicate the structural design of real casinos or other gambling activities, while remaining free to play and not awarding any real monetary rewards to players [113]. However, they heavily feature social play and interaction with other users. Although technically defined as games (and because of this, not regulated), social casino games have raised concern. For example, in a study of 521 adults, 19.4% reported real-money gambling as a result of playing social casino games

[114]. Moreover, social casino games are available to adolescents without any of the protection existing around real gambling [115].

Another emerging area of concern is that of esports betting, which facilitates betting with real money on the outcomes of video gaming. Spectating esports and participation in general forms of gambling are associated with increased esports betting, and in this way, esports may act as a 'vehicle for gambling content' [116]. Esports betting is associated with gambling even in adolescents, and an analysis of 6810 adolescents found that 20% of this sample had bet on esports during the past year [117].

Attention has also recently turned to the convergence of gaming and gambling via the medium of streaming. In an analysis of 442 extensions offered by Twitch, one of the most successful live-streaming websites in the world and one popularly used by gamers to showcase their play, Abarbanel and Johnson [118] found several gambling themes, such as giveaways by streamers, and gambling for accumulation of loyalty points. They also highlight the use of affective gambling techniques, such as the use of the word 'addictive' in advertising, and the engagement of viewers when the streamer is away from the keyboard to stop them from switching to another activity.

All of the above are examples of gaming-gambling convergence outside of loot boxes. Doubtlessly, there are also many more less studied, and a reader who encounters this thesis in several years from now will see a different picture due to further technological developments. The fact remains, however, that the convergence clearly exists, and microtransactions are a vehicle for gambling to infiltrate video games.

Behavioural parallels

The use of the above-described structural elements and design which parallels gambling serves to induce similar states to those experienced during gambling.

Entrapment

Such design elements have been discussed in various angles and contexts. For example, King and Delfabbro [119] coined the notion of 'predatory' monetisation; defining it as 'purchasing systems which disguise or withhold the long-term cost of the activity until players are already financially and psychologically committed.' As such, King and Delfabbro frame such types of microtransactions through the lens of *entrapment:* the belief that 'despite mounting losses, players feel obliged to continue betting ("investing") both time and money through some internal sense that they have gone too far to give up now' [120].

Entrapment is a phenomenon commonly seen in gambling, with one example being players holding onto electronic gambling machines for hours because they think they are due a win [121]. King and Delfabbro apply this idea to video games by discussing how players may spend escalating sums of money, which leads to them feeling like they ought to continue spending more in the game, due to their existing investment. They frame design aspects of microtransactions as characteristics which might serve to facilitate this: e.g. costs being less salient and virtual credits. The primary example used is loot boxes as the closest resemblance of gambling elements in games and serving as the link between the two domains - 'observing other players' spending and opening of loot boxes with favourable outcomes may provoke counterfactual comparisons… that sustain players' spending.'

Immersion and the machine zone

As mentioned above, in her book "Addiction by Design", Natasha Dow-Schüll found that many such gamblers enter something she terms a 'machine zone'. It is described by a gambler in the book as follows:

> *"It's like being in the eye of a storm, is how I'd describe it. Your vision is clear on the machine in front of you but the whole world is spinning around you, and you can't really hear anything. You aren't really there—you're with the machine and that's all you're with."* (p. 27).

This machine zone is encouraged and facilitated by the design and engineering of the gambling machines [97]. This ranges from the physical design of the machine and surrounding ambience, to the elements involved in the gambling interface, like acceleration of play and equipping machines with steel trays so winning would be associated with the distinct sound of falling money.

Meanwhile, much focus has been placed on designing games for immersion. Immersion in games is generally considered to be good for player experience, e.g. [122]–[124]. That means many games are designed with immersion in mind. However, the state of immersion is by definition very similar to that of the machine zone: immersion is described as “being cut off from reality and detachment to such an extent that the game was all that mattered.” [125]. There are clear parallels with the machine zone. Both mention being removed from reality and only focusing on the technology.

As gaming-gambling convergence grows, therefore, and more games incorporate gambling elements and incentives, immersion could become the machine zone, blurring the lines between the two activities even further.

Beyond gambling

Gaming-gambling convergence is a worrying facet of microtransaction design. However, it represents only one aspect of why microtransactions may be negatively perceived. This section will outline possible other reasons for this negative discourse.

Dark patterns

Several research methods have been applied to non-loot box microtransactions in an attempt to landscape the field: an important step in moving forward in understanding player wellbeing and media effects in interaction with microtransactions.

One conceptualisation has focused on so-called *dark patterns,* which was defined in 2010 by Brignull [15] as "tricks used in websites and apps that make you do things that you didn't mean to, like buying or signing up for something." Gray et al. [126] performed a content analysis on examples of practitioner-identified dark patterns to differentiate between them on a more granular level. They identified nagging (redirection of expected functionality that persists beyond one or more interactions), obstruction (making a process more difficult than it needs to be), sneaking (attempting to hide, disguise, or delay the divulging of information that is relevant to the user), interface interference (manipulation of the user interface that privileges certain actions over others), and forced action (requiring the user to perform a certain action to access certain functionality).

Similarly, Mathur and colleagues [127] outline high-level features of dark patterns based on how they might affect user decision-making and play into cognitive biases. According to the authors, dark patterns are covert, asymmetric in the choices presented, deceptive, restrictive, and hide information.

One seminal piece of work on dark patterns in games was by Zagal et al. [16], who examined games from a design perspective with the intent of understanding 'elements of a game's design whose purpose can be argued as questionable and perhaps even unethical.' They employed an amalgamation of methodologies including 'analysis of descriptions of design strategies by professional designers (e.g. how to monetize social media games), observations made by game researchers (our own and by others), and critical and player reactions.' The result is several broad categories of dark design patterns, covering temporal (players being cheated out of time, taking more or less time than players expected), monetary (players being deceived into spending more money than they expected or anticipated), and social capital (the value of player social standing and relations is being risked).

Other work has taxonomised in-game purchases along several dimensions in which they may be problematic. Generally such work is done from the researcher perspective. King et al. [20]

conducted an analysis of video game patents through a consumer rights framework. Their findings revealed designs which incorporated information asymmetry between the designer and the consumer, and data manipulation to personalise manipulative and exploitative offers designed to engage users and drive their gameplay and spending investment. Windleharth and Lee [21] generated two taxonomies through play of 65 mobile games: the types of monetisation techniques encountered in such games, as well as so-called *engagement strategies:* 'elements of mobile game design created with the explicit purpose of motivating players to keep returning to the application.' The full list of problematic design mechanisms identified in prior work is presented in Table 1 for comparison.

Name of microtransaction	**In *King et al.***	**In *Windleharth & Lee***	**Description**
Exploitation of player data	Yes	No	A player's profile or data may be used to create customised targeting of monetisation
Limited disclosure of the product	Yes	No	Limited information about product contents.
Adaptive solicitation	Yes	No	A player who does not make purchases already will receive targeted purchase offers.
Price manipulation	Yes	No	A player may have to pay more/less for items based on their behavioural data, regardless of how much the item actually costs.
Limited possession	Yes	No	An item loses its value or usability after a period of time.
Item value manipulation	Yes	No	The player may be unaware

			that the likelihood of receiving an item from a mystery draw is determined by past spending.
Collecting	No	Yes	Game system provides collections to complete, promotes completionism
Content updates	No	Yes	New content is released often and repeatedly to keep players engaged
Customisability	No	Yes	Ability to modify game elements based on individual preferences
Ease of play	No	Yes	Game is made very easy to play, often with one hand or one finger
Exciting visual scheme	No	Yes	Bright and colourful graphics used to incentivize elongated gameplay
Interesting sound effects	No	Yes	Pleasing ambient game music and in-game sounds
Leaderboards	No	Yes	A board that shows names and scores, ranking the leaders in a competition
Levelling up	No	Yes	Measurable progress of game characters or other elements
Log-in rewards	No	Yes	Provides a daily or periodic in-game reward for logging in and playing

Notifications	Yes - the use of player data for targeted purchasing often uses notifications.	Yes	Push notifications are sent to the player to remind them to play
Relaxing	No	Yes	Low stress game design without pressure to perform
Social features	No	Yes	Can add friends in game, ask for assistance in gameplay, communicate about the game, or interact/view other players' game states, often for incentives
Special events	Yes	Yes	Time-limited occasions offering access to unique themed content that is typically not available to the players
Surprise elements	Yes	Yes	Unpredictable levels, rewards, or game mechanics

Table 1. A summary of the in-game purchasing systems identified by King et al. as unfair or exploitative, alongside the Windleharth & Lee taxonomy of user engagement strategies.

Notably, the overlap between the researcher-led mechanisms is minimal. This is an indicator of the breadth of problematic monetisation techniques in games. It is also an illustration of a possible methodological gap. Perhaps alternative methods or perspectives are needed to truly understand problematic monetisation in games?

In some cases, players are aware of the implementation of these dark patterns and manipulative techniques, and particularly so in the case of freemium games. Gray et al. [128]

identified that requirement to pay in digital games caused users to perceive the product as potentially manipulative. Nielsen [129] also found that players harboured negative reactions and contempt towards microtransactions in games, characterising the publishers as 'antagonists'. The idea that microtransactions are connected to dark patterns has led to a reputation for in-game purchases. Many now feel microtransactions are designed to manipulate players.

Microtransactions and the magic circle

Traditionally, play is perceived as a 'magic circle'. This is a protected environment which exists separately from the real world. Subsequently, it ought to also be protected from economic concerns [130], [131]. Because of this, the introduction of such economic concerns into a game in a continuous format throughout gameplay - as microtransactions are - may disrupt the magic circle. Indeed, players experience even an identity shift, considering themselves as consumers rather than players in such a context [131]. Ball and Fordham [132] discuss that the introduction of modern microtransactions has had a fundamental impact on player relationships with video games as a medium, claiming that "while the content of video games is important, it is also important to recognise that this content can be reduced to a mere delivery mechanism for microtransactions when such monetization methods are introduced." Some negative perceptions of microtransactions by players can therefore be attributed to the disruption of this magic circle.

However, in the discussion of microtransactions and the magic circle one must also be mindful of the changing nature of creative industries and technological developments. Just because microtransactions do not fit into traditional conceptualisations of play, that does not necessarily mean that they are a bad thing. Wardle [133] suggests that games can no longer be kept separate from economic concerns, and that simply means we need to re-imagine our definitions of what a magic circle is, and whether the player experience should be perceived as free from monetisation. Arguably, the introduction of virtual economies into games as soon as the

technology allowed suggests that economic activity is also fundamental to humans, and perhaps in some ways is linked to play.

Ethical perspectives

Besides directly measurable design and effects on the player experience, microtransactions are also considered by some to be unethical. Several pieces of research have considered them through various ethical standpoints.

Heimo et al. [134] take an Aristotelian virtue ethics perspective to game monetisation, their primary argument being that the most important characteristic of one's pursuit is whether one is engaging in said pursuit with the aim of bettering one's character. According to this framework, creating unethical games is problematic to both the character of the developer and the character of the players, who may be pulled into vices by the design of the game. Heimo et al. further argue that choosing to prioritise revenue over game design can lead to "the destruction of the narrative, enjoyment, fairness or experience of the game, or at the worst to cheating" (p. 8).

Harviainen, Paavilainen, and Koskinen [17] continue the line of application of ethical theory to game business models by choosing the lens of Ayn Rand's objectivist ethics, justifying this as a philosophy which has had an effect on the thinking of certain political subgroups. The main premise of objectivism is that rational self-interest is the greatest virtue, as it is the most likely to lead to survival. Although this philosophy is more lenient towards various types of game monetisation, Harviainen et al. conclude that games which engage in psychological manipulation techniques, such as false advertising, are unethical even through objectivism.

A more general overview of game monetisation models is provided by Neely [19]. Neely concludes that random rewards which are purchased with real money (e.g., loot boxes) are fundamentally unethical because they are not able to rationally evaluate whether the purchase is worth it, and so are changes to the gameplay experience in multiplayer games, as they reduce

winning primarily to whoever is spending more money (also tapping into other societal issues, such as economic discrepancy). However, both functional and cosmetic items may not be necessarily unethical, if they are not essential to gameplay, and, particularly in the case of functional items, can be obtained through methods besides spending money (e.g., continuous gameplay).

Kimppa et al. [135] approach the field from a Moorean just-consequentialist perspective. Moor [136] calls for a unified theory, built on consequentialism, which aims to achieve justice above all (and as such, may sometimes prioritise intent) in the case of computing policies. (For the reader's understanding, regular consequentialism prioritises the assessment of consequences above other factors when attempting to characterise an action). Kimppa et al. assess a variety of game monetisation methods according to just consequentialism and conclude that several types of microtransactions could be considered suspect - although they admit it is difficult to come to any clear-cut conclusions in the domain.

Based on the above literature, all currently studied ethical perspectives agree at least to the extent that certain implementations of game monetisation are not ethically sound.

However, it is important to remember that 'games as a service' use microtransactions to earn revenue over time, enabling the financial support of an (often small) development team which works on updating the game and adding new content for the player experience. Games as a service models can be considered player-centric, as they are based on updates, revenues, and player retention. Developers who work on such games have interpersonal relationship building as a core part of their role, and 'take pride in looking after players' [137]. In a way, this means the industry has moved away from the commodification of video games, given the constant update of games as a service means there is never a final form of a product [138]. Moreover, there is no reason to criticise rational self-interest in game development unless a game engages in manipulation techniques [17].

Biases and norms

To an extent, negative player perceptions of in-game payments could also be attributed to player biases and established norms. Christopher Paul [81] discusses how large amounts of negative perceptions of free-to-play games stem from traditional ideas of what a 'game' is. Moreover, the norms of what defines a 'game' are created by primarily male-dominant communities. These are traditionally AAA, computer games, available for an upfront fee. This means that casual games, which are favoured by women, and their more flexible microtransaction-based monetisation, is framed more negatively, as it does not fit into this classification.

A good example of this is the microtransaction-monetised game *Kim Kardashian: Hollywood* [139]. The game was heavily criticised by game reviewers, but was still highly commercially successful. (Interestingly, when it was followed several years later by *Harry Potter: Hogwarts Mystery* [140] - a game with very similar mechanics, but Harry Potter-themed, this game accrued far less criticism.) As journalist Leigh Alexander noted, this negative reception is likely due to a discrepancy between those who are in a position to write about the game and those who play it: games journalism is even now dominated by male voices [141]. Meanwhile, people who are content with the monetisation of more casual, microtransaction-based games may remain silent while simply enjoying playing them [142].

Media effects & player well-being

Gaming and its effects on those who engage in it is not a new topic, and for a reader to fully understand the context of microtransactions we must zoom out into the discourse of media effects and player wellbeing. A product of the Sisyphean cycle of technology panics [143], digital games are constantly the centre of attention. One of the original 'panics' regarded video games supposedly causing aggression. This is something which gained less and less consensus over time. Evidence emerged which challenged the assumptions of primary models in the field, and

perspectives began to appear that research on the topic had been based on 'insufficient or ambiguous methods' [144].

However, this panic was swiftly replaced by concerns about screen time and its effects on wellbeing, particularly in children and adolescents. These concerns have leaked into politics and media [145], causing anxiety amongst parents and leading to the popping up of apps which help restrict their children's technology use. Even though a body of research is accumulating which suggests the relationship may be more nuanced or even non-existent (e.g. [146], some damage has already been done to the public perception of any activity which involves time spent on screens. This means that the links between playtime and wellbeing have also entered scrutiny.

Playtime and wellbeing

From concerns about screen time in general comes a wave of interest into *playtime* in digital games and its effects, particularly on wellbeing.

At the time of writing, one school of thought is forming that gameplay (and technology use in general) either has no significant negative effects, or is in fact positively correlated with wellbeing. Examples include the work of Johannes, Vuorre and Przybylski [147], who used survey and telemetry data (provided by industry) of players of *Animal Crossing* and *Plants vs Zombies.* They write 'contrary to many fears that excessive play time will lead to addiction and poor mental health, we found a small positive relation between game play and affective well-being'. Notably, this relation is very small (R-squared = 0.01), and has the limitation of data having been collected during peak points of a pandemic, at which time *Animal Crossing* especially was experiencing high volumes of play given its timely release date (which was highlighted in popular media [148]. At this point, most people also did not have access to many other hobbies (and may have had a lower base level of wellbeing which was improved by gaming as one of the only accessible hobbies).

Another piece of work was by Vuorre et al. [149], who connected six weeks of 38,935 player game data samples with three waves of self-reported data and found no evidence for a causal link between wellbeing and gameplay. The authors argue that in itself, the relationship may not be significant, but *motivations* for play do have an effect: intrinsic motivations have a positive effect on well-being and extrinsic motivations have a negative effect. In this way, the argument of the paper is that motivations beyond play may affect wellbeing, but time spent playing itself is unlikely to.

Gaming disorder

Such a perspective is not without merit and makes sense in the context of dysregulated gaming also, in the case of which underlying motivational factors for engaging in excessive play are the cause of the dysregulation, rather than the playtime itself.

'Internet Gaming Disorder' is defined as situations in which gaming causes "significant impairment or distress" in several aspects of a person's life. It is characterised by an individual experiencing five or more of the following symptoms over a 12-month period: preoccupation with gaming, withdrawal symptoms when gaming is taken away or not possible, the need to spend more time gaming to satisfy the urge; inability to reduce playing; giving up other activities; continuing to game despite problems; deceiving family members or others about the amount of time spent on gaming; the use of gaming to relieve negative moods; and risk (having jeopardized or lost a job or relationship due to gaming) [150]. Fundamentally, the disorder criteria attempt to conceptualise *excessive gaming which leads to problematic consequences.* Such consequences include health problems, disruption to relationships, problems at school and work, negative mood, and more [151].

Due partly to gaming-gambling convergence, Internet Gaming Disorder has become relevant for research into microtransactions. As free-to-play games aim in their design to increase player time on device and player investment in the game - in the same way as many gambling machines [5], [97] - game design elements offer players the choice between spending their

money and spending their time. For example, in the game *Candy Crush,* one can either wait several hours for one's lives to refresh, or spend some money to play again instantly (see Figure 6). This encourages excessive spending of time, which may cause consequences similar to gaming disorder. This thesis will explore in part the relationship between microtransactions which force the player to choose between time and money as a currency, and consequences this may create.

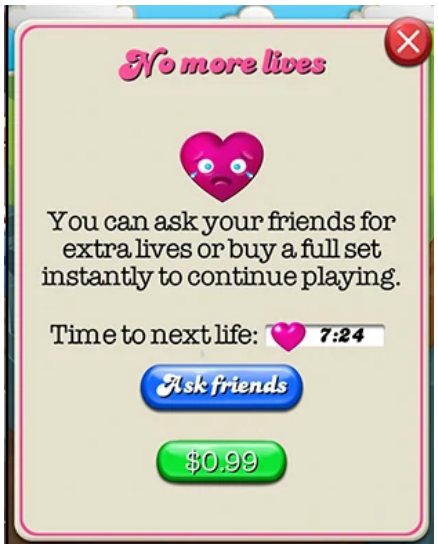

Figure 6. Energy timer in *Candy Crush*.

Spending in games

Spending time on games may be harmful in certain situations when this time is not available to give or comes out of other activities. But what about spending money?

In the early days of commercial games, the spend distribution of players per game was uniform - with an upfront cost, there was a cap on how much a player could spend on a game. With the popularisation of free-to-play models, spending on games becomes uncapped. There is evidence to suggest that such games bring in the majority of their revenue from high-spending players, known in the industry as 'whales' [152], [153], or more recently, VIP players [154]. Zendle et al. (2023) found that free-to-play games are split into several spend distributions, with

significant differences between how much the top 1% of individuals are spending within a game. In the distribution labelled by the paper as 'uniform', the median spend by the top 1% was $19, whereas in the 'hyper-pareto' distribution (in which 38% of revenue comes from the top 1%) , this median spend was $1711. The authors conclude that "The more a game relies on its top 1% for revenue generation, the more these individuals tend to spend." This suggests a difference between games in terms of how much and why the top players are spending, and illustrates the contribution of the 1%.

There are concerns that these high-spending individuals may not be high earners who are happy to spend on these games, but those who are disproportionately affected by the game design. For example, Dreier [153] discovered that average revenue per paying user (ARPU) is significantly associated with gaming disorder, with higher-paying players sharing significant characteristics with 'addicted' video gamers in a sample of adolescents. Likewise, Close et al. [155] showed that higher-spending players do not have higher earnings, and indeed, around ⅓ of high-spenders can also be classified as problem gamblers. Garrett et al. [156] found links between loot box spending and positive urgency, sensation seeking and reward sensitivity and Lemmens and Weergang [28] showed that increased needs for relatedness and competence were predictors of microtransaction spending. Hing et al. [26] found in a sample of adolescents that the likelihood of meeting the criteria for gaming disorder increased by 3.8 times with expenditure for microtransactions (when controlling for demographics and impulsivity), compared to the baseline of not spending

This suggests an unhealthy link between spending large amounts in games and player wellbeing. The relationship between amount spent, player characteristics, and wellbeing is also unpacked in this thesis.

The state of play in regulation

This thesis is being written in 2023, in the context of several growing strands of regulatory interest across game monetisation. While the main focus of regulation has so far been on loot

boxes, recent regulatory developments are putting pressure on alternative microtransactions, particularly in the context of protection of children in games.

This is particularly true in the case of loot boxes, the links of which to problem gambling have proven robust [9], [12]–[14]. This potential for harm has been deemed too great to leave unattended, and so governments have had to consider regulation - to varying degrees. The primary discussion has been around whether to regulate loot boxes as gambling [157]. However, there is a lack of consensus regarding what constitutes a legal definition of a loot box, and in different countries different definitions may or may not fall under regulation [110], [158].

As discussed in the section **'A case study: loot boxes'**, loot boxes can be classified in four categories: Embedded-Embedded, Embedded-Isolated, Isolated-Embedded, and Isolated-Isolated. Regulation mostly attends to the first two categories, which constitute loot boxes which are available for real money (*embedded* in the real world). More particularly, the first category of embedded-embedded - whereupon a paid loot box yields a reward which is of some value outside of a game - constitutes gambling under several existing laws. It is regulated as gambling in Belgium and the Netherlands, where an operator requires a gambling licence to implement such loot boxes. In the UK, although such loot boxes have been acknowledged as similar to gambling, they are not currently under regulation according to the Gambling Act of 2005 [159]–[161].

The second type, embedded-isolated, where the player pays real money for the loot box but receives only virtual goods, currently constitutes gambling only in Belgium. In 2022 the Belgian Gambling Commission threatened more serious enforcement of this and criminal prosecution of non-compliant companies implementing paid loot boxes without a gambling licence. However, following this, out of the 100 top-grossing iPhone games in Belgium, 82.0% continued to include loot boxes [162].

Moreover, the isolated types of loot boxes remain unconsidered by regulation in most countries. This is in part attributable to the fact that they do not require payment with real money. However, they remain an example of effective gambling, whereupon they demonstrate a gambling mechanic, and it is unclear how exposure to them of vulnerable people may lead to problematic consequences.

As mentioned above, microtransaction regulation in the UK is also being heavily considered from a children's protection perspective. In 2021, the Online Safety Bill was proposed, which in 2023 is undergoing the relevant processes to become a law. The Bill places new responsibilities on online social media platforms, particularly around enforcing age limits and age-checking measures, and preventing children from accessing age-inappropriate content [163]. In parallel, the Information Commissioner's Office issued guidance in 2023 specifically to games companies on how they can conform with the Children's Code (a set of standards when using children's data). The recommendations include "identify if players are under the age of 18 with a reasonable degree of certainty, and discourage false declarations of age", "turn off behavioural profiling for marketing by default," and "discourage the use of "nudge techniques" to encourage children to make poor privacy decisions" [164].

However, the same standards have not been implemented in the case of adult players. Dark patterns, affective gamblification, content creation around games, and many other forms of possibly problematic monetisation has largely been untouched by regulators until very recently. At the time of writing, some attention is beginning to form around the application of consumer protection to microtransactions [165], [166]. In January 2023, the European Parliament voted to adopt a report which called for the adoption of several practices around game monetisation [167]. The main angle of this was to better consumer protection, particularly around younger people. Amongst others, one of the outcomes of the report will be an assessment of whether the current consumer law framework is adequate for addressing issues raised by loot boxes and in-game purchases.

An incident also took place in the US in 2023, whereupon the Federal Trade Commission required Epic Games (creators of *Fortnite),* to pay a settlement of $245 million, on account of their use of 'dark patterns'. The official Commission press release reads, "Fortnite's counterintuitive, inconsistent, and confusing button configuration led players to incur unwanted charges based on the press of a single button" [168].

It seems, therefore, that regulation around microtransactions is trending towards consumer protection - while beginning to recognise the possible dangers of microtransactions. This is a theme explored further in the thesis: to what extent are existing consumer protection mechanisms sufficient and what changes could be made?

The player as a resource

Having discussed topical literature around game commercialisation, production, and monetisation, I must also touch on the player-centric methodology used for this thesis.

As science and technology advance, researchers are becoming aware of the need for alternative data collection methods which help address some of the structural problems in research. One such data collection method is *data donation:* whereupon "people voluntarily contribute their own personal data that was generated for a different purpose to a collective dataset" [169] (p.1). In the case of games and microtransaction-related research, researchers would ask players for a donation of their playtime and spend-related data. Such data is often difficult to come by through other methods, like relying on industry support, and especially in the case of studying microtransactions may be subject to a myriad of conflicts of interest [170].

Furthermore, as described above, players are the main stakeholders in microtransaction-based research. As such, they deserve a voice in how and why this research is designed and implemented. One of the main advantages of data donation is the active involvement and participation of the user. Indeed, new data protection regulations have given more power to players, creating more of a user-centric culture within academic work [171]. Players regularly

interact with in-game transactions, and therefore are likely to have in-depth understanding and nuanced perspectives on when these transactions might be considered predatory and of their effects. For example, members of the player community themselves have attempted to build up informal classifications of monetisation techniques [172], indicating that such knowledge is important and interesting to players as well as the research community. Working with adolescent players to understand what their perspectives are on what constitutes gambling in games showed that player perceptions do not match with official conceptualisations (e.g. social casinos are perceived as gambling by players) [173]. Recommendations for conducting policy-relevant research also urge researchers to involve stakeholders in their work [174].

Moreover, involving the player in data donation has advantages for the research team. The involvement of the player can also shed light on a topic which would have been inaccessible from an objective researcher viewpoint. For example, Hamari et al. [23] investigated purchase motivations in games by the method of a survey, and uncovered seven motivations, some of which, such as 'economic rationale', would have been difficult to glean externally. As mentioned above, involving the players can also allow research teams to collect high quality data which they may not otherwise have had access to. This can enhance the validity and reliability of research into microtransactions. It provides quick access to objective data while allowing participants to ultimately retain control of their information and negate privacy and ethics concerns.

Conclusion

The above discussion has synthesised work around game production, ethics, gambling, dark patterns, players, gaming disorder and more to show the negative light and complicated discourse around the possibly negative effects of microtransactions. There is a consensus that players may experience some effects as a result of interacting with in-game purchases, and indeed, in the case of loot boxes as one type of microtransactions, links to gambling have already been highlighted. However, when it comes to other types of in-game purchases, it is not

only not clear what their possible effects might be, but even a comprehensive overview of what microtransactions might be of concern is lacking.

Study 1: identifying problematic microtransactions

Introduction

The study presented in this chapter is the development of a comprehensive taxonomy of problematic microtransactions in desktop and mobile video games as seen by players who interact with them regularly. Understanding **what** problematic microtransactions are present in games is the first step towards their regulation, and towards studying their effects. Drawing on player perspectives means understanding of these microtransactions will be scaffolded around the main points of concern for the key stakeholders.

Previous research has taxonomised microtransactions in games to an extent: Windleharth and Lee [21] recruited a sample to play 65 mobile games, and generated two taxonomies from this play. The first was the types of transactions between game players and companies that 'transfer or create value for the game owner', and the second was a 'taxonomy of methods companies use to drive engagement and retention with mobile games'. Other work has included an examination of video game patents [20], and dark patterns [16], [175]. Hamari et al. [23] incorporated the players into their taxonomisation, constructing six in-game purchase motivation dimensions based on a survey of 519 people.

These taxonomies all have merits. However, there is not an existing taxonomy which incorporates both a) the viewpoint of the player, and b) considers problematic microtransactions. Both of these characteristics are necessary. The perspective of the player may come in useful when we consider that players are the primary consumers of games as products, and therefore best acquainted with the monetisation mechanics in those products. Taking a consumer protection lens to the topic allows actionable insight which may be useful to players and regulators alike.

Consumer regulation in the UK is handled by the Competition and Markets Authority (CMA), which is responsible for 'tackling unfair behaviour' around businesses [176], including in the domain of games. Amongst others, the CMA has conducted investigations into mobile ecosystems, acquisitions of games companies, and, most notably for the current topic, online choice architecture (referring to consumers being nudged to make certain decisions via game design). At the time of study execution, the most relevant existing regulation that applied to the protection of adult consumers of microtransactions was the Consumer Protection from Unfair Trading Regulations 2008 (hence 'Unfair Trading Regulations'), the aim of which is to protect consumers by prohibiting unfair, misleading, and aggressive business practices [177]. Consumer protection refers to the idea that buyers should be safeguarded against unfair or exploitative marketplace practices [178]. These regulations are enforced by the CMA, in partnership with local Trading Standards offices. Contravention of the Regulations may mean consumers engaged in a transaction because of processes outside of their own free will, and may also mean their experience of a product (in this context, of a game), is distorted or impacted negatively.

For this study, I use the UK's Unfair Trading Regulations as the basis of the definition of 'problematic'. Simply using the word 'problematic' when gathering player opinions would likely have led to a discrepancy in people's understanding. Terminology is vital in discussions of monetisation. For example, although 'dark patterns' are a widely used term in the field, even this term has been criticised as 'ontologically incoherent' for implying subjective states of designers [179]. Operationalising 'problematic' in-game transactions as 'unfair', 'misleading' or 'aggressive' according to an established legal definition provided a clear reference point. Moreover, given the Unfair Trading Regulations serve as the only legal touchpoint for consumer protection regarding microtransactions, it also made sense to angle the search for problematic microtransactions based on its wording.

According to the Regulations, a commercial practice is unfair if it *"contravenes the requirements of professional diligence"* and *"materially distorts or is likely to materially distort the economic behaviour of the average consumer with regard to the product"*—meaning it may affect

consumer decisions regarding whether to purchase the product. In a similar vein, misleading practices involve using untruthful information for the presentation of a product, which is likely to impact consumer perception of the product and subsequently their decision. Misleading actions include *misleading advertising, artificial scarcity, false information,* and *misleading omissions,* in the case of which certain information about the product is withheld. An aggressive tactic is one which *"significantly impairs or is likely significantly to impair the average consumer's freedom of choice or conduct in relation to the product concerned through the use of harassment, coercion or undue influence"* and as such again *"causes or is likely to cause him to take a transactional decision he would not have taken otherwise"* [177]. In short, the Regulations outline practices according to which it is believed a consumer decision about whether to purchase a product is inappropriately influenced by the provider of the product. A trader would be committing offence by engaging in any of the above practices.

The study described in this chapter is a qualitative survey, administered to 1104 players of 50 top-grossing mobile and desktop games. Players were asked what microtransactions they had encountered in games which they perceived as unfair, misleading, or aggressive. The aim of this was to address the research question of *'What forms of problematic microtransactions exist?'* Content analysis was done on the results to create a categorisation of problematic microtransactions. This categorisation consists of eight broad domains: *game dynamics designed to drive spending, product not meeting expectations, monetisation of basic quality of life, predatory advertising, in-game currency, pay to win, general presence of microtransactions* and *other* (for microtransactions not captured by any other domain). The domains encompass 35 subcategories, which are described in detail in the chapter. Interestingly, many of the categories seem to be in violation of the Unfair Trading Regulations, and the implications of this are discussed.

Methodology

Data were collected through an online survey. Questions asked players about transactions they had encountered which they felt had misled them, and how that experience had made them

feel, and then likewise about transactions which they felt had been unfair or aggressive towards them. As described above, these words were taken directly from the Unfair Trading Regulations.

The questions were open, for example 'Think of any features you may have encountered in games, the end goal of which was a transaction of real money, that you feel misled you—gave you the wrong idea or impression—in order to promote the transaction'. The aim of this question was to gather information about as many techniques as possible. Some additional questions around game monetisation were also included but not used in the current analysis. Players were also asked how long they had been playing games, how often they played games, an example of a game they had been playing a lot recently and an example of a favourite game. Other background characteristics, such as age or gender, were not collected. I wanted to prioritise truthful and open discussion of monetisation experiences, and felt that asking for less anonymity may have impeded this. The full survey is available in Appendix A.

Loot boxes are already established in the literature as a potentially problematic form of video game transaction, and the aim of the present study was to understand problematic microtransactions *beyond* loot boxes. In order to prevent respondents from focusing on this aspect of game monetisation, an initial question in the survey asked players to name games in which they had seen specifically loot boxes. Prior to open-ended questions about problematic monetisation participants were then told "The next section will ask you about any in-game transactions you may have encountered besides lootboxes".

Participants

Participants were recruited using the discussion website Reddit and the social networking website Twitter. To ensure the sample of players represented a wide breadth of games, I used a list of 100 most played Steam games, and 100 most played mobile games, and found the subReddits (special interest online bulletin boards) for all of these games. The moderators of all the individual subReddits were then contacted to ask for permission to post the survey. In the end, I was given permission to post on 50 game-specific subReddits, of which 19 were mobile

and the rest were PC. In addition to this, I posted on more general game-related subReddits: r/Steam, r/Twitch, r/PCMasterRace, r/TrueGaming, r/MobileGaming, r/SampleSize. One must note that I did not restrict the game samples to free-to-play games only, as many paid games also incorporate microtransactions, and I was interested in problematic in-game purchases across all games. I also publicised the survey on Twitter. I believe this sampling frame allowed for a diverse sample of players of different games. The full list of subReddits is available in Appendix A.

In total, 1471 respondents completed the survey. Participants were not reimbursed. After data cleaning and processing (as none of the questions were compulsory due to ethical considerations), 1104 were included in the analysis. It is of interest that respondents were highly engaged with this research: I received numerous positive comments and responses to the Reddit posts, as well as some direct emails sharing experiences and asking for the results when they were available. Several participants even offered to publicise the survey around their own networks.

Ethical considerations

Ethical approval was obtained for this research by the University of York Physical Sciences Ethics Committee, case number Petrovskaya20200729. As mentioned, no personal identifiers were collected for this research. All questions were also optional, so that if participants did not feel comfortable answering a certain question they did not have to do so to progress through the survey.

The choice was made to not collect any demographics from participants, such as age, gender or occupation. This was done with the aim of maximising participant anonymity for a context where they shared sensitive and potentially distressing information around their negative experiences with game monetisation.

Analysis

Content analysis [180] was used as an analysis method to identify patterns and classify the techniques presented by respondents into categories. Content analysis allows for a subjective interpretation of qualitative data in a systematic way [181]. More specifically, the current study uses qualitative content analysis, which deals with the assignment of categories to text, using techniques such as segmenting data and generating definitions. Qualitative content analysis seeks to maintain the validity of quantitative approaches, for example, relying on the development of a coding frame [182]. It shares certain philosophies with other qualitative analysis approaches, such as a reiterative data-driven analytical process, and the importance of context in a sense-making process [183].

The current study uses more specifically conventional qualitative content analysis. This type of analysis is used with research questions which aim to describe a phenomenon, in this case, the problematic microtransactions in games. Hsieh and Shannon [184] describe conventional content analysis as appropriate for situations when existing theory on the subject is limited, and discuss that researchers should avoid using preconceived categories, instead allowing them to emerge during coding. At later stages of the analysis, researchers organise the categories and subcategories (often into a hierarchical structure), and develop definitions with examples for a structured coding frame.

Conventional qualitative content analysis was chosen as the method for this study because of its philosophy of inductive coding (developing categories without preconceived notion), and the structured philosophy and organisation of the categories. The aim was to produce distinct categories of microtransactions, which could be used practically.

Analytical procedure

Each mentioned technique was coded, regardless of how many were mentioned by each respondent, or in each utterance. My primary supervisor and I worked together to develop a categorisation. This was done by initially separate coding, with regular discussions. Once we had

developed separate coding schemes, we met to merge the codes and resolve any discrepancies. Then, I developed a final shared categorisation system, which the second coder signalled their satisfaction with.

An independent rater (who had not been involved in the generation of the codebook but was familiar with the subject matter) coded a subset of the data (100 utterances) against the codebook. The same subset was coded by one of the original coders, and a Kappa score, a standardised measure of inter-rater reliability, was calculated. A Kappa statistic of greater than or equal to 0.81 is classed as being 'almost perfect agreement' [185]. For this reason, and to keep consistency with previous work, I set a minimum threshold of agreement of 0.81.

In the first pass, the Kappa score was 0.62, which did not meet the proposed benchmark of 0.81. We were able to identify some trends in disagreement, which were resolved through an iteration of the codebook. The same independent rater was asked to code a fresh subset of 100 utterances, and the process was again repeated by me. In the second iteration, the Kappa score was 0.92. This was a high enough score to be confident in the reliability of our results. However, before finalising the categories, myself and the supervisor who had been involved in the initial development of the categorisation discussed the codes which had contributed to the remaining rater disagreements, and made final edits to their phrasing. All of the data were then re-coded using the final coding scheme in order to have accurate numbers of occurrences and examples. The final codebook can be found in Appendix A.

Results

In total, 35 in-game monetisation issues ('microtransactions') were reported by players as being either misleading, unfair, or aggressive. These issues are grouped into eight broad domains (see Figure 7).

1. Game dynamics designed to drive spending.
2. Product not meeting expectations.

3. Monetisation of basic quality of life.
4. Predatory advertising.
5. In-game currency.
6. Pay to win.
7. General presence of microtransactions.
8. Other.

These domains will now be discussed in more detail in turn, with respondent quotes to supplement the descriptions.

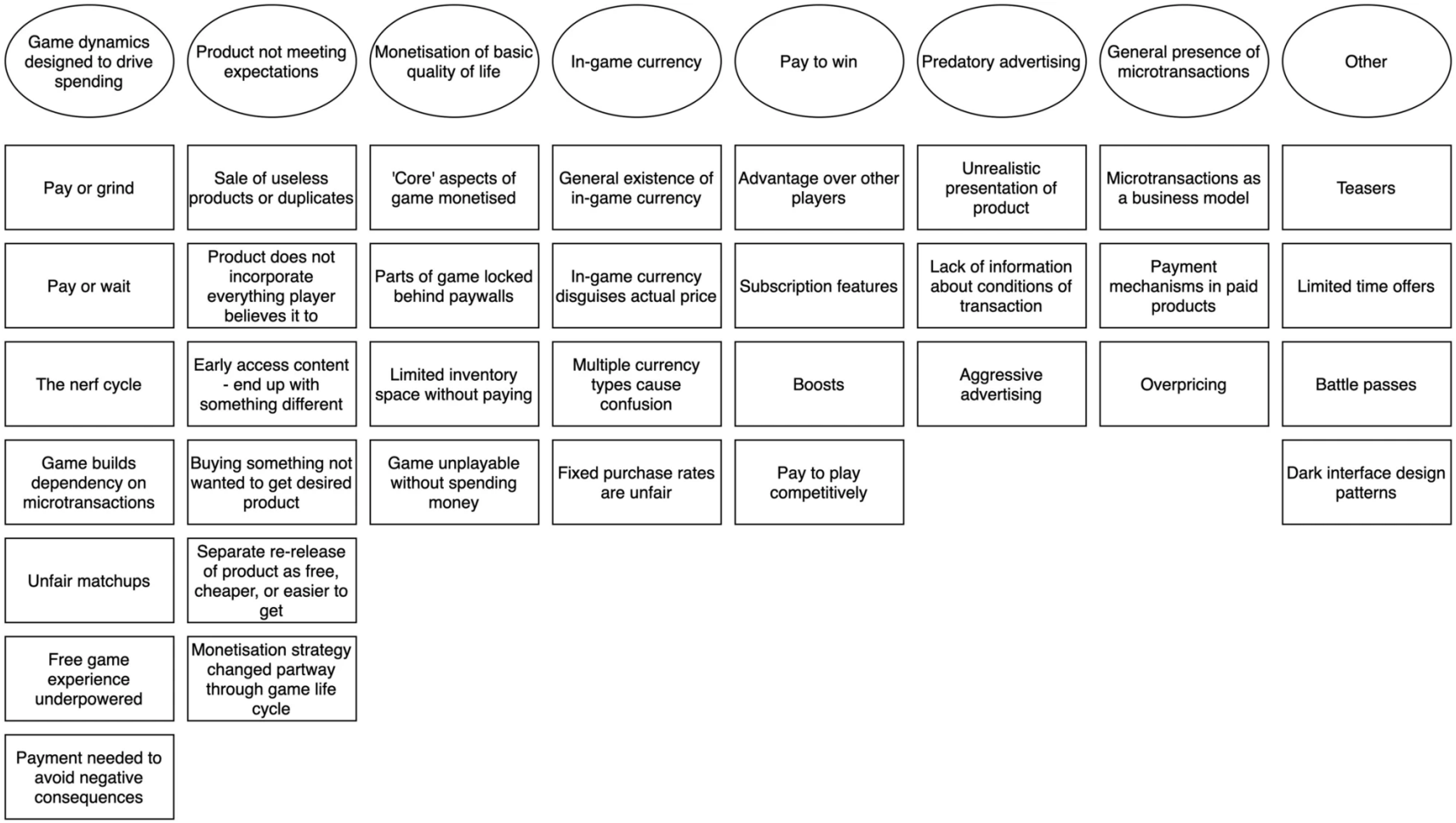
Game dynamics designed to drive spending
Product not meeting expectations
Monetisation of basic quality of life
In-game currency
Pay to win
Predatory advertising
General presence of microtransactions
Other
Pay or grind
Sale of useless products or duplicates
'Core' aspects of game monetised
General existence of in-game currency
Advantage over other players
Unrealistic presentation of product
Microtransactions as a business model
Teasers
Pay or wait
Product does not incorporate everything player believes it to
Parts of game locked behind paywalls
In-game currency disguises actual price
Subscription features
Lack of information about conditions of transaction
Payment mechanisms in paid products
Limited time offers
The nerf cycle
Early access content - end up with something different
Limited inventory space without paying
Multiple currency types cause confusion
Boosts
Aggressive advertising
Overpricing
Battle passes
Game builds dependency on microtransactions
Buying something not wanted to get desired product
Game unplayable without spending money
Fixed purchase rates are unfair
Pay to play competitively
Dark interface design patterns
Unfair matchups
Separate re-release of product as free, cheaper, or easier to get
Free game experience underpowered
Monetisation strategy changed partway through game life cycle
Payment needed to avoid negative consequences

Figure 7. The problematic microtransactions in mobile and desktop games according to players. There are 35 microtransactions across 8 domains.

Game dynamics designed to drive spending

These are situations where players feel game dynamics - the ways in which the game patterns and players evolve over time - have been designed especially to encourage spending, rather than primarily for the improvement of a player's in-game experience.

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 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. This was a prominent mechanism (*N* = 57).

> *"In Darkorbit you have to either spend insane amounts of money, spend insane amounts of time grinding or buy a third party software that grinds for you."* (P239)

Furthermore, players often appeared to resent the manipulation of the game in this way.

> *"Upgrades to skip grinding defeats the purpose of video games that give feeling* [sic] *of achievement."* (P276)

Pay or wait

In contrast to pay or grind**,** which involves payment to avoid the expenditure of time and effort, this refers to a situation in which 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.

> *"Everything you did had obsorbetently* [sic] *long wait times with the option to speed them up by spending premium currency."* (P927)

The nerf cycle

Another often expressed idea (*N* = 35), referring to a situation in which players perceive an item of specific strength or usefulness being sold at specific price, only for that item to be reduced in strength or general value at a point after the transaction. Frequently, this process of 'nerfing' is described as a cyclical, deliberate system: a new item is released, then reduced in power ('nerfed') in preparation for another new release.

> *"On the other hand War Thunder by Gaijin offers a wide range of premium vehicles, which break the game balance upon release, to make them more attractive, and then are "nerfed" (weakened or rebalanced) which is very questionable. It seems that Gaijin wants WT to earn money by selling more and more tanks which are slowly nerfed, while new overpowered tanks are released again soon after."* (P717)

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.

> "*When mobile games offer some premium currency in abundance at the beginning of your exposure to the game, and then decline the amount available as time moves forward. This practice misrepresents the abundance of this resource, driving the player to make a transaction to gain a sense of normalcy and power which they had at the start of the experience."* (P140)

> *"I generally know what I'm getting into when spending real money, but dramatically escalating in-game costs are what annoy me. Ex. You buy magic*

> *bucks to get an upgrade only to find out the next upgrade would require significantly more magic bucks to accomplish."* (P584)

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.

> *"Back when I played mobile games including player vs player elements (such as C.a.t.s., and Clash royale) I oftentimes found myself matched up with players that had opted to buy into the microtransaction store and found myself at an unfair disadvantage."* (P780)

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,

> *"Division 2. Dlc was for new york, game update is for the whole game, with or without any dlc. Basic Content is always released late or not at all to people who only have the base game. Honesty* [sic] *quite disgusting, not to mention the number of bugs that every update introduces."* (P559)

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.

> *"In Fire Emblem Heroes there is a game mode in which you are temporarily given four units that as you play levels will access to the best skills in the game without*

> *their base cost, usually the sacrifice of the original unit that has the skill. The only way to keep those characters is by spending 30$ on an item called a "forma soul."* (P284)

Product does not meet expectations

Players used this domain to refer to the outputs of in-game transactions, describing a variety of situations in which a purchased product did not serve their purpose in the way the player might have expected before engaging with a transaction.

Sale of useless products or duplicates

This refers to situations in which players purchase an in-game product, but that product does not work in the intended way - either because of some of the characteristics of the player's existing items, or because of an in-game duplication mechanic.

> "*On Love Nikki there was a rather low cost promotion which was a comeback, the problem was whoever had already bought it would not be warned, making a second unnecessary purchase."* (P62)

> *"Buying equipment not yet usable by my character (ad said you could use the same day)"* (P740)

Product does not incorporate everything the player believes

Some players felt that the products that they bought were not strictly useless or duplicates, but nonetheless did not match the expectations that were created for them, or had to be bought blindly due to a lack of information.

> *"It was sold as you would get all post launch content but they recently released a truck that isn't a part of the season pass and they implied they're gonna do it again."* (P897)

Early access content - end up with something different to what was paid for

A related idea is situations in which players may purchase specific early access content, but experience disappointment due to ending up with something different that they paid for, or just never receiving the completed version of the game.

> *"A limited edition version of the game at purchase that got you early access to play and more stuff to be named later but never was."* (P620)

Buying something not wanted to get a desired product

Players also thought that instances where they had to buy something not wanted to get a desired product were unfair. This refers to situations where desirable purchases (e.g. discounts, upgrades, etc.) which are only available as a consequence of buying something else.

> *"RPG's or gacha's* [sic] *where you have to get multiple of the same unit to level up said unit so you get 4 or 5 so you can level up your 1 main dude but "o no turns out every character needs to be at the same level as your top man for them to fuse and level up" so now your 5 or so hour journey to get a good character just turned into a 35 or 40 hour trip for 1 character."* (P757)

Separate re-release of product as free, cheaper, or easier to get

Players identified instances in which a product was locked behind an initial transaction, often in some kind of bundle or subscription, but then re-released separately (normally cheaper) outside of the original purchase setup, or is made free and publicly available.

> *"In general: buying the DLC and then developers giving it away. Mafia 3 recently put out a free update which gave out the entire DLC catalogue for free. Why buy games the year they come out, if they'll be fixed and in-full 12 months down the line, for cheaper?"* (P43)

Monetisation strategy changed partway through the game lifecycle

This referred specifically to situations where microtransactions were introduced into a game which did not have them before, or introduced in additional amounts.

> *"Crash Team Racing Nitro-Fueled - the devs behind this game made it clear that there would be no micro transactions in the game before release. About a month or so after I purchased the game and it got good reviews, the game got micro transactions in the form of an in game store for skins. People like me who try to avoid games with micro transactions ended up purchasing the game because the developers behind the game lied about their intentions, waited for the reviews to come out so the reviews won't mention the microtransactions, and then put in the micro transactions."* (P757)

Monetisation of basic quality of life

This domain refers to situations in which players discuss aspects of games which are central to what they imagined their experience of playing that game to be, but which they cannot access without a transaction.

'Core' aspects of game monetised

This category refers to situations where parts of a game which players feel are integral to that game are inaccessible without spending. Sometimes players even suggest that a free game has been created in a purposefully incomplete form so that players are forced to spend money on making it more complete.

> *"They then added quality of life improvements behind paywalls like bottomless inventory. summonable storage and vendors without wasting time managing limited inventory, or traveling to sell, restock on items. I purchased a lot of these admittedly and regret doing so now."* (P237)

Parts of game locked behind paywall

Relatedly, one of the most mentioned techniques in the sample (*N* = 58) was that of parts of game content locked behind paywall**s**, in which parts of the game which players wish they had access to are locked behind payments. This covers both functional and decorative content.

> *"Pokemon sword and shield DLC felt very miss placed* [sic]*, as a fan for over 16 years it felt dishonest to lock specific Pokemon behind a paywall...It felt misleading to try to exploit fans like this the slogan is gotta catch em all not pay to catch most of them…"* (P86)

> *"Forza Horizon 4: In that game if you don't have all the dlc expansions, you will get missions on your map that you can travel to, but will not be able to participate because you're missing that content. This is extremely misleading and frustrating when you travel the whole size of the map only to realise that you cannot do the race."*(P903)

Limited inventory space without paying

Some games also have limited inventory space without paying**,** which specifically restrict the amount of inventory space which is available in the game. Even if the player obtains items for free within the game, they would have no way of holding onto them without payment.

> *"Elder scrolls online, and now Fallout 76, creating quality of living issues (inventory space) that are remedied by pay services and subscriptions."* (P174)

Game unplayable without spending money

Sometimes the monetisation of basic quality of life has a harsher manifestation, with the game being unplayable after a certain point without spending money, meaning that although an initial part of the game might be free, the player is literally unable to play the game further than a specific point without a transaction. Players appear to feel particularly misled in situations where they were not informed of this prior to beginning the game.

> *"Creating an event which has 20 stages. 18 stages of which you can fulfill* [sic] *for free (just spending loads of your time) and for the last 2 you have to pay ingame* [sic] *currency to get the final reward. This is very very sneaky tactics. Even if you're notified at the start of the event you still feel like you're being robbed in plain sight."* (P705)

Predatory advertising

Players reported advertising or product descriptions that present incorrect, incomplete, or skewed pictures of what a purchased product entails. This was a common domain within the sample (*N* = 171).

Unrealistic presentation of product

Players report situations where a product is made out to be something which is not. Sometimes they report this occurring via explicit deceit. Other times the unrealistic presentation of products takes the form of the tactical highlighting of certain features.

> *"Cosmetic microtransactions in Path of Exile are often announced via showcase videos that use slow motion, an unnaturally zoomed-in camera, and otherwise situations that are impossible or not reflective of actual gameplay"* (P706)

> *"World of Tanks frequently sells premium vehicles for real money by exaggerating the strengths and not discussing the weaknesses of said vehicles."* (P9)

Lack of information about conditions of product

Other times, players report instances of a product being promoted without discussing important additional conditions or aspects that accompany the transaction.

> *"Mobile games do this a lot. "Free Gems/turns/skins" then you click it and it's "when you buy this starter pack!"* (P391)

Aggressive advertising

This is a widely-reported technique (*N* = 65), which refers to frequent or inconvenient pestering of players to make purchases within the game. Interestingly, these reports appear to be particularly commonly seen in mobile games.

> *"The most egregious microtransactions come from mobile games. For instance, Candy Crush - it has microtransaction prompts that "get you" right after you were so close to completing a level."* (P381)

In-game currency

This domain covers issues with practices that relate to virtual currency which can only be used within the context of the game world and has no value outside of it.

General existence of in-game currency

Some players generally find the presence of in-game currencies to be problematic.

> *"Anything involving buying in-game currency in order to require certain resources or items."* (P336)

In-game currency disguises actual price

This refers to situations where translating purchases into an in-game currency, rather than simply using real money, is perceived as obscuring the true price of in-game items and making decision-making harder.

> *"False currencies in-game obfuscate the cost of purchases, making it difficult to make a reasonable decision as to something's value."* (P778)

Multiple currency types cause confusion

An extreme case of this confusion over currency conversion appears to occur when there are multiple currency types, in which players report being disoriented by the presence of multiple

in-game currencies, and believe that this multiplicity disguises the true cost of in-game transactions.

> *"Multiple premium currencies. These (such as in Heroes of the Storms currency for playing, currency for real money) make it very difficult to gauge what is required to obtain said items without knowing how much you are spending / how much the item costs."* (P404)

Fixed purchase rates are unfair

Video games commonly constrain the specific amounts of real money that can be exchanged for in-game currency. Players felt that the design of these exchanges may be tactical, in order to maximise profits: currency exchange amounts and microtransaction costs are perceived as misaligned in order to encourage increased subsequent spending.

> *"I think League of Legends again, in how they price their in game currency. It is intentional so that when you spend £10 worth it ends up only allowing you to buy 1.75 items. It feels incredibly blatant that being left with nearly enough for another purchase should encourage more spending."* (P591)

Pay to win

This refers to transactions the outcome of which gives players an advantage towards being successful in the game, often at the expense of other players.

Advantage over other players

Being able to pay for advantage over other players is seen as inherently unfair. This specifically refers to situations where players report that it is unfair when one player has the option to pay for products which are distinctly better than free items and thus give an advantage over players who have not carried out any transactions in terms of completing the game, such as by an improved gameplay experience, or in direct combat.

> *"Anything that makes paying opponents stronger than non paying is unfair. In dominations this is with troops and museum."* (P369)

Subscription features

Another category is subscription features, which involves regular payments to receive additional features which provide one with an advantage.

> *"In Fire Emblem Heroes they added a subscription service for $10.00 a month called "Heros Pass" which basically gave people who buy it, 3 free 5 star Heros, a bunch of quality of life improvements that people had been asking for since launch, higher stats on specific units, and more."* (P462)

Boosts

Boosts refer to instances of being able to pay to progress through a game quicker or earn additional benefits when progressing through. Boosts do not always affect a player's advantage relative to other players, more so in relation to completing the game.

> *"Boosters in puzzle games, many free to play mobile games have a set of boosters that extend turns remaining or clear large parts of a level. Candy Crush is the one I played."* (P228)

Pay to play competitively

The word '*compete*' is often specifically used to refer to this experience. In some games, although players are technically able to play the game without buying anything, in order to feel like they can enter a competitive mode and stand a chance against other players, they feel pressured to spend. As such, this category is connected to *advantage over other players,* although the emphasis in this one is that free-to-play players feel excluded from even beginning to compete by payment barriers.

> *"Lord's mobile, West game. The games are Pay2Win. If you're not paying tons of real world money you don't have a fair chance to compete with those who are."* (P570)

General presence of microtransactions

Some players believe microtransactions in general are unfair, particularly when implemented within a product that has already been paid for. It also covers reports of unfair pricing of microtransactions.

Microtransactions as a business model

This category refers to the broad idea that the very concept of revenue being generated through continuous, uncapped monetisation once the player is in the game is unfair.

> *"Team Fortress 2 and Counter-Strike: Global Offensive. Great games ruined by greed, I can't even think how could a virtual, non-existant* [sic] *item could cost almost like a used car. Ironically or sadly, the same company who made my favorite game is also the one responsable* [sic] *to have brought in this system. And TF2 is the ground zero of this."* (P223)

Payment mechanisms in paid products

Games which necessitate an upfront payment *and* include additional in-game transactions are described in especially negative terms.

> *"The assassin creed games have that and I turned me away straight from the start. XP boost, skins and other random money sucking stuff that don't make sense after you pay a bunch for the game."* (P990)

Overpricing

Some players feel that the pricing of in-game transactions is too high for the nature of their purchased products.

> *"Crash team racing nitro fueled micro transactions are insane. Some karts (cosmetic items) cost upwards of 25 dollars and the game only costs 40 bucks. Fortnite is just as bad with 40-60 dollar skins (cosmetic item) for a free game."* (P757)

Other

This section consists of several techniques which did not naturally fall into the other domains.

Teasers

This refers to receiving an initial part of an in-game item for free, such as through gameplay, but not being able to fully use it without spending money.

> *"A harvest diary event where you get bonus rewards for daily missions, and a special character. However, in order to get the character, you need to pay. Non-playing players will just end up with a pile of shards for that character that isn't enough to unlock them."* (P729)

Limited time offers

This code refers to instances where players believe that some products are promoted as only being available for a set amount of time to artificially create a sense of fear of missing out and anxiety in players, and push them to engage with the transaction.

> *"They're time gated so you can only buy one weekly, giving the impression that they're a good deal to buy, but generally aren't worth their contents."* (P252)

Battle passes

Battle passes are a form of video game monetisation which involve paying for a time-specific set of content, which provides within itself additional rewards that can be acquired either by playing the game or in some cases, paying even more additional money. In certain cases, players link this to the exploitation of both player time and money.

> *"Around £10 for the battle pass where you have to play a lot to get any decent rewards, it traps you into playing that specific game to get your money's worth out of it"* (P598)

Dark interface design patterns

This refers to situations where a game is not merely aggressive in pushing purchases, but the user interface itself is designed in such a way as to manipulate users into carrying out transactions against their intentions.

> *"Makes it too easy to click - like putting the button to buy under a screen that you have to push ok to advance. I have my buy locks on because of this but if someone has them auto approved they might not even realize they made a purchase"* (P444).

Subset of players not affected

It is also worth noting that a substantial proportion of players (*N* = 134, 12.1% of respondents) did not believe that they had been affected by problematic monetisation techniques. This group can be broadly split into three reasons: one category believed they had not encountered such techniques at all, one group was aware of these techniques and actively avoided games which they knew employed them, and one group had encountered them and was able to identify them, but because of being able to do so had not engaged in the actual transactions.

A subset of respondents also did not believe that microtransactions in their essence could be unfair or misleading, as they felt players had substantial freedom to not engage with these transactions, and as such any choice they made was of their own volition.

> *"I think I've been given choice by the games and it's completely up to myself if I spend the money or not. There are games that require more in-game transactions but it's my own choice if I would be willing to continue playing the game in a way its company wants me to"* (P951)

> *"Equality or Justice? It's a game, you can just uninstall it. You have no rights to play video games and therefore no expectations of "fair" pricing"* (P957)

Loot boxes

It is also interesting that although I directly made it clear that I was interested in transactions outside of loot boxes, a subset of respondents (*N* = 85) still talked about loot boxes and the various mechanisms employed in promoting and manipulating their outcomes. This may highlight the high degree to which gamers perceive loot boxes to be problematic, and reflects the level of attention which loot boxes have received thus far.

Discussion

I worked with a large sample of players of digital games to generate a categorisation of monetisation techniques in games which are perceived as being unfair, aggressive, or misleading, and thus potentially not in accordance with consumer protection laws. These techniques are split into 8 domains: *game dynamics designed to drive spending, product not meeting expectations, monetisation of basic quality of life, predatory advertising, pay to win, in-game currency, microtransactions as a business model*, and *other* (for techniques which did not cluster into any of the other groups). Understanding that these are the mechanisms which players, the primary users of games, may perceive as problematic and therefore having an effect on their game experience, is important for designing games both as products and as experiences.

Relevance of player-perceived problematic monetisation to consumer protection

In this study, 'problematic' was operationalised according to the wording used in the Unfair Trading Regulations. This was done with the aim of relating player-perceived problematic microtransactions to existing consumer protection law. Given this operationalisation and aim, there was value in circling back and seeing whether microtransactions in games are being satisfactorily covered by UK consumer law: if not, it would illustrate a gap in existing regulations around game monetisation. Indeed, several of the microtransactions described by players could be seen as not currently being covered by the Regulations. A full outline of this is provided in Table 2, according to what types of microtransactions might be considered as unfair, misleading, or aggressive.

Monetisation technique as identified by players	**Reason for inclusion**
Misleading: **misleading actions include misleading advertising, artificial scarcity, false information, and *misleading omissions*, in the case of which certain information about the product is withheld.**	
Unrealistic presentation of product (in **predatory advertising)**	Commercial practices which contain false information are specifically prohibited under the Unfair Trading Regulations
Lack of information about conditions of product (in **predatory advertising)**	Information which may be important to making a purchase decision is perceived as being obscured.
Product does not incorporate everything a player believes it to **(**in **product does not meet expectations)**	Players assert that they have been misled into a purchase through false promises about content.
Sale of useless products or duplicates (in **product does not meet expectations)**	Players assert that they have been misled into a purchase through false promises about content.
Early access content where players end up with something different to what they paid for (in **product does not meet expectations).**	Players assert that they have been misled into a purchase through false promises about content.
Unfair: **practices which contravene "the requirements of professional diligence" and "materially distorting or likely to materially distort" consumer spending.**	

In-game currency	The perception of obfuscation and deliberate distortion of prices, leading consumers to spend more than they may have intended.
***Aggressive:* impairing "the average consumer's freedom of choice or conduct ... through the use of harassment, coercion or undue influence" in such a way that said consumer takes a transactional decision that they would not otherwise take.**	
Aggressive advertising (in **predatory advertising**)	Players reported advertisements on the behalf of industry that may be classified as harassment.
Dark interface patterns (in **other**)	Players perceived patterns which coercively impaired their freedom of choice regarding spending.

Table 2. Summary of types of microtransactions which could be considered as contravening the Unfair Trading Regulations.

Misleading practices

Several monetisation practices were described by players in ways that may align with how the Unfair Trading Regulations define 'misleading' practices: misleading actions which include "misleading advertising, artificial scarcity, and false information, and misleading omissions", in the case of which certain information about the product is withheld [177]. This can be seen as applicable to predatory advertising. For example, players report the unrealistic presentation of products in dishonest ways, such as through tactical highlighting of features or provision of false information, and lack of information about conditions of product, in which case some critical information that may affect engagement with a transaction is withheld until after the transaction is complete.

Further examples of this are: 'product does not incorporate everything a player believes it to', 'sale of useless products or duplicates', and 'early access content' - where players end up with something different to what they paid for. In all of these instances, players engage with a purchase with a created expectation that is different to the actual product they receive.

Unfair practices

The Unfair Trading Regulations additionally define a generic set of prohibited practices as those which contravene “the requirements of professional diligence” and “materially distorting or likely to materially distort” consumer spending; or are aggressive, which the Regulations define as impairing “the average consumer's freedom of choice or conduct ... through the use of harassment, coercion or undue influence” in such a way that said consumer takes a transactional decision that they would not otherwise take.

One good example of this is the domain of *in-game currency*. Players perceive in-game currency as being specifically implemented to contribute to their confusion when they are deciding whether to make a purchase, such as in the case of ‘multiple currency types cause confusion’ and ‘in-game currency disguising actual price’, which could fall under ‘material distortion’. In some instances, players also believe currency bundle sizes to have been intentionally designed to be of inconvenient size, meaning they end up spending more than they would have liked to acquire the correct amount (‘fixed purchase rates are unfair’).

Aggressive practices

In terms of aggressive practices, the most prominent example in our data were reports of ‘aggressive advertising’. This code referred to situations in which players clearly reported behaviour on the behalf of industry that may be classified as harassment.

Another example is the practice of ‘dark interface design patterns’, relating to in-game interfaces might be seen as a form of aggressive commercial practice as they may impair freedom of choice amongst gamers.

Taken together, the Regulations cover a number of issues raised by players in terms of aspects of games which they believe have been implemented to drive revenue generation in potentially problematic ways. In particular, this spans across the domains of *predatory advertising, in-game currency,* and *product not meeting expectations*.

However, plenty of other domains discovered in our data have no evidenceable links with consumer protection, for example, those which could be interpreted subjectively, such as *game dynamics designed to drive spending*, or the more broad *microtransactions as a business model* which focuses on player distaste for the addition of payment mechanisms into a game. Nonetheless, these domains were still identified by players as potentially problematic. Based on this study alone, it remains unclear the extent to which these types of microtransactions could be regulated, and if government-based regulation is the appropriate measure to take in this context at all.

Moreover, although several monetisation techniques were prominent across our sample, a considerable number of players commented that they did not believe they had been misled because of their own alertness, or indeed, they had gone one step further and were avoiding the types of games which used such techniques. This may be seen as reassuring, as it suggests that players may be able to identify and reject or resist spending money in problematic ways in games. However, it is difficult to ascertain what proportion of the player population this represents in practice, given that our survey is likely to have attracted players who had negative experiences with in-game monetisation and opinions to voice on the topic.

Relationship to previous work

A direct connection can be seen between these findings and those of King et al. [20], who investigated the way major games companies have patented designs for systems that are based around encouraging repeat purchases. Interestingly, players within the present sample perceive very similar mechanics to the ones identified by King et al. operating under the surface of the games that they play. For example, King et al. discovered that games may present players with time-limited offers with limited information about their contents, which is represented in our sample through ‘limited time offers’ and ‘lack of information about conditions of transaction’’. King et al.’s findings in particular draw attention to purposeful system manipulation, such as players being directed into unfair matchups. From my results it appears that the players themselves are clearly aware of said techniques, and do not feel positively about their implementation.

Overlap can also be seen between our categories and the transaction types taxonomy of Windleharth and Lee [21]. In particular, their work recognises premium currency and its potential for misuse, limited time offers, and a variety of techniques which they categorise as 'resources', namely: direct gameplay advantage (in this work, 'pay to win), powerups (XP boosts), limited content ('parts of game locked behind paywalls'), and inventory capacity ('limited inventory space without paying'). However, there are many techniques present in my categorisation which are not found in the one of Windleharth and Lee, and vice versa.

As such, the taxonomy from this chapter can be used complimentarily with the work of King et al. [20] and Windleharth and Lee [21]. To demonstrate this, the problematic monetisation taxonomy from the current chapter is compared with the findings of King et al. (Table 3) and Windleharth & Lee (Table 4). (Note: the taxonomy of transaction types is used from Windleharth & Lee, as opposed to the player engagement mechanisms taxonomy which was discussed in the 'literature review' section).

Name of monetisation technique	**In current taxonomy**	**Description**
Exploitation of player data	No	A player's profile or data may be used to create customised targeting of monetisation
Limited disclosure of the product	Lack of information about conditions of transaction	Limited information about product contents.
Adaptive solicitation	No	A player who does not make purchases already will receive targeted purchase offers.
Price manipulation	No	A player may have to pay more/less for items based on their behavioural data, regardless of how much the item actually costs.

Limited possession	Limited time offers, the nerf cycle.	An item loses its value or usability after a period of time.
Item value manipulation	No	The player may be unaware that the likelihood of receiving an item from a mystery draw is determined by past spending.

Table 3. Comparison of the taxonomy with the findings of King et al.

Domain	**Name of monetisation technique**	**In current taxonomy**	**Description**
Currency	Real currency	No	Legal cash
	In-game currency	General existence of in-game currency	In-game digital currency
	Premium currency	Some overlap with 'multiple currency types cause confusion'	A rare and exclusive form of in-game currency
Transaction types	Direct monetisation	No	Company receives direct cash payments
	Subscription	Subscription features	Pay a periodic fee for bonus or exclusive content
	Ad removal	No	Pay real money to avoid ads
	Real currency gambling	No	Gamble with real money
	Indirect monetisation	No	Company receives indirect financial benefit
	Viewing Ads (Required)	Aggressive advertising	Ads appear on screen,

			and sometimes between levels
	Viewing Ads (Optional)	No	Ads players can elect to watch for in-game goods
	Virtual Currency Gambling	No	Players gamble with virtual currency
	Acquisition	No	Players use social media and other systems to recruit new players
Resources	Direct Gameplay Advantage	'Pay to win' domain.	Resources that convey benefits in the game system mechanics
	Powerups	No	Resource that provides time limited benefits
	Permanent boost	No	Resource that conveys a permanent advantage to the player's game state
	Limited content	No	Exclusive, premium game features not available to all players
	Remove Time Related Barriers	Pay or wait/pay or grind	Reducing or removing limitations to time played, or turn timers
	Customisation	No	Cosmetic objects for character avatars or environments
	Inventory Capacity	Limited inventory space without paying	Ability to store more in-game resources

	Random goods	No	A resource generating random in-game goods
	More items	No	Acquiring more materials, weapons, or other items used in-game
Marketing Methods	Game as Ad	No	The game is also an ad for merchandise
	Merchandise Store	No	Merchandise store integrated into game application
	Limited Time Offer	Limited time offers	Time limited sale, or time limited availability of rare game goods
	Special Events	Limited time offers	Time limited events featuring temporary thematic game content

Table 4. Comparison of the taxonomy with the Windleharth & Lee taxonomy of 'transaction types'.

The reported monetisation techniques also encompassed monetary design patterns as outlined by Zagal et al. [16], who discuss paying to skip and gating access to content. However, Zagal et al. also describe the monetisation of rivalries as an important dark design pattern, which was not at all present in this sample. Indeed, a surprisingly low number of people commented on social dynamics in relation to monetisation in this work: while things like unfair matchups were discussed, they were referred to from a game balancing rather than social perspective.

'In-game' monetisation?

It is worth highlighting that although the wording of questions asked to participants directly used the words 'in game', given the aim of the study was to understand *in-game monetisation* players, the domain *product not meeting expectations* incorporates some subcategories which

could be said to refer to out of game monetisation also: for example, ‘monetisation strategy changes part way through game life cycle.’ Players still recognised these monetisation issues as important to them within the context of in-game payments, and they touch on microtransactions in the explanations for why they are problematic, like the monetisation strategy changing to a microtransaction-based model.

Moreover, this criticism could be taken further, and one may argue that subcategories such as ‘game builds dependency on microtransactions’ are subjective and intangible, and as such not of use. However, these issues are identified as distinct gestalts within the data, and in some cases, although possibly difficult to identify in the design, may show that players are aware of developer intent from their gameplay experience (and they would not necessarily be wrong - see King et al. [20]).

Because of this, the reader may notice that both the terms ‘microtransaction’ and ‘game monetisation’ have been used throughout this chapter. This is because the primary aim of the work was to investigate microtransactions, which are also known as in-game monetisation, and the lens through which the study was designed and analysed focuses on microtransactions also. As such, the two are equated in this work.

Limitations

I was interested in what players perceived to be problematic forms of in-game monetisation. The self-report methodology provides the most appropriate starting point for understanding the player perspective. However, it has one obvious limitation: subjectivity. A player may perceive a mechanism at work whereas in reality the algorithmic underpinnings of a game implement no such mechanism. This may be exacerbated by existing player pre-conceptions of free-to-play games and in-game transactions as ‘bad’, inferior to alternative payment models [81], leading players to be harsher in their assessment of microtransactions. Nonetheless, this should not strongly influence the results. Even if the in-game monetisation techniques players discussed are influenced by their preconceptions, they are still presented by a large number of players, and as such, deserve attention. Furthermore, they shed light on *why* players may be biased

against in-game payment mechanisms, which ultimately serve the games industry in understanding how to alter these perceptions for the better.

Furthermore, I only investigated the nature of *problematic* monetisation. A critic may note that the majority of video game monetisation may be entirely unproblematic: fair, unaggressive, and honest - a valid concern. My interest here was specifically in transactions which had the potential to be negative to the player in some way. However, it may be the case that if I had gathered data investigating a more neutral question, asking about microtransactions in general, I may have uncovered a more holistic picture of how video games make money.

I also did not collect any participant demographics, which means I was not able to control whether the views expressed in the survey were over-representative of any particular group, such as male gamers. It also means that no indication can be given at this stage regarding whether there are certain groups which are more likely to express their views on problematic microtransactions, or indeed, experience microtransactions as problematic. Notwithstanding, the large sample size allows for confidence in taxonomizing specific types of microtransactions that could be problematic across different games, even though this taxonomy should not be seen as exhaustive.

Chapter conclusions

The findings of this chapter suggest that the range of in-game monetisation techniques that players perceive as being problematic are more diverse than has previously been acknowledged. Thirty-five separate forms of monetisation were identified by players as unfair, misleading or aggressive. These results also suggest that several of these in-game monetisation mechanisms may be in tension with existing consumer protection regulations, which points to the need to examine regulation in the context of games. This work also has implications for understanding the player experience in microtransaction-based game models, as well as player perceptions and relationships of games that should be taken into account by developers and regulators alike to create a games industry that is mutually beneficial to all.

Armed with an understanding that there is a surprising amount of problematic microtransactions hiding in games, which are currently unscathed by regulation, I wanted to find out what the extent of the problem is. It is one thing to know that something exists; it is another if it exists in the most popular and successful games. The next chapter therefore considers the question of the popularity of the microtransactions discussed in this chapter across top-grossing games.

Study 2: how common are problematic microtransactions?

Introduction

Chapter 2 follows on from the previous, which assessed what microtransactions players consider to be problematic. The next step in assessing to what extent such microtransactions may be a problem is to understand how frequent they actually are in the marketplace.

In the related field of gambling research, such prevalence studies have been acknowledged as a necessary foundation of effective regulation [186]. Population studies of the prevalence of gambling are used in understanding the extent of gambling problems across different demographics. For example, Calado et al. [187] assessed the prevalence of problem gambling in adolescents. They concluded that a 'small but significant minority of adolescents' have gambling-related problems, and identified several demographic characteristics which were linked to this, such as being male and having parents who gamble. Gainsbury et al. [188] studied the prevalence of problem gambling across interactive (online, internet) and non-interactive gamblers, thus assessing the impact of this new technology on problem gambling.

Gaming-gambling convergence has also assessed the prevalence of certain gambling elements in games. Particular attention has been given to social casino games: games which simulate gambling products or activities. Zendle [189] analysed monthly estimated instals of all social casino games (n=2344) on Android phones from March 2012 to February 2020. Zendle found that of the 1166 social casino games available in February 2020, only 47 were on the market in 2012, but the prevalence of social casino games relative to the overall market decreased from 2012 to 2020 from 2.54% of all game downloads to 1.56% - suggesting a high turnover of such games.

Another piece of work by Zendle et al. [190] assessed exposure of players to loot boxes, pay to win, and cosmetic microtransactions. A sample of 463 most played Steam games from 2010 to 2019 was traced. A core finding showed that in 2010, only 8.3% of players on Steam played games that contained cosmetic microtransactions, but in 2019, this had risen to 85.8%. Similarly, the numbers of players exposed to loot boxes rose from 7.2% to 71.2%. Interestingly, the use of pay to win microtransactions did not follow a similar trend, and in 2019 only 15.9% of the sample were playing games that included pay to win elements.

Further attention has been given to loot boxes. Zendle et al. [107] showed that 58% of games on the Google Play store and 36% of games on the Steam store contained loot boxes; 93% of loot box-containing games on the Play store were available to children [191]. Similarly, Xiao et al. [109] found loot boxes in 91 of the 100 top-grossing iPhone games in the people's republic of China. In Australia, this percentage for 'best-selling' video games which included loot boxes was 62% [108].

Such prevalence assessments are highly useful in understanding monetisation design tendencies, and in turn, the microtransactions players are being regularly exposed to. Zendle's analysis of social casino games shows the trends around these games, and this knowledge is beneficial to both players and regulators. Similarly, the Zendle et al. [191] paper of the changing prevalence of loot boxes, cosmetic and pay to win microtransactions provides an interesting account of an industry ecosystem, and possible evidence of self-monitoring in terms of the lack of increase in the pay to win mechanic. In 2021, Xiao et al. repeated Zendle et al.'s analysis from 2019 by considering the same sample of 100 highest-grossing iPhone games and found that 77% of this sample contained loot boxes [192]. Accounting for methodological differences, Xiao et al. still conclude that it is likely loot boxes had become more widely spread during that period. Without both prevalence assessments, this knowledge would not be available, whereas now there is more certainty around the fact that loot boxes are a popular design mechanism.

However, there is a gap in the literature pertaining to the prevalence - and therefore widespread availability - of more granular microtransactions which may be considered as problematic by players and regulators, such as pay or grind mechanics, energy timers, limited time offers, battle passes and others. The current chapter builds on the player-perceived problematic microtransactions established in Chapter 1 to answer the research question of *"What is the prevalence of problematic microtransactions across the highest-grossing mobile and desktop games?"* Player reviews of popular games are used as a resource, to maintain the player perspective. These reviews were obtained from pages of the fifty top-grossing mobile and desktop games on the App Store and Steam Store, to include both mobile and desktop games.

The results show that a higher proportion of mobile games contain microtransactions which players believe to be problematic than desktop games (88% versus 28%). These microtransactions are also different, with more issues around microtransactions affecting the game experience being raised in discussion of mobile games. Understanding the prevalence of problematic microtransactions as players see them can help inform designers around player perceptions of their monetisation models, but also aid regulators in understanding monetisation trends in the games industry.

Methodology

Data collection and preprocessing

The sampling strategy of games followed the methods of Zendle et al. [107] in their assessment of the prevalence of loot boxes. For mobile games, I sampled the top 50 highest grossing games on the Google Play store, according to the store's own charts at the time of data extraction (18.02.2021). I chose this sample as the Google Play store serves the largest global install base (73% of all smart phones in 2021, and is the biggest mobile app store worldwide by number of apps available and installed [193]. I focused on the 50 highest grossing games as they are likely to account for a serious percentage of player spending. While there is not a specific estimate for

the top 50 games, by some estimates, the top 30 games accounted for 30% of all user spending on the Google Play store and Apple App Store [194], and the top 100 games accounted for 64% of all spend on both app stores [195].

For desktop games, I used Steam's self-reported top sellers of 2020 as measured by gross revenue, and again selected the top 50 games [196]. Steam was chosen as it is currently the largest online store for PC games by total and active player base and play time [197].

Written player reviews were scraped from the product page for each game on the Steam and Google Play store respectively. For Steam, the scraping criteria were that reviews were classed as 'Negative' (the only two options are 'Positive' and 'Negative'). For the Play Store, the classification system is 1-5 stars and I scraped the 1 star reviews. For each game, the last 50 reviews were collected. This generated an initial total of 5,000 negative reviews.

The data was cleaned prior to beginning analysis by manually removing any negative reviews which were unrelated to monetisation. This included removing reviews which did not directly mention real money, as well as ambiguous reviews, for example, those mentioning 'coins', as it is unclear without context whether in-game currency can be obtained only through purchase or also for free, through play. Based on personal moral and ethical principles, I also removed any reviews which were discriminatory (for example, sexist or racist). Finally, any reviews not written in English were also removed, as I did not have the capacity to analyse these.

After cleaning had been completed, 801 reviews remained: 692 of mobile games and 141 of Steam games.

Ethical considerations

Ethical approval was obtained for this research by the University of York Physical Sciences Ethics Committee, case number Petrovskaya20210208. Even though I used review data, which was publicly available, I was concerned that individuals could be identified from their reviews, which

contain monikers and chosen images. I handled this issue by completely removing any identifiable information as soon as the data had been collected. As mentioned above, I also looked to my personal morals and values as a researcher in the data collection and analysis process to understand which data I might not be comfortable with analysing. On this basis, I removed any reviews which were discriminatory.

Data analysis

The data was analysed using quantitative content analysis [198]. This type of content analysis focuses on systematically categorising data by applying a structured coding scheme to understand the frequency of occurrence of certain content across this data. In this case, the coding scheme used was the taxonomy of problematic microtransactions developed in Chapter One. Prior to analysis, an initial codebook was derived, which included definitions of each category, from this taxonomy. The final step is the application of quantitative techniques, like frequency counts, to summarise the findings. I chose to use specifically quantitative content analysis as the aim of the study was to describe the data according to its substantive features - understanding what monetisation techniques were being discussed in reviews of top-grossing games, and the frequency of these features.

The smallest unit of analysis was an individual review. The whole dataset of 801 reviews was coded. Because each review could mention several techniques, it could therefore be coded as several techniques at once. The coding was done manually using a spreadsheet. Each review was entered as a line in the spreadsheet, and marked with a number which corresponded to a category in the codebook. I carried out the analysis, with another coder coding a sub-sample of the data to ensure reliability.

As part of coder training, we both initially coded a subset 100 reviews from across all 100 games. I calculated Krippendorf's alpha to establish inter-rater reliability. This statistic was used because it can handle coding units of analysis with several values for this calculation [199]. Because of this, it was selected over Cohen's kappa, which does not allow for flexibility outside

of coding with binary variables. After the initial round of coding, Krippendorf's alpha was 0.36, significantly below Krippendorf's suggestion of values of > 0.8 for confidence in the coding process.

This resulted in a systematic review of the disagreements between the two coders, explaining terms to one of the coders who was less familiar with the subject matter. A couple of relevant changes were also made to the codebook at this stage, which are outlined below.

Two codes were added:

- **'Game is broken',** defined as 'the game itself stops working in a way which means the player loses their money',
- **'Stealing money',** defined as 'money being taken from the player without their consent, refunds are refused in situations where a product is not as expected, or anything else which might be labelled as a 'scam''.

These codes were added as they were frequently being referenced by players in the sample and yet had not been adequately captured by the coding scheme. They had to be incorporated into the current analysis for a valid understanding of the data.

Within the 'pay to win' domain I merged the 'pay to play competitively' and 'boosts' codes, as players mostly referred to pay to win mechanics in one specific context and the distinction was unnecessary in this sample. The merged code was named 'game experience better if paying.' I also split the code 'game builds dependency on transactions' in the 'game dynamics designed to drive spending domain' into two codes: 'game dynamics designed to drive spending' and 'escalating payments', as there appeared to be a distinction being made by players clearly, whereupon 'game dynamics designed to drive spending' was referenced more broadly as an overall perception of the game, and 'escalating payments' as references to increasing payments. Building on this, I renamed the domain 'game dynamics designed to drive spending' into

‘intentional design to drive spending’, to avoid confusion between higher-level domains and lower level codes. I renamed the code ‘game unplayable without spending’ in the ‘monetisation of basic quality of life’ domain into ‘game realistically unplayable without spending’ for clarification, and removed the code ‘core’ aspects of game monetised’ from the ‘monetisation of basic quality of life’ domain, as there was confusion over what ’core’ referred to. The final categorisation scheme as used for this study can be seen in Figure 8. The final codebook is available in Appendix B.

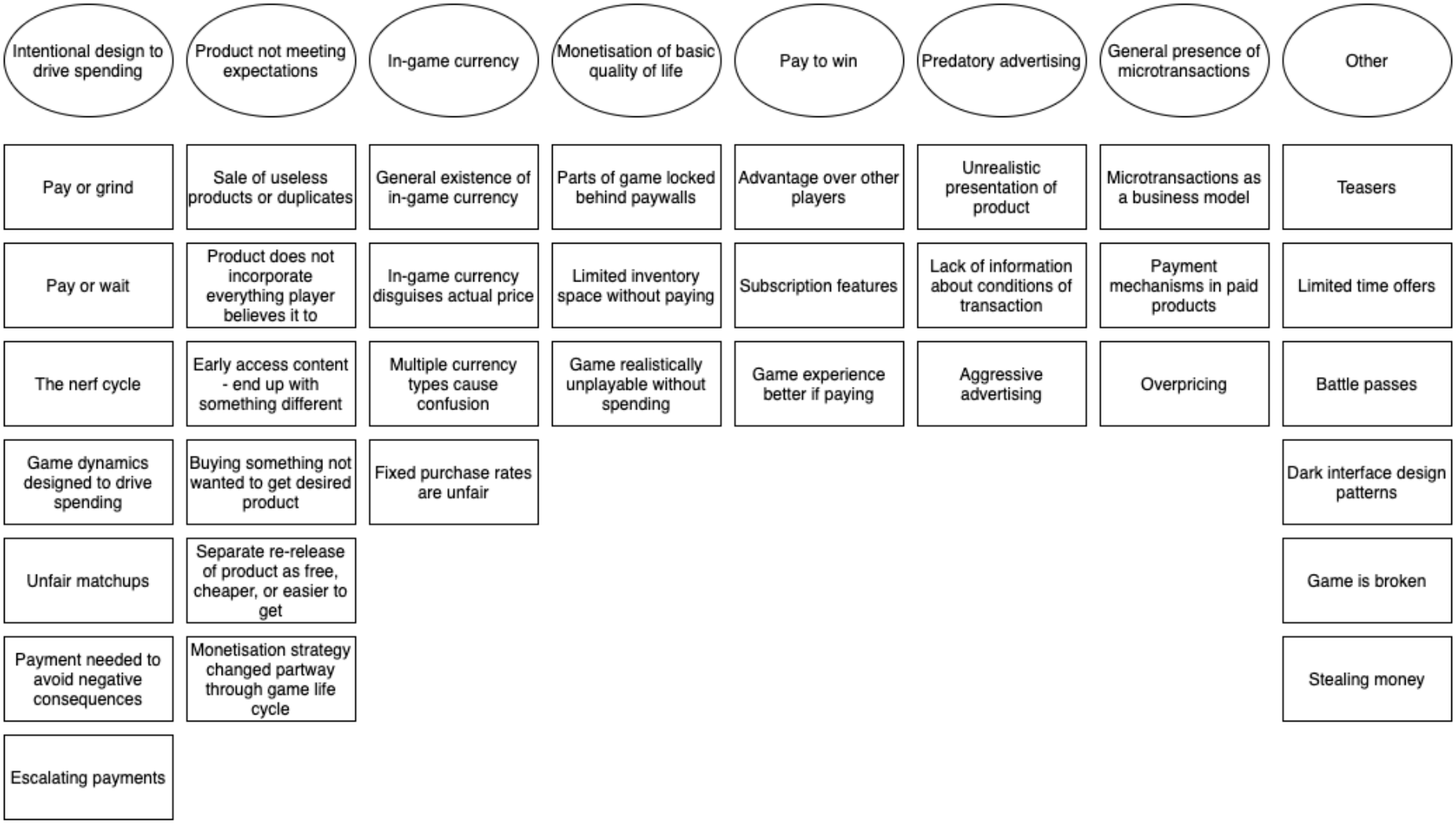
Intentional design to drive spending
Product not meeting expectations
In-game currency
Monetisation of basic quality of life
Pay to win
Predatory advertising
General presence of microtransactions
Other
Pay or grind
Sale of useless products or duplicates
General existence of in-game currency
Parts of game locked behind paywalls
Advantage over other players
Unrealistic presentation of product
Microtransactions as a business model
Teasers
Pay or wait
Product does not incorporate everything player believes it to
In-game currency disguises actual price
Limited inventory space without paying
Subscription features
Lack of information about conditions of transaction
Payment mechanisms in paid products
Limited time offers
The nerf cycle
Early access content - end up with something different
Multiple currency types cause confusion
Game realistically unplayable without spending
Game experience better if paying
Aggressive advertising
Overpricing
Battle passes
Game dynamics designed to drive spending
Buying something not wanted to get desired product
Fixed purchase rates are unfair
Dark interface design patterns
Unfair matchups
Separate re-release of product as free, cheaper, or easier to get
Game is broken
Payment needed to avoid negative consequences
Monetisation strategy changed partway through game life cycle
Stealing money
Escalating payments

Figure 8. Revised version of problematic microtransactions in mobile and desktop games according to player reviews.

A second subset coding round of 60 reviews, coded by both of the coders, yielded a satisfactory Krippendorf's alpha of 0.81. We resolved any remaining disagreements through discussion. I then coded the rest of the data (the remaining 641 reviews) using the final coding scheme.

Prevalence analysis

Once all reviews had been coded for microtransaction techniques, I was able to identify which games included which techniques. To minimise the chances of false positives, I only counted a game as featuring a particular technique if at least two negative reviews mentioned it. I saw this as analogous to using multiple coders in content analysis: a code is counted as present if more than one person is able to identify it and confirm its existence. In the same way, a particular monetisation technique would only be classed as existing if it was mentioned by two or more reviewersFor example, if only one review mentioned that a game included a 'pay or grind' mechanic, the game would not be counted as being pay or grind.

I categorised games as mobile or desktop based on whether I accessed them on the Google Play store (mobile) or Steam store (desktop), and categorised games by genre based on the descriptions of games on the store pages. I then calculated the prevalence of a technique based on the number of games within a platform or genre counted as containing this technique, e.g. a prevalence of 7 for a microtransaction technique means that 7 games featured at least two negative reviews each mentioning that technique. A database of all games with technique, developer and genre information for each game is included in Appendix B, split into mobile and desktop.

Results

Of the 50 top-grossing mobile and 50 top-grossing desktop games in our sample, 44 mobile games (88% of the mobile sample) and 14 desktop games (28% of the desktop sample) were

identified by players as containing at least one problematic microtransaction. The average number of techniques per game was 2 for desktop games and 3 for mobile games.

Mobile games

The most prevalent problematic technique across mobile games was 'game dynamics designed to drive spending' with 26 occurrences (52% of the total sample of 50), defined as 'general discussion of how the game feels like it has been made to manipulate players into spending, as opposed to a genuinely good product for the user.'

The next most prevalent was 'unrealistic presentation of product' (21 occurrences, 42%), defined as 'the product is presented as being better or more attractive than it actually is, for example, through explicit deceit, misinformation about the product, or tactical highlighting of certain features', followed by 'game experience better if paying' (20 occurrences, 40%), defined as 'payment makes progress through the game quicker, easier, and more pleasant - paying customers have a better experience playing the game. Players will have a worse experience without spending money and feel driven into purchases'. They are closely followed by 'game realistically unplayable without spending', defined as 'although payment is not officially required to progress through the game, it is realistically impossible to play without spending' (16 occurrences, 32%).

Three of these techniques are characterised by their focus on altering the game experience for revenue generation. Full frequencies of the microtransactions are outlined in Table 5.

Technique	**Frequency of occurrence**	**% of games featuring technique**
Game dynamics designed to drive spending	26	52%
Unrealistic presentation of product	21	42%

Game experience better if paying	20	40%
Game realistically unplayable without spending	16	32%
Overpricing	10	20%
Game is broken	8	16%
Pay or grind	6	12%
Stealing money	6	12%
Escalating payments	5	10%
Aggressive advertising	4	8%
Desired product not received	3	6%
Pay or wait	2	4%
Unfair matchups	2	4%
Monetisation strategy changed partway through game lifecycle	2	4%
Limited inventory space without paying	1	2%
Advantage over other players	1	2%

Table 5. Problematic microtransactions across 50 top-grossing mobile games.

Across the 44 mobile games with at least one problematic technique, I found the following genres in descending order of number of games: strategy (n=13), puzzle (11), role-playing (6), casino (4), sports (2), simulator (2), and other (6). Of those, the genre with the highest prevalence of problematic techniques was casino games, at an average of 5.25 different techniques per game, followed by role playing games, at 4.5 techniques per game, and simulation games, also at 4.5 techniques per game. The full breakdown of counts by genre is available in Table 6 (‘other’ is not included as it covers a range of genres).

Genre	Number of games including 1+ techniques	Average techniques per game
Casino	4	5.25
Role-playing	6	4.5
Simulation	2	4.5
Strategy	13	2.7
Puzzle	11	2
Sports	2	1.5
Other	6	-

Table 6. Problematic microtransactions across mobile game genres.

The mobile game with the highest number of problematic monetisation tactics was *Marvel Strike Force* by Scopely, with 9 techniques: 'game dynamics designed to drive spending', 'overpricing', 'game realistically unplayable without spending', 'game experience better if spending', 'pay or grind', 'unfair matchups', 'desired product not received', 'unrealistic presentation of product', and 'game is broken'.

Thirty-three developers accounted for the 44 mobile games with at least one problematic technique. Of those, seven had produced more than one game: Playrix features with three, Playtika with three, and Scopely, Zynga, Long Tech, Lilith Games, and Century Games all with two games. Of these seven, Scopely had the largest number of problematic techniques per game, with an average of 6.5, followed by Playtika with an average of 4.33. The full breakdown of games and developers is available in Appendix B.

Desktop games

Not only were there far fewer desktop games reported as containing problematic monetisation techniques, but these techniques were also different. The most prevalent technique was 'core parts of game locked behind paywall (DLCs)', with seven occurrences (14% of the 50 games), defined as 'parts of the game which players feel should be integral to the game experience are inaccessible without spending'. This was closely followed by 'game dynamics designed to drive spending' (five occurrences, 10%). Table 7 presents all of the prevalence data for desktop games.

Technique	**Frequency of occurrence**	**% of games featuring technique**
Core parts of game locked behind paywall (DLCs)	7	14%
Game dynamics designed to drive spending	5	10%
Overpricing	4	8%
Game experience better if paying	3	6%
Game is broken	2	4%
Subscription features	2	2%
Season pass	1	2%
Pay or grind	1	2%
Advantage over other players	1	2%
Early access content	1	2%

Table 7. Problematic microtransactions across 5 top-grossing desktop games.

Genres proved more difficult to characterise across desktop games, as most games spanned several genres. For example, *Mount & Blade 2: Bannerlord* describes itself as a 'strategy action roleplaying' game. Thus, I did not analyse monetisation techniques according to the desktop game genre.

Across the 14 games with at least one problematic technique, Paradox accounted for three games and Bethesda for two, with an average of 2 and 2.5 problematic techniques per game respectively. The Steam game with the highest number of monetisation techniques was *War Thunder* by Gaijin Entertainment, with four techniques: 'pay or grind', 'game experience better if paying', 'advantage over other players', and 'game dynamics designed to drive spending'. The full breakdown of microtransactions by developers is located in Appendix B.

Discussion

This study found that according to player reviews, microtransactions are more prevalent in mobile games than desktop games. Eighty-eight percent of mobile games were reported by players to contain at least one problematic microtransactions, as compared to a much lower proportion of 28% of desktop games.

This is an interesting finding. Firstly, it matches the results of Zendle et al. [191] (whose methodology was followed in this chapter), who found only 36% of games on Steam contained loot boxes as compared to 58% on the Google Play store. One possible explanation for this is that the freemium model is more common in mobile games, and this means more microtransactions. Many desktop games continue to support an upfront purchase model. However, this means that if not all content is included in this price, this may become a problem for players - hence the seemingly prevalent problematic microtransaction on desktop of 'core parts of game locked behind paywall'.

Another explanation could be existing biases around mobile games. Mobile games have a lower barrier to entry, making them more accessible to casual players - which women tend to be [81].

This is in contrast to critics and journalism around gaming, which still tend to be male. Thus, there is a disconnect between people giving their opinions of mobile games, and people actually playing these games: the former may be biased towards more 'hardcore' games as the 'real' type of game, and consequently having a more derogatory opinion of mobile games. Because player genders were not identified in the analysis of reviews, it remains unclear whether they perhaps perpetuated the existing male voice in game discussions. As such, the bias could therefore have seeped into the current sample, explaining why microtransactions were more discussed in reviews of mobile games.

It is interesting that many of the prevalent microtransactions tap into issues not commonly discussed around loot boxes. Techniques such as overpricing, core parts of the game locked behind paywall, subscription features, unfair matchups, advantage over other players for those who pay, a game experience that is better for paying players, pay or wait all centre around issues of *fairness.* They suggest player dislike of a better experience for paying players, creating *social inequality,* and similarly of an inability to have the same experience without paying as with. Fairness and degraded user experience have been variously raised in conceptual ethical analyses (e.g. [134], and are cited in consumer protection conversations. Another value flagged by players was honesty and transparency: 'unrealistic product presentation' featured as a highly prevalent microtransaction. Taken together, these values provide an idea of what is important to players around microtransaction design.

Another notable finding is that there was no mention of pay to win microtransactions, in either mobile or desktop games. Given that the chosen method, analysing player reviews, does rely quite significantly on player perceptions, the possibility that players simply did not consider pay to win microtransactions as problematic or as notable as others cannot be excluded. However, this finding can also be linked to that of Zendle et al. [191], who found that in contrast to loot boxes and cosmetic microtransactions, there was no increase in prevalence of pay to win exposure in Steam games over a period of 9 years. The current study could provide further

evidence of this - perhaps pay to win mechanics are no longer favoured by developers. Indeed, modern games monetise in diverse and varied ways [200].

The most concerning finding that needs highlighting is that 'game dynamics designed to drive spending' is the most prevalent problematic monetisation technique in mobile games, appearing in 52% of the sample. This suggests players take issue with the mere fact that microtransactions intrude upon their gaming experience. This ties into discussion in the literature around how players may feel microtransactions intrude upon the magic circle of their gaming experience, possibly impacting player relationships with games as a medium [132] [133]. It is also consistent with the findings of Gray [129] who found that the mere requirement to pay in digital games causes players to perceive it as possibly manipulative.

Limitations

Unfortunately, by choosing to focus on high-grossing games and the platforms which accommodate them, these findings are not representative of the full diversity of modes of game production, especially indie games. Indie creators often express their dislike of microtransaction-based models [201], and possibly monetise in different ways. Using a different sample may therefore render a different picture of prevalence, as would a different method, such as asking players to rank microtransactions. Furthermore, the top 50 desktop games were selected based on self-report by Steam, and it remains unclear how these choices were made by the platform.

The decisions made by me as the researcher and the rest of the research team in the sampling process could have reduced the data in the sample which may have excluded some possible microtransactions from the final results. Only one-star reviews were selected on Google Play (out of a maximum five stars). This was done to ensure all the reviews in the sample were negative; however, two star reviews may have also made a contribution. Reviews were also cleaned when it was not explicitly clear whether they were talking about monetisation, but similarly, in the event that they were, these data points were not included in the analysis.

Nonetheless, these choices were made to minimise the likelihood of false positives. As such, one can be sure that microtransactions that *did* consistently appear in a stringently selected sample truly are being consistently reported by players.

Choosing quantitative content analysis as a method in this instance also has its limitations. Primarily, taking a feature that is being discussed in a review outside of the broader context of the review may result in loss of meaning. It also overlooks underlying meaning which is conveyed through tone: for example satire, sarcasm, and similar.

Nonetheless, the idea that 'game dynamics designed to drive spending' is a real problem is prevalent across player reviews. This could be due to player perceptions of what a gameplay experience ought to involve. However, it could also be a worrying indicator of the rise of the gamblification of games, given the similarity between the design incentives of such games and gambling. If the idea of a 'game designed to drive spending' is true, then such games would share characteristics with gambling machines of encouraging players to maximise the time they spend playing and increasing financial investment. It is therefore important to investigate the effects of player interaction with such games, given their potential to drive players into time or financial investment which they are not making of their own choice.

Chapter conclusions

This chapter has presented a content analysis of player reviews of top-grossing games on the Steam and Google Play store, with the aim of identifying how often mentions of the problematic microtransactions identified in chapter 1 were present. These findings were then used to make inferences about how prevalent certain microtransactions are across top-grossing games. The key findings from this chapter are that mobile games feature, or at least appear to players to feature, a higher proportion of player-perceived problematic microtransactions than desktop games: 88% compared to 28%. Moreover, 52% of mobile games are categorised by players as 'designed to drive spending', meaning players believe monetisation has been prioritised in the design of these games over their player experience.

This finding is particularly interesting because such design shows parallel with the design incentives used in gambling, for example, maximising revenue generation and time spent on device. If confirmed, the existence of such games would be evidence of the gamblification of mobile games in particular. However, where is the line between problematic and frustrating? The next step in understanding this is to investigate whether playing such games has any tangible links with player wellbeing, in a way which may be expected if players are being affected by the design aimed to drive their spending, which would parallel known correlates of gambling. This is the purpose of Chapter 3.

Study 3: are problematic microtransactions linked to harms?

Introduction

Chapters 1 and 2 in this thesis have outlined a broad landscape of player-perceived problematic microtransactions and examined their prevalence. The focus of this chapter is on understanding whether these microtransactions could have problematic consequences for the players who interact with them, in a similar way to the design of gambling products and services.

Players perceive certain games as having had their 'game dynamics designed to drive spending'. This describes situations in which "the game feels like it has been made to manipulate players into spending, as opposed to a genuinely good product for the user. Often, this is discussed in the context of developer greed." Players feel these design decisions put them in uncomfortable situations. The games which are described this way are primarily mobile. Fifty-two percent of the highest grossing mobile games on the Google Play store fit this description (see Chapter 2).

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

The media regularly reports stories of players spending more than they can afford. These are often accompanied by descriptions of the negative consequences of such spending for the individual's life. Examples particularly highlight financial problems, and include stories of people who have racked up huge credit card debts and emotional comments on the dangers of microtransactions from the families involved. In a journalistic account [202], a story of one such player is given 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 create the appearance of spending money being the only option.

Despite such anecdotes in the media which indicate possible financial harms as a result of certain design mechanics in games, there is a paucity of scientific research which investigates the relationship between player wellbeing and interaction with game design aimed to drive player spending. Given the growing link between gaming and gambling, one 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 robustly associated with financial, lifestyle, and health consequences [203], [204]. The most palpable association with problem gambling are financial outcomes, being associated with higher financial distress and lower financial planning [205]. Other known links include social consequences [206], [207], such as tension in family environments, with spouses of gamblers being particularly affected [208] and problems at work and education because of factors like loss of productivity [209]. Gambling also has an impact on mental health, such as triggering/worsening symptoms of anxiety and depression [206], and links to problems with physical health [210], such as bodily pain and physical functioning.

Moreover, some of the microtransactions in the 'intentional design to drive spending' category allow players a time-money trade-off ie. players can either spend exorbitant amounts of time playing a game and trying to achieve objectives, or can pay money to skip this time investment. These include the 'pay or grind' and 'pay or wait' elements. In this way, games frame player time as a valuable resource also.

There are already some known relationships between disordered gaming - excessive investment of time into games - and problems for player functioning. Known associations cover psychosocial problems, such as loneliness, anxiety, and depression [211]; low self esteem and

social conflicts [151]; and certain personality tendencies such as increased impulsivity [212]. They also include health problems, such as musculoskeletal problems and obesity [213]. (In fact, one can note some overlap between these associations of gaming disorder and the above listed consequences of problem gambling).

Furthermore, there are established links between excessive time investment, microtransactions, and maladaptive outcomes for players. For example, Garea et al. [27] found that in the case of loot boxes, excessive gaming was positively related to loot box spending. Carey et al. [25] found that the likelihood of meeting the criteria for gaming disorder increased 3.8 times with expenditure on microtransactions and 4.6 times with buying loot boxes, and Hing et al. [26] found adolescents who had engaged with loot boxes in games in the past month more likely to report meeting the criteria for gaming disorder. 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.

However, studies in the field have been largely externally focused and top-down, 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. As such, it may overlook possible factors and links which cannot be seen from a researcher perspective. Yet such insight could be integral to a more nuanced understanding of the underlying processes, and foundational to prevention strategies.

Moreover, much of the spotlight in the field focuses on children and adolescents, as being a particularly vulnerable demographic [105], [106]. 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 [119], [146], [214]. Whilst prior work has shown that

engagement with loot boxes correlates with the presence of gaming disorder symptomatology, little work has investigated the interaction between alternative microtransactions and disordered 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 adults.

The study described in this chapter considers specifically games described in chapters 1-2 as having had their 'dynamics designed to drive spending'. I therefore explore a sample of *games* which I have reason to hypothesise would have directly negative consequences for players, rather than exploring *patterns* of gaming in general, as previous work has done. I consider 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 the acquisition of knowledge which would not have been possible from a purely objective epistemological standpoint.

I conducted interviews with 14 adult players. The interview questions focused on what - if any - consequences players believed playing the games had had for their lives, considering the research question "*What problems are linked to interaction with games which have microtransactions designed to drive player spending?*" The data was analysed and collected using a grounded theory approach. Key problems could be categorised into 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. These consequences parallel the known consequences of problem gambling, and of gaming disorder.

Methodology

I took a phenomenological approach to the research, which meant focusing on the subjectivity of the gaming experience and player perception [215].

Grounded theory

A grounded theory approach was used to explore player experiences of interaction with such games, as well as the contextual factors which surround this interaction. Grounded theory is a qualitative methodology which involves the construction of theories by following the data, without imposing researcher preconceptions and applying inductive reasoning [216]. I chose to use this approach for this study as it allowed for a guided 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.

Within grounded theory, there are many schools of thought. I opted to follow the constructivist approach as outlined by Charmaz [217]. 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 begin with the 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 - ie. 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; 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 [218], and the researcher's role and influence in shaping the representation of the participant is paramount. This also means it is important for the researcher to acknowledge and reflect on their own biases throughout the data collection and analysis.

Participants

I referred to the list of mobile games which had been identified by players in Chapter 2 as having had their dynamics to drive spending for the recruitment process. (Note: in chapter 2, some games were perceived by players as including the element of 'game dynamics designed to drive spending'. However, by the very definition of this feature, it applies to the whole game, and chapters 3-4 are interested in players of those games rather than distinguishing features within the games. For this reason and ease of understanding, the games are referred to as 'games designed to drive spending').

I followed the grounded theory method of theoretical sampling, which consists of collecting more 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 subReddits of the above described relevant games (the full list of games which meet these characteristics can be found in Appendix C.)

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 subReddit by accident, and in case of playing multiple games of interest). I wanted to make

sure the study had a diverse sample of genders, cultural backgrounds, and professions to make the findings as robust as possible, so these demographics were collected. I 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 I was 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 female, 5 non-binary, 69 male; average age=33): after the first 50 participants (22 female, 2 nonbinary, 26 male; average age=33), I 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 I went further through data collection and more participants responded than I had capacity for, I 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.

As the study progressed, I 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 the 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.

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 8.

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: RiseToWar, SkyWeaver, Diablo Immortal), AFK Arena
14*	Female	27	Business Analyst	UK	Legend of the Phoenix

Table 8. Participant demographics. The * denotes participants who believed themselves to have experienced problems with wellbeing in relation to playing games.

Ethical considerations

Ethics for this project was obtained from the University of York Physical Sciences Ethics Committee, ref Petrovskaya20210803. Ethical considerations included discussion of potentially sensitive topics with a lack of anonymity throughout the data collection and analysis process, and the fact the material would be recorded and stored.

I 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.

It was made clear to participants that they did not have to answer any questions which they did not feel comfortable with.

Data collection procedure

The interviews were semi-structured. I constructed a script to ensure core areas of interest were included, but participants were encouraged to describe all and any relevant experiences at length. 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 C.

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. Wellbeing issues which participants believed to be related to their gaming were explored in detail. If participants needed prompts to discuss wellbeing, 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 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, I began to see that people experienced consequences based on some of their life situations and characteristics. I adjusted the questions to account for this, as well as to continue validating the consequences of such interaction which I had discovered throughout.

The interviews were conducted remotely, using online conferencing software, and recorded using the software OBS. I conducted and manually transcribed all interviews.

Analysis

The data was coded and analysed using the qualitative data analysis software MAXQDA. I coded 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. I used constant comparison, comparing both within participants and between them. I also wrote memos throughout the research process to have a clear idea of emerging concepts and how to integrate them into future directions.

Results

The developed theory is illustrated in Figure 9.

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, and a perceived poor quality of life. 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.

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,

"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,

"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 therefore one of the drivers of in-game time and monetary investment, as players seek to maintain this feeling by any means possible.

However, for the sake of this thesis it must be noted that while need for achievement was linked to problems for wellbeing in the current study, it is outside of the scope of this thesis to discuss whether it is the *only* possible driver of over-engagement with the games.

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 raise 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)

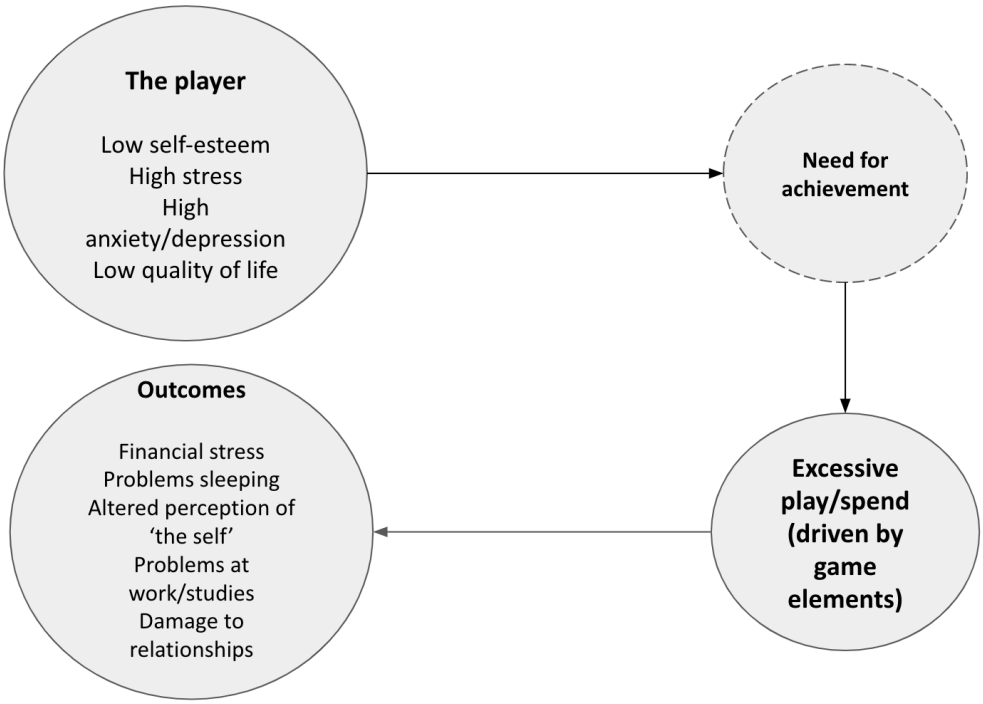

Figure 9. Diagram of theoretical model from the grounded theory.

Wellbeing problems

This interaction with vulnerable traits and certain game mechanics is associated with wellbeing problems for players. Such problems consist of: financial, social, employment/education-related, emotional, and physical.

Financial wellbeing

Changes to financial wellbeing are linked to 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 some cases leads to having to ask for help from other people.

Educational/vocational wellbeing

Likewise, problems for the participant's main life activity - their job or their studies - are linked to excessive play, 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 wellbeing. 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)

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.

Emotional wellbeing ('the self')

Changes to emotional wellbeing are linked to 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).

Social wellbeing

To a lesser extent, people also experience problems with social wellbeing linked to games. 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.

The unaffected

According to the theory, it is only people with traits and life circumstances that make them vulnerable to these mechanics that will be particularly affected by such mechanics. This may lead to the point of over-engaging and experiencing problems in other life areas. 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 non-vulnerable 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 9).

Discussion

I conducted interviews with 14 players of mobile games to develop a grounded theory of problematic outcomes which are linked to such gaming, and the processes which may lead to this. The results showed that mobile games which include elements identified by players as 'designed to drive player spending' are linked to a range of problems for players, including financial, educational/vocational, sleep-related, social, and emotional. However, it is not only the spending of money in such games which has potential to lead to problems. Often, such games drive over-investment of *time* instead of (or alongside) spending, leading to the above described outcomes because of excessive gaming.

Similarity to gaming disorder and gambling

Indeed, the current sample showed some behaviours which correspond to DSM-5 criteria of gaming disorder. These were preoccupation with gaming, deceiving family members, giving up other activities, risk, and continuing to game despite problems. This similarity is important to note because the focus was on 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 concern.

Some of the outcomes of excessive play and spending as a result of interaction with certain game features also parallel known harms of gambling. The current work's categories can be compared alongside Langham et al. [203] dimensions of harm, which incorporate financial, relationship disruption, emotional or psychological distress, and 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). The outcomes from this chapter can also be considered through Wardle et al.'s [219] 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. Microtransaction-based games share some elements of gambling machines (e.g. Larche et al. [6]), 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.

Predisposition and vulnerability to being affected by game design to drive spending

"Gaming is very popular, but very few individuals will ever experience significant gaming-related problems" [220]. Indeed, in the current sample, while everyone interacted with game monetisation elements that to some extent could be said to be problematic, not everyone experienced problems. A deeper look is warranted at what individuals are vulnerable to over-engaging with games that have such mechanics, and experience problematic outcomes.

This study suggests 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. [221] 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.

In fact, there is a well-established link between psychopathology and gaming [220] - and mental health problems were cited as an antecedent to disordered gaming and spending in this sample too. Lower life satisfaction, another factor, has also been linked to gaming disorder [222] and can be connected to job stress. The vulnerability factors which emerged from this 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.

In the current sample, it was women who reported being more affected by the games of interest, and exhibiting symptoms and consequences of problematic gaming. 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 [219]. This discrepancy may be due to specific types of games being investigated. Women are more likely to engage in casual mobile gaming, due to lifestyles and interests, whereas men have historically gravitated more towards big-budget, desktop gaming [81]. This difference in findings calls for closer investigation into whether problematic monetisation design in mobile games is likely to affect women more disproportionately.

Limitations

The sample did consist 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 this methodology, I was unfortunately unable to work with people who were in a different place with their gaming habits, yet this may have provided different insights.

Similarly, I looked at only the games which I had already conceptualised as 'games designed to drive spending' in the earlier studies. This meant that there was potential to overlook some games which also would have fallen into this category. Furthermore, I did not consider the broader ecosystem of games and game production, focusing only on top-grossing mobile games. I did not look at desktop games or at less successful mobile games; I also did not consider indie games, which may have been designed according to different principles. Possibly,

expanding the sample to be more diverse may have rendered more nuanced findings. However, using a sample of games which was defined in a rigorous way also has its advantages in making the findings more reliable.

Chapter conclusions

Previous work has considered problematic gaming as patterns of behaviour across games, viewing any negative correlates as associations of specifically excessive engagement. I looked at a subset of games which are perceived by players as targeted to drive player spending and assessed the possible correlates of engaging with such games, as well as the underlying processes behind these correlates. Problems which were linked to 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.

The next step is to see whether the qualitative findings can be replicated quantitatively in a broader population, specifically assessing whether the psychological and environmental traits in the theory may predispose players to experiencing problems in parallel with their gameplay, and validating whether the games themselves truly are contributors to these problems. This is the purpose of chapter 4.

Study 4: who experiences harms linked to problematic microtransactions?

Introduction

Chapter 3 presented an interview study with players that believed the games they were playing had dynamics which were designed to drive their spending. This resulted in a grounded theory of five life areas in which players experienced problems with their wellbeing which they believed were related to playing the games in question. The areas identified were financial, emotional, educational/vocational, sleep, and social wellbeing. An interesting trade-off which emerged in the study was that the problems identified were not a result of purely financial investment. Some design elements in the games offered players a choice of whether they wished to attain an objective by spending money, or by spending a lot of time playing ('grinding').

As such, some of the problems with regard to wellbeing occur because of excessive time invested into play - but this time investment is also a result of what players label as 'design to drive spending'. The study described in this chapter aims to investigate further how the wellbeing problems are related to both financial and time investment into the games. In this way, it joins a larger academic discourse on whether playtime has an effect on player wellbeing. A recently published study by Vuorre et al. [149], which tracked 38 935 players across 7 games for 6 weeks in playtime and linked it to affective wellbeing and general life satisfaction, found that time spent playing had 'limited to no impact on wellbeing'. The authors conclude 'limiting or promoting play based on time alone appears to bear neither benefit nor harm.'

However, this is part of a broader context of research into gaming disorder, which is associated with heavy gameplay (e.g. [223]), and also with various problems with wellbeing, like health

consequences [224], problems with academic and career achievements [151], and psychosocial problems [211]. This is likely due to a series of interconnected factors, rather than a direct link between heavy gaming and consequences for wellbeing. Identifying what these factors are should therefore be a priority, and the work in this chapter aims to contribute to this goal by considering the role of the *game*. Could the game itself be what causes the distinction between healthy heavy gaming and excessive, disordered play?

The grounded theory also posited that only certain types of players were vulnerable to being affected by such elements, whereas others were able to engage and disengage as they wanted. The characteristics which distinguished players that were more likely to experience wellbeing problems after playing the game were mental health problems, stress at work, low self esteem, and poor quality of life. Other contributing factors included being female - nearly all of the affected participants identified as female, and not having children that the participant regularly saw. This is in line with work into gaming disorder, which consistently suggests that not all individuals who play games will experience gaming-related problems, but a small subset will. Those include players experiencing mental health problems, lower life satisfaction, and stress [222], [225].

The study presented in this chapter examines the idea that certain players of games will experience problems for their everyday wellbeing further. It investigates the research question of '*Are certain types of people more likely to experience problems linked to these games?'.* It contributes to unpacking the relationship between excessive play and disordered gaming, using a subjective measure of playtime and financial investment into games. I conducted a survey of 295 players of games identified earlier in this thesis as having had their 'dynamics designed to drive spending'. collected psychoenvironmental characteristics as measures of vulnerability, demographic information, and wellbeing, as well as objective measures of time and financial spend, obtained through participants providing screenshot evidence. The study was pre-registered (https://osf.io/nkc86/).

Research questions and hypotheses

The broad research question under investigation in this chapter is split into two smaller questions which combine to answer it.

RQ4a) Is there a link between wellbeing and psychoenvironmental traits in players of games 'designed to drive spending', moderated by time and financial investment into these games?

'Vulnerable individuals', where stated, were characterised as a combination of the following traits: life satisfaction, self-esteem, impulsivity, job satisfaction, and general psychopathology. This is based on the factors from the grounded theory in chapter 3. Impulsivity was added as a factor of interest because of its very well-established links to gambling, gaming disorder, and loot boxes [222], [226], [227]. As such, I had reason to believe it would be important in the context of interaction with games designed to drive spending also.

'Wellbeing problems', where stated, were characterised as a combination of the following: financial, emotional, physical (sleep), and education/employment. Upon reflection on the grounded theory from chapter 3, it was decided that there was weaker evidence for 'social' than the other categories. With this in mind, social problems were not ultimately investigated in this study, as their removal also allowed for a larger sample size within available resources for participant payment.

H1) Vulnerable individuals are more likely to experience financial problems related to playing mobile games designed to drive spending, moderated by financial and time investment.

H2) Vulnerable individuals are more likely to experience emotional problems related to playing mobile games designed to drive spending, moderated by financial and time investment.

H3) Vulnerable individuals are more likely to experience educational or vocational problems related to playing mobile games designed to drive spending, moderated by financial and time investment.

H4) Vulnerable individuals are more likely to experience sleep-related problems related to playing mobile games designed to drive spending, moderated by financial and time investment.

H5) Women are more likely than other genders to experience problems related to playing mobile games designed to drive spending, with time or financial investment as a covariate.

H6) People without children who they regularly see are more likely to experience problems related to playing mobile games designed to drive spending, with time or financial investment as a covariate.

RQ4b) Are there more wellbeing problems in players of these games than other games?

H7) Players of games characterised as having had their dynamics designed to drive spending will be more likely to experience wellbeing problems than players of other games.

Methodology

Participants

Participants were recruited from two sources: the online bulletin board Reddit, and the participant database Prolific. Reddit participants were recruited specifically from subReddits of 'games which are perceived by players as having been designed to drive spending' (see Appendix C). One of the motivations for mixing both was that I was interested in studying as representative a spread of adult players as possible, as much previous work has focused on dysregulated players or adolescents. It is likely that Reddit and Prolific attract different audiences, which would have contributed to the diversity of the sample. A large proportion of the population play the games of interest, and I wanted to see if the nature of ‘dynamics designed to drive spending’ would affect a normative player who interacts with them.

A total of 295 players were included in the analysis for hypotheses 1-6 (from a total of 727 initial respondents). This number was based on a power analysis of 5 predictors, alpha level of 0.01, and an f squared of 0.0625 for a linear multiple regression, and a proposed power level of 0.80. A purposefully stringent alpha level was chosen to minimise the likelihood of false positives, given the amount of comparisons which were being conducted. Of those respondents, 157 were female, and the age range was 18-60 (average = 27). Two hundred and twenty five respondents did not have children that they regularly saw. Fifty participants were recruited from Reddit, and the rest from Prolific.

In addition, 72 players of other games were recruited for comparison of wellbeing (hypothesis 7): the rationale for this was a power analysis of a one-tailed t-test to detect effect size of 0.4, at alpha = 0.01 and power of 0.9. The games considered were non-mobile: desktop and console games. The rationale for this sample was taken from chapter 2, the findings of which showed that desktop games had a much lower prevalence of 'dynamics designed to drive spending': only 10%.

Ethical considerations

Ethical approval for the study was granted by the University of York Physical Sciences Ethics Committee, reference Petrovskaya20210803. No identifying information was collected besides the demographic data specified below, and participants were identifiable only by their Prolific ID, which were also removed once data collection was complete. The screenshots collected were converted into numerical data in the early stages of analysis, and destroyed upon completion of the project. Only I had access to the data at all stages.

Measures

Participants completed a battery of measures in the survey.

Psycho-environmental characteristics which may increase vulnerability, used in hypotheses 1-4:

- Life satisfaction was measured with the Satisfaction with Life Scale [228]. This is a 5-item scale designed to measure global cognitive judgments of one's life satisfaction .Agreement is rated on a 7-point scale that ranges from 7 ("strongly agree") to 1 ("strongly disagree").
- Self esteem was measured with the Single-Item Self-Esteem Scale [229]. This is a one-item measure of global self-esteem. Although one-item, it has strong convergent validity with the Rosenberg Self-Esteem Scale (a 10-item scale) and similar predictive validity.
- Impulsivity was measured with the Barratt Impulsiveness Scale [230], the most widely cited instrument for the assessment of impulsivity which consists of 30 items in total. The scale is made up of six first-order factors: attention, cognitive instability, motor, perseverance, cognitive complexity and self-control.
- General psychopathology was measured with the Depression Anxiety Stress Scale (DASS-21 version) [231]. It is a set of three self-report scales designed to measure the emotional states of depression, anxiety and stress.
- Job satisfaction was measured with the Brief Index of Affective Job Satisfaction [232], a 4-item scale rated from 5 ("strongly agree") to 1 ("strongly disagree").

Wellbeing measures, used in hypotheses 1-7:

- Financial wellbeing was measured using the InCharge Financial Distress/Financial Well-Being Scale [233], an 8-item scale where items are rated 1-10 with higher scores indicating greater financial well-being. The scale measures "a latent construct representing responses to one's financial state on a continuum ranging from overwhelming financial distress/lowest level of financial well-being to no financial distress/highest level of financial well-being".
- Emotional wellbeing was measured using the Warwick-Edinburgh Mental Well-being Scale [234], a 14-item scale with 5 response categories, summed to provide a single score. The items cover both feeling and wellbeing aspects of mental wellbeing.

- Employment/education-related wellbeing was measured using the 'organisational skills' and 'efficiency' subscales of the Job Performance Scale [235] (8 questions in total, rated from 7 "strongly agree" to 1 "strongly disagree"). These particular subscales were selected as they were the ones deemed most relevant to the qualitative conceptualisation of vocational wellbeing from previous work.
- Sleep wellbeing was measured using the Single-Item Sleep Quality Scale [236], a one-item sleep quality assessment "which possesses favourable measurement characteristics relative to lengthier sleep questionnaires."

In general, I wanted to find a balance between using the most valid measures and maximising player survey completion, which is why brief/single item measures were used where they showed similar validity levels to longer questionnaires.

Demographic information - age, gender, occupation, and whether or not the participant had children which they regularly saw - was also collected. This data was either needed for the proposed analyses, or was collected for possible exploratory further analyses.

Measuring playtime and spend

A core contribution of this study was the objective measurement of time and money invested by players into the games. Both of those types of data are difficult to gather in studying games (particularly spend), as companies are often reluctant to share this data unless it aligns with corporate interests [170]. Studies of gaming and wellbeing therefore often rely on self-report measures, which are notoriously inaccurate for this purpose (e.g. [237]. This problem can be negated by asking users to share their own game-related data, which also actively involves the user in the research [238].

Players were asked to upload a screenshot of their activity and spend on the relevant games as generated by their device. The majority of mobile phones allow users to see how much time they have spent on certain apps in a recent period, and can also track spend (See Figure 10 below). Because of this approach, I had objective data of both playtime and spend.

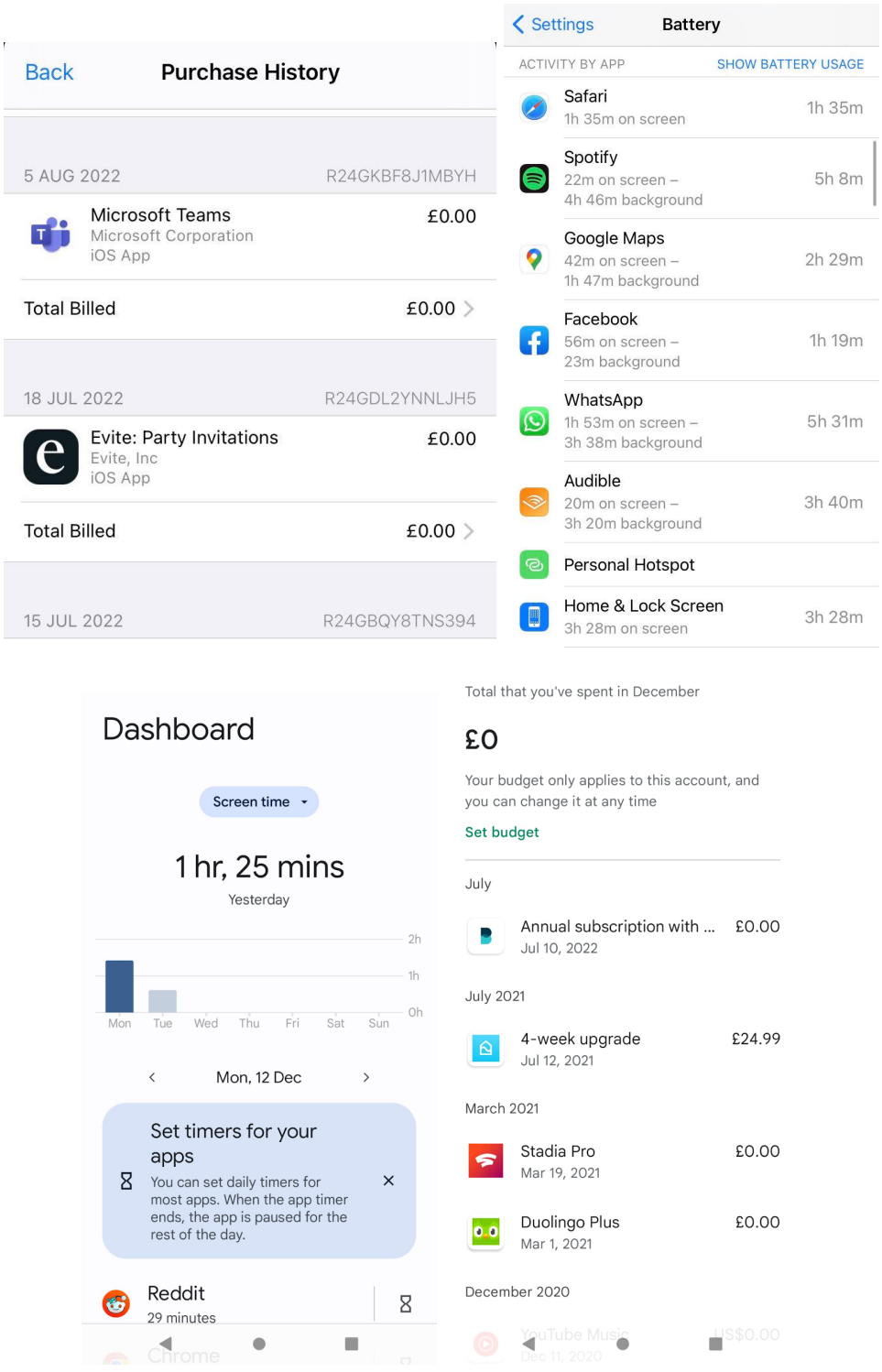

Figure 10. An example of the way a mobile phone might present the time and money a user had spent on a specific app (top two images are iPhone; bottom two are Android). Note: the screenshots are provided as an example and are not actual data from the study.

Procedure

In the Prolific version of the study, participants were pre-screened to ensure that they were players of the games of interest. They were asked to select games from a list that they played regularly (at least twice a week), or indicate that they did not play any of the games. The main body of the survey was made available to everyone who had indicated that they played at least one of the games. In the Reddit version, the same question was integrated into the full survey, as it would have been more practically difficult to follow up with participants. Any respondent who did not play any of the games was automatically redirected, and did not have access to the rest of the survey.

The main body of the survey included all of the above measures, as well as instructions for how to find evidence of their playtime and spend and upload it to the questionnaire. The upload was executed directly through Qualtrics, which has a file upload feature.

Analysis

The data was processed prior to analysis. Respondents were removed on the basis of failing at least one attention check; or uploading the wrong screenshot evidence of their time playing and spending - for example, many participants did not convert their time in game from battery percentage to minutes before taking the screenshot, as was requested in the survey.

The participant time and money spent on the game was also manually processed from the screenshots into an analysable format. The time invested was converted to minutes, and the money was converted to GBP. Both time and money were also standardised for the last 7 days, which was done to match some of the periods of time the self-report measures focused on.

All other measures were standardised by subtracting the sample mean and dividing by the sample standard deviation for each measure, as specified in our pre registration.

Hypotheses 1-4

Vulnerable individuals are more likely to experience [H1: financial/H2: emotional/H3: vocational/educational/H4: sleep-related] problems related to playing mobile games designed to drive spending, moderated by financial and time investment.

A single vulnerability score for all relevant measures (self-esteem, impulsiveness, general psychopathology, life satisfaction, and job satisfaction) was computed. Self-esteem, life satisfaction and job satisfaction were reverse-scored for this calculation.

I had originally pre-registered and planned to run a multiple regression for hypotheses 1-4. Prior to these analyses, I checked the data for relevant assumptions: linearity, lack of outliers, homoscedasticity, normality of residuals, lack of multicollinearity, and independence. However, for the majority of the measures, the assumption of normality was not met. As planned in the pre-registration, I next applied a series of transformations to the data, beginning with a log transformation (log base 10 of the data with an added constant of 1, to account for values which were zeroes). This was not successful in solving the above issues, and after some thought at this point I decided a linear model would not be the most appropriate way to explain the data in this instance.

Therefore, in deviation from the pre registration plan, I used a quantile regression, which can be used as a non-parametric extension of linear regression which does not require conditional assumptions regarding underlying distributions. Quantile regression expresses the conditional quantiles of a dependent variable as a linear function of the explanatory variables [239]. A linear regression fits a line to the mean of the data, traditionally using the least squares approach and minimising the sum of squares of the residuals. By contrast, a quantile regression works with medians and quantiles. In the case of a median, quantile regression would fit a line which expects half of the data on each side; for X quantile, it would find a line which has X% of data below it [240]. Quantile regression coefficients are interpreted in the same way as linear

regression coefficients, meaning for one unit change in the predictor variable, the response variable increases by the coefficient at whichever quantile is under investigation [241].

A quantile regression therefore allows an understanding of the relationships outside of the mean of the data, and does not have to follow the idea that variables behave the same at tails of the distribution as they do in the centre [242]. It can therefore be used when the assumptions of linear regression are not met. Quantile regression also allows more nuanced conclusions on the relationship between where a data point might be located in the distribution and their performance on measures [241].

Hypotheses 5-6

[H5: Women/H6: People without children] are more likely than other genders to experience problems related to playing mobile games designed to drive spending, with time or financial investment as a covariate.

A single combined wellbeing outcome score was computed as the sum of scores for the measures of financial, emotional, physical (sleep) and education/employment wellbeing measures.

Similar issues regarding violation of statistical assumptions were faced with hypotheses 5-6, which were originally planned to be analysed with an ANCOVA. In this instance, the assumption of the independence of the covariate (time and money invested into game) and treatment effect (gender; presence of children) was not met. This meant I was again unable to proceed with the model as planned, and in deviation from the pre registration plan- opted to remove the covariate, as is commonly recommended in such situations [243]. I thus ended up running an ANOVA rather than an ANCOVA.

Prior to running an ANOVA, the three core assumptions of this test were also checked. Normality was checked through a Shapiro-Wilk test of normality and by plotting a histogram of the response variable and a Q-Q plot; equality of variances was checked via examination of

boxplots and confirmed by administering Bartlett's test (which confirmed equality of variance for both H5 and H6). All the figures can be found in Appendix D. Independence of observations were met by default, given the nature of our data collection.

Hypothesis 7

Players of games characterised as having had their dynamics designed to drive spending will be more likely to experience wellbeing problems than players of other games.

This hypothesis was answered through a t-test, between the comparison group of players of other games and a randomly selected sample of the same size from the main body of participants, to ensure they were matched on other characteristics. The data was tested for normality using the Shapiro-Wilks test of normality, which was met.

Results

Descriptive statistics

Before moving onto the analyses, I present the sample mean, maximum, and minimum, seen in Table 9. These statistics help ascertain an overview of the structure of the data.

Variable	**Mean**	**Maximum**	**Minimum**	**Standard Deviation**
Life satisfaction	14.31	31	1	7.22
Self esteem	3.84	7	1	1.67
Psychopathology	37.38	110	0	25.72
Impulsivity	62.8	107	34	10.80
Job satisfaction	12.48	20	4	3.72

Time spent playing over the last 7 days (minutes)	328.49	3844.4	0	560.45
Money spent over the last 7 days (£)	0.72	50.12	0	3.78
Financial wellbeing	36.83	68	10	9.59
Job performance	39.81	51	24	5.00
Sleep	5.19	10	1	2.25
Emotional wellbeing	44.88	70	14	10.32

Table 9. The mean, maximum, minimum and standard deviation for each variable.

A feature of the data worth highlighting at this stage is the extreme skewness and high prevalence of zeroes in the 'money spent' variable. Only 22 of the 295 participants had spent any money during the time period in question (7.5%) (see Figure 11). Moreover, the highest amount of money spent was £50.12, which is not necessarily representative of the small percentage of high spenders which may be cause for concern.

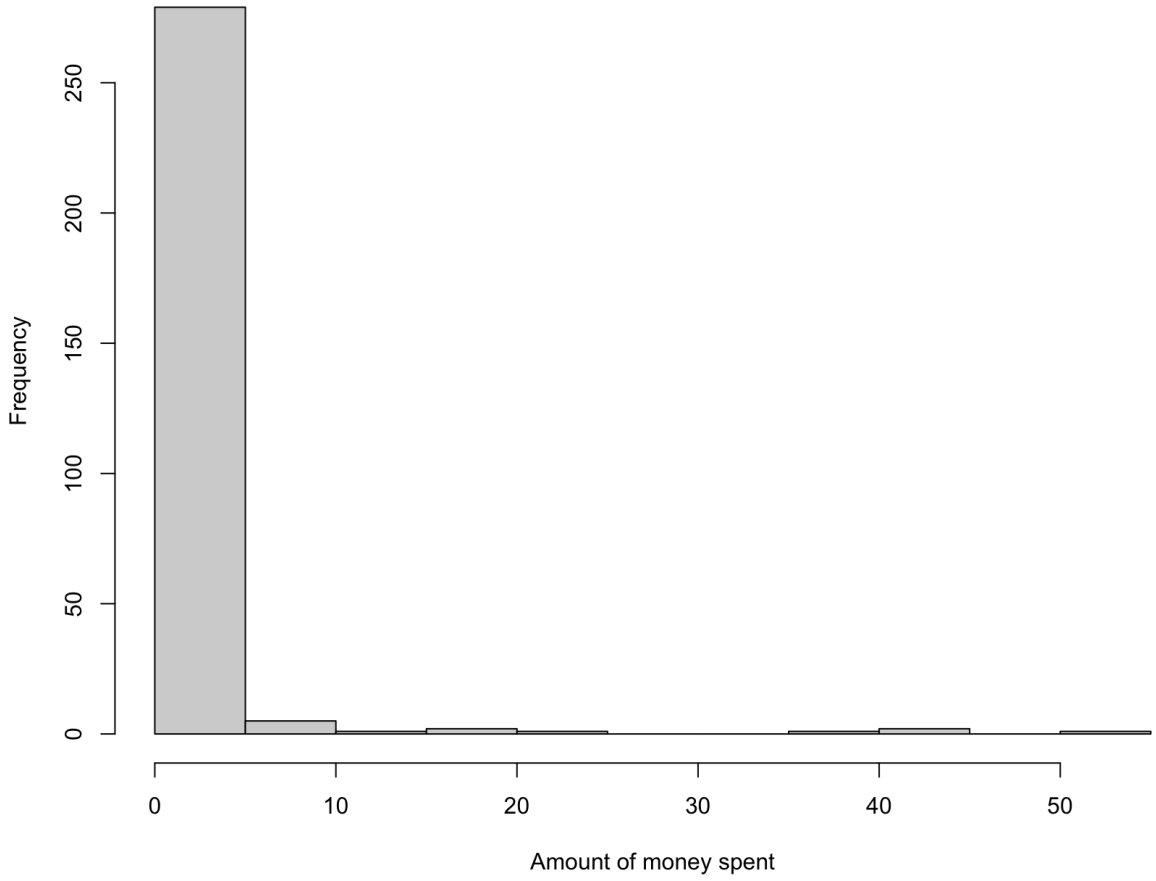

Figure 11. A histogram of the distribution of money spent in games by the sample.

This does not affect the choice of analysis methods, given the lack of assumptions in quantile regression about the distribution of the predictor variable. However, it should be borne in mind as the reader moves on to the results and discussion, given that it may reflect an underlying sample characteristic.

Hypotheses 1-4

Vulnerable individuals are more likely to experience [H1: financial/H2: emotional/H3: vocational/educational/H4: sleep-related] problems related to playing mobile games designed to drive spending, moderated by financial and time investment.

A separate quantile regression was fitted for each of the hypotheses 1-4. I estimated the 0.25, 0.5 (the median), and 0.75 quantile. These choices were made to gain as comprehensive an understanding as possible of the relationships at different levels of the sample. They were also based on an updated power analysis of the same alpha level (0.01), effect size, and power (0.8) as planned for the linear regression. The required sample size for the median was 202; and for the 0.25 and 0.75 quantile was 300. The full results are presented in Table 10.

Hypothesis	**Quantile (tau)**	**Predictor**	**Coefficient**	**P-value**	**95% confidence interval**
1:Financial wellbeing.	0.25	Vulnerability	0.07634	0.00776*	0.03, 0.12
		Time	-0.00013	0.57448	-0.0003, 0.0001
		Money	-0.01921	0.42006	-0.06, 0.03
		Time*Vulnerability	-0.00006	0.39041	-0.0001, 0.000
		Money*Vulnerability	-0.00466	0.64629	-0.023, 0.01
	0.5	Vulnerability	0.10487	0.00003**	0.05, 0.15
		Time	-0.00003	0.80335	-0.0003, 0.0002
		Money	-0.02996	0.25071	-0.09, 0.03
		Time*Vulnerability	-0.00002	0.51453	-0.00009, 0.00005
		Money*Vulnerability	-0.00245	0.82208	-0.03, 0.02
	0.75	Vulnerability	0.08544	0.00055*	0.04, 0.12
		Time	-0.00004	0.69257	-0.0003, 0.0002
		Money	-0.02171	0.55991	-0.07, 0.03
		Time*Vulnerability	0.00000	0.97127	-0.00006, 0.00006

		Money*Vulnerability	0.00418	0.72661	-0.015, 0.023
2: Emotional wellbeing	0.25	Vulnerability	-0.20692	0.00000**	-0.24, -0.17
		Time	-0.00002	0.85593	-0.0002, 0.0002
		Money	0.01963	0.18331	-0.02, 0.06
		Time*Vulnerability	0.00000	0.93167	-0.00005, 0.00005
		Money*Vulnerability	0.01119	0.04702	-0.004, 0.03
	0.5	Vulnerability	-0.20765	0.00000**	-0.24, -0.17
		Time	-0.00018	0.15952	-0.0004, 0.00002
		Money	0.01041	0.55470	-0.03, 0.05
		Time*Vulnerability	0.00000	0.84759	-0.00004, 0.00006
		Money*Vulnerability	0.01385	0.04020	-0.0009, 0.029
	0.75	Vulnerability	-0.18221	0.00000**	-0.22, -0.15
		Time	-0.00019	0.05716	-0.0004, 0.00001
		Money	-0.00523	0.75497	-0.043, 0.033
		Time*Vulnerability	0.00000	0.94035	-0.00005, 0.00004
		Money*Vulnerability	0.00118	0.91705	-0.014, 0.017
3: Educational /vocational wellbeing	0.25	Vulnerability	-0.08505	0.00197	-0.12, 0.05
		Time	0.00016	0.28694	-0.00005, 0.0004
		Money	0.00364	0.86515	-0.042, 0.04
		Time*Vulnerability	-0.00001	0.69831	-0.00006, 0.00004
		Money*Vulnerability	0.00772	0.48714	-0.008, 0.023

	0.5	Vulnerability	-0.07705	0.00972*	-0.11, -0.04
		Time	0.00008	0.64064	-0.0001, 0.0003
		Money	-0.00795	0.78339	-0.05, 0.03
		Time*Vulnerability	-0.00003	0.41045	-0.00008, 0.00002
		Money*Vulnerability	0.01298	0.37002	-0.003, 0.03
	0.75	Vulnerability	-0.10640	0.00007**	-0.15, -0.06
		Time	-0.00013	0.32474	-0.0004, 0.0001
		Money	0.03457	0.57398	-0.013, 0.08
		Time*Vulnerability	0.00000	0.90457	-0.00006, 0.00005
		Money*Vulnerability	0.01465	0.39021	-0.004, 0.03
4: Sleep wellbeing	0.25	Vulnerability	-0.09702	0.00110**	-0.14, -0.05
		Time	-0.00018	0.27357	-0.0004, 0.00009
		Money	-0.00168	0.92540	-0.05, 0.05
		Time*Vulnerability	0.00003	0.44910	-0.00003, 0.00009
		Money*Vulnerability	0.00604	0.46636	-0.01, 0.03
	0.5	Vulnerability	-0.13927	0.00000**	-0.2, -0.08
		Time	-0.00041	0.01135	-0.0008, -0.00006
		Money	-0.02651	0.21777	-0.092, 0.04
		Time*Vulnerability	0.00003	0.37856	-0.00005, 0.0001
		Money*Vulnerability	-0.00063	0.94936	-0.03, 0.03
	0.75	Vulnerability	-0.06819	0.02834	-0.12, -0.02

		Time	-0.00040	0.00616**	-0.0007, -0.0001
		Money	-0.05074	0.01217	-0.1, -0.001
		Time*Vulnerability	-0.00003	0.35566	-0.0001, 0.0003
		Money*Vulnerability	-0.00311	0.77316	-0.02, 0.017

Table 10. The coefficients and p-values for all predictors across all hypotheses at different tau levels. The * denotes significance at an alpha level of p < 0.01. The ** denotes significance at the Bonferroni corrected level of p < 0.002 for multiple comparisons.

Table 10 illustrates the significance of all the variables across the above-described quantiles. Four models were fitted, one per hypothesis, and are denoted by the wellbeing outcome in question. By looking at the spread of quantiles in each model, the reader can consider whether the magnitude of the predictors and the interactions changes at all as the outcome variables move from the lower to the upper quantile.

As per the hypotheses, I was interested in the significance and effect sizes of the interactions, namely, Time*Vulnerability and Money*Vulnerability, as those were the variables of interest in the hypotheses. Should these interactions have been significant, the hypothesis that 'vulnerable' individuals were more likely to experience wellbeing problems through moderation by greater playtime or greater in-game spend would have been met.

However, none of the interactions were significant at the pre-registered alpha level of $p < 0.01$, meaning none of the hypotheses were met. Therefore, I cannot conclude that 'vulnerable' individuals are more likely to experience financial, emotional, educational/vocational, or sleep-related problems linked to playing mobile games designed to drive spending, moderated by financial and/or time investment. Nor was there any changes in significance across the quantiles, which suggests there is no difference even at the extreme ends of the outcome distributions.

The variable 'Vulnerability' is consistently significant. This is not directly relevant to our analyses, as it shows merely a link between certain psychoenvironmental characteristics and wellbeing, which is already widely documented.

Because the variables were standardised prior to analysis, the coefficients of the predictors in quantile regression can be interpreted as expected change in the predictor when the response variable changes by 1 standard deviation. The effect size of interest was 0.4 standard deviations, which was based on a paper by Norman et al. [244] who argue that "the threshold of discrimination for changes in health-related quality of life is half a standard deviation". I adapted this effect size with the rationale that the study is about wellbeing across different life areas, and corrected it to 0.4 using Lord and Novick's [245] correction. None of the predictors showed an effect size of this magnitude.

Hypotheses 5-6

[H5: Women/H6: People without children] are more likely than other genders to experience problems related to playing mobile games designed to drive spending, with time or financial investment as a covariate.

A one-way ANOVA was performed to compare the effect of gender on the combined wellbeing measures. There was no statistically significant difference in wellbeing between females and other genders , $F(1, 293) = 0.015$, $p = 0.903$. Another one-way ANOVA was fitted to compare the effect of having children on wellbeing, and was also not significant: $F(1, 293) = 3.522$, $p = 0.0616$. Hypotheses 5-6 were therefore also not met.

Hypothesis 7

Players of games characterised as having had their dynamics designed to drive spending will be more likely to experience wellbeing problems than players of other games.

Hypothesis 7 was tested by a t-test comparison of a random sample of players of 'games designed to drive spending' with players of other (non-mobile) games. The t-test was not significant: $t(141.52) = -1.0745$, $p = 0.2844$, thus not concluding that players of games characterised as having had their dynamics designed to drive spending will be more likely to experience problems for wellbeing than players of other games, and meaning hypothesis 7 was not met either.

Exploratory analyses

There was no significant difference between wellbeing outcomes in the players in the sample of interest who had invested the greatest amount of time playing (n = 72), and the least amount (n = 72): t139.71 = −2.3141, p = 0.02212.

There are also no notable correlations between any of the 'vulnerability' variables and time or money spent, nor with wellbeing.

Discussion

The work presented in this chapter aimed to investigate the extent to which psychoenvironmental characteristics are related to time, financial investment, and wellbeing problems in a sample of players of games previously identified as 'designed to drive spending'. The hypothesis was that several characteristics would be important in this context: life satisfaction, self-esteem, job satisfaction, impulsivity, gender, and whether or not the player has children that they regularly see. Another hypothesis tested was that players of games reported to be 'designed to drive spending' would be more likely to experience wellbeing problems across several life areas: financial, emotional, educational/vocational, and sleep. Notably, objective evidence of time and financial investment into games - screenshot evidence provided by participants - was used, rather than self-report, which is an established yet unreliable measure of playtime and spend in games. However, in a sample of 295 players of 'games designed to drive spending', none of the hypotheses were met.

RQ4a) Is there a link between wellbeing and psychoenvironmental traits in players of games 'designed to drive spending', moderated by time and financial investment into these games?

Firstly, there were no significant effects on any wellbeing-related outcome variables as a result of any interaction between psychoenvironmental characteristics and time/financial investment into games. As such, one may conclude that psychoenvironmental characteristics may not be significant in this context, while not excluding the possibility that games designed to drive spending can be linked to harm for players - as the grounded theory from chapter 3 suggests. To paraphrase, this simply means that there is no evidence in the current study that an individual with higher levels of these characteristics is more likely than someone with lower levels to spend more time playing or on microtransactions in the game. It is unlikely that at least a subset of the relevant characteristics that may have contributed to a relationship was not captured if such a relationship does exist; the psychoenvironmental characteristics were drawn not only from my own work but from studies on inter- and intra-personal characteristics in gaming disorder [222] and in gambling [246]. Given the robustness of the study design, this conclusion seems likely, and one can speculate that the characteristics of those experiencing harms in the qualitative study in chapter 3 could have been coincidental.

Of course, there are other possible explanations for why psychoenvironmental characteristics were not significantly linked to playtime and spend and in turn, to wellbeing problems Potentially the most important of these relates to sampling. It may be the case that our recruitment strategy was not tuned to capture people for whom the relationship between psychoenvironmental characteristics and wellbeing problems does hold. As mentioned above, our characteristics of interest are also commonly seen in studies in problem gambling and problem gaming. The key word here is 'problem': these associations are seen in small proportions of the population who show dysregulated behaviour. Meanwhile, the primary sample of interest in the current study was the normative gamer. I was interested in answering the question of whether a normative individual can start playing a 'game designed to drive spending' and begin experiencing harm. It is possible that this work is a step forward in

concluding that perhaps the 'average' individual will not experience harm if playing such a game.

Moreover, perhaps considering spending and playtime in a cross-sectional study did not capture the full extent of player behaviours, which may be *sustained* over a period. A potential future direction to investigate is that of *frequency* of spend. Some literature has already turned to this method. Zendle [247] linked gambling-like practices in video games to disordered gaming and problem gambling by measuring the frequency of participant engagement with gambling activities. King [248] measured expenditure frequency on loot boxes in understanding the effects of peer purchasing behaviours. Moreover, gambling research considers frequency as an inherent part of understanding problem gambling (e.g. [249], and indeed, gambling frequency is significantly related to gambling pathology [250]. Perhaps in this study, asking participants about their spending on a specific occasion in the past month was not enough to understand the true picture and accordingly characterise whether or not the participant was an excessive spender.

On a related note, the recruitment strategy ultimately drew only a small proportion of spending players. Only 22 of 295 participants had spent any money at all on games during the past 7 days, and only 8 of these had spent more than £10. The findings relating to spending as a moderator may be different if I had surveyed only players who had spent; or only those who were engaged in heavy and sustained spending. This will be a primary concern going into the subsequent chapter, as it is possible that players who do feel inclined to spend on games which have features that elicit spending may demonstrate different relationships between their traits and wellbeing (see Spending in games). However, most microtransactions are relatively small, relying on the amount of purchases made rather than one-off purchases. Zendle et al. [200] profiled games according to their revenue generation and spend per user, and found that a cluster labelled as 'uniform' accounted for 34.4% of the games in the sample. The median revenue in those types of games was only $3.58 per paying user. This means that while the current study may not have captured players who spend in games in a way which may be

harmful to their wellbeing, it would have been representative of an average player-game interaction.

RQ4b) Are there more wellbeing problems in players of these games than other games?

The investigation of the second research question, that players of games 'designed to drive spending' would exhibit lower wellbeing levels than players of other, non-mobile games, was also met with a surprising finding. No difference in levels of wellbeing across any life areas was significant across the two groups. This is a particularly surprising result, given that the effect of interaction with such games on player wellbeing was the primary finding of chapter 3, and the grounded theory developed as a result of interviews with players showed that players do experience distress and reduced wellbeing. However, the study outlined in the present chapter does not quantitatively support this.

There are possible explanations for this difference too. Primarily, the control sample of games did not undergo an additional categorisation process. Furthermore, the control sample consisted entirely of non-mobile games. This was based on rationale from chapter 2 that non-mobile games are less likely to be 'designed to drive spending', but does pose a limitation in that there were no controls for different play styles or other confounds in non-mobile games. Imposing such controls and considering whether comparison with an alternative sample of games may yield different results therefore becomes a priority in understanding why the results of this chapter were so surprising.

The case may also be that the measures used to understand wellbeing were too broad, and did not capture the subjective experience of the participants. In the interview study in chapter 3, participants talked about *all* the ways in which they felt playing games had affected them. For example, to one participant, this meant they had spent a sum of money in *Genshin Impact* which they would normally have spent on an art class, and had to cut back on the class for that very reason. This change, while significant and upsetting to the participant, may not have been

picked up by the InCharge Financial Wellbeing and Distress scale used in this chapter's study, which asks questions along the lines of "How frequently do you find yourself just getting by financially and living paycheck to paycheck?" This, of course, also ties into the sampling limitations discussed in relation to RQ4a.

Chapter conclusions

The work presented in this chapter aimed to quantitatively validate the grounded theory from chapter 3. This theory was that players of games perceived as 'designed to drive spending' are at a risk of experiencing wellbeing problems across several life areas linked to playing these games, and that players with certain psychological and environmental characteristics are more vulnerable to this. However, quantitative analyses, designed with standards of psychological rigour in mind in terms of sample size, effect sizes, and objectivity, did not find evidence of these relationships. This result provides evidence for the possibility that while microtransaction design is in some cases frustrating for players and seems like it is aimed at getting them to spend, for at least some people, such design will not be linked to problems.

The implications of these null results, and those of the preceding chapter, are examined further in the Discussion.

Discussion

This thesis drew on player perspectives to understand what problematic microtransactions are found in games, how common they are across successful games, and whether they could be linked to harms for players who interact with them. I took a mixed-methods approach, using qualitative methods for Chapters 1-3, and quantitative methods for Chapter 4. Throughout the thesis, I worked directly with players, so all conclusions around what microtransactions are 'problematic' (studies 1-3) rely on player perspectives rather than an objective assessment. .

Summary of findings

There were five research questions under investigation in the thesis. These questions were developed sequentially, each based on the findings of the question before it.

RQ1) What forms of problematic microtransactions exist?

In an open-ended, qualitative survey to 1104 players of 50 mobile and 50 desktop games, I asked players what microtransactions they had encountered in games which they felt had misled them, or were unfair or aggressive in order to promote the transaction. These definitions were taken from the Consumer Protection from Unfair Trading Regulations 2008. The data was analysed via content analysis.

In total, 35 player-perceived problematic microtransactions were identified by players, which were classified into 8 broad domains. These domains were: *game dynamics designed to drive spending, product not meeting expectations, monetisation of basic quality of life, predatory advertising, in-game currency, pay to win, general presence of microtransactions* and *other.* Some domains were more measurable than others and less based on personal beliefs and subjectivity. For example, *general presence of microtransactions* may stem from how specific players believe games should be monetised, whereas *pay to win* mechanics are identifiable in

games and tie into broader issues of fairness, such as social inequality. This will be discussed further below.

RQ2) What is the prevalence of problematic types of microtransactions across top-grossing mobile and desktop games?

Having developed a landscape of what microtransactions exist in games that players may perceive as problematic, I wanted to understand to what extent these microtransactions are prominent in popular games. I analysed player reviews for 50 top-grossing mobile games and 50 top-grossing desktop games, using top-down content analysis based on the microtransaction types identified in chapter 1.

Eighty-eight percent of mobile games contained at least one player-perceived problematic microtransaction, and 28% of desktop games. Moreover, 52% of mobile games were characterised as 'games designed to drive player spending' (compared to 10% of desktop games), meaning players believed they contained elements that developers had implemented to encourage their spending, rather than for the gameplay experience. Players raised issues of fairness around artificially engineered social inequality and transparency from the developer in their assessment of microtransactions.

RQ3) What problems are linked to player interaction with games which are perceived as having microtransactions designed to drive player spending?

Players characterising games as 'designed to drive spending' was prominent particularly across mobile games. 'Games designed to drive spending' is a distinct gestalt to players, defined as 'situations where players feel game dynamics - the ways in which the game patterns and players evolve over time - have been designed especially to encourage spending, rather than primarily for the improvement of a player's in-game experience.' Such games use design which presents obstacles to gameplay, relying on player engagement and converting that into payments. In this way, there are some similarities between the aims of this game design and gambling, in that both aim to prioritise player time on device and convert free paid into paid play [5], [6].

Given these parallels, I wanted to investigate this subset of games further, particularly whether playing them could be linked to comparable harms and problems to the ones seen in gambling.

I conducted interviews with 14 players, and developed a grounded theory of who and why might experience problems linked to playing such games. The theory is that certain people are more vulnerable, particularly those who are experiencing a poor quality of life, high anxiety, stress, or depression, or are in a negative life situation. Amongst other things, these people may not be having their need for achievement fulfilled in their lives, and may turn to gaming to fulfil this. Because games designed to drive spending allow players to become engaged with their gameplay before implementing payments, players get an initial taste of achievement in these games and want to continue, often by investing excessive time and excessive money into the game. This investment is linked to financial harms, problems sleeping, problems at work or in education, negative perceptions towards oneself, such as guilt or shame, and damage to relationships.

RQ4) Are certain types of people more likely to experience problems linked to these games?

Having established a qualitative theory of possible problems that certain types of people may experience linked playing games designed to drive spending, I wanted to test this theory quantitatively, with the aim of understanding whether it generalised to a broader population of players of games 'designed to drive spending'. I was particularly interested in focusing further on the psychological and environmental characteristics which may be linked to excessive play and spending in games and in turn to wellbeing problems as outlined in chapter 3.

I administered a battery of measures to 295 players of 'games designed to drive spending': measures of self-esteem, life satisfaction, impulsivity, depression, anxiety and stress, job satisfaction, and wellbeing measures: financial, emotional, vocational wellbeing, and sleep quality. I collected objective playtime and spending data from players by asking them to share

screenshots that showed this data. The relationships between the variables were analysed using quantile regression. No significant results were found to suggest any relationships between psychological and environmental characteristics, time and money invested into player-perceived games designed to drive spending, and problems across different life areas. Moreover, no difference in problems experienced was found between players of games designed to drive spending and a control group of 72 players of non-mobile games.

Discussion

The primary contributions of this thesis are firstly a comprehensive understanding of what microtransactions players perceive to be problematic and across what games such microtransactions are found. The second contribution is more complex, given I found evidence of harms linked to game dynamics designed spending in a small interview sample, but this was not replicated in a quantitative study. This section will discuss both of these findings and link them to existing literature.

Landscape and prevalence of player-perceived problematic microtransactions

One of the biggest concerns linked to the implementation of microtransactions is their role in gaming-gambling convergence. Primarily, this convergence can be split into *affective* - where game design elements trigger similar responses in the player to gambling, and *effective,* where specific gambling design mechanics are placed into games (see: Figure 5. A slot machine mechanic in Coin Master.). Existing literature has so far been focused on identifying which game design elements can be causally linked to problem gambling and its related harms, with a particular emphasis on loot boxes [10]–[12], [14], [24], [103], [110]. The existing research is therefore top-down: it has identified loot boxes as a possible problem relating to gaming-gambling convergence due to their structural features, and has focused on assessing their effects for players.

One of the notable findings of this thesis is the sheer amount of microtransactions perceived by players as being problematic which were found in Chapter 1 - thirty-five microtransactions

across eight broad domains. Of those, the majority - besides ‘game dynamics designed to drive spending’ - are not linked to gambling. Product not meeting expectations, monetisation of basic quality of life, predatory advertising, in-game currency, pay to win, and the general presence of microtransactions are not examples of effective or affective gamblification. Instead, the microtransactions identified are examples of situations where payment creates an artificial distinction between players, with those who pay having a better experience (pay to win, monetisation of basic quality of life). Another running theme is that of transparency on the part of the developer: in-game currency, product not meeting expectations and predatory advertising are all examples of withheld or false information. The most prevalent microtransactions when seen through player eyes were also ‘game dynamics designed to drive spending’, ‘core parts of game locked behind paywall’, and ‘unrealistic presentation of product’. This could be explained by them exemplifying these values, which are aligned with ethical perspectives of microtransactions. For instance, both Neely [17] and Heimo et al. [135] conclude that any microtransactions which change the gameplay, particularly with the aim of generating revenue, are unethical. These were microtransactions that players thought of, even though they could have raised more direct gambling mechanics, such as bingo or slot machine mobile games. Meanwhile, those concepts have been largely absent from the regulatory discussion.

Simultaneously, as mentioned, the idea of ‘game dynamics designed to drive spending’ was also very present in the results for chapters 1-2. This category of microtransactions could be said to be an example of affective gaming-gambling convergence, as it is perceived by players as attempting to maximise time and money they spent into games and converting free players into paid players [5]. As chapter 3 shows, in certain cases players do also link spending on such microtransactions with harms which are also commonly connected to gambling. Players took issue with such microtransactions more broadly, discussing how they felt manipulated and pressured into spending. Taken with the raised non-gambling issues, it seems microtransactions defined by players to be ‘problematic’ violate their expectations of what a ‘game’ ought to look like, which ties into agency and fairness.

Whether or not these expectations are universal and objective, it is still interesting that gaming-gambling convergence is not the only issue in player eyes, although it remains the dominant issue in regulation and research. If regulation remains primarily consumer protection-focused, perspectives such as these ought to be incorporated by listening to the consumers.

Another angle which has been taken when considering problematic microtransactions is that of dark patterns, which are an action on the part of a designer to mislead users towards an end goal that is not in their best interest [15], [16], [126]. Dark patterns in game monetisation are being flagged by regulators: In 2022, Epic Games agreed to refund $245 million to players after it was ruled by the FTC that the company was using 'design tricks' [168].

However, there were only a few parallels between the the player-perceived problematic microtransactions fit in with broader dark pattern design strategies as identified in HCI. Gray et al. [126] identify five dark pattern strategies: nagging, obstruction, sneaking, interface interference, and forced actions. Of those, obstruction - 'impeding a task flow… a major barrier to a particular task that a user may want to accomplish' can be seen in 'pay or grind', and 'pay or wait', where time and effort are used as barriers which can be removed for payment. Sneaking - 'an attempt to hide, disguise, or delay the divulging of information that has relevance to the user' - is the category with the most parallels, seen partly in 'product not meeting expectations' and partly in 'lack of information about conditions of transaction.' Gray et al.'s other categories are acknowledged in this thesis' 'dark interface design patterns', which is defined as 'situations where a game is not merely aggressive in pushing purchases, but the user interface itself is designed in such a way as to manipulate users into carrying out transactions against their intentions', but no differentiation was provided by players beyond that.

The game design dark patterns by Zagal et al. [16] are split into temporal, monetary and social capital-based dark patterns. Some of the monetary and temporal dark patterns can be seen in

the problematic microtransactions in Chapter 1. Zagal et al.'s 'pay to skip' is a combination of 'pay or grind' and 'pay or wait', and 'pre-delivered content' maps onto 'core parts of the game locked behind paywall (DLC)'. However, temporal patterns also include 'playing by appointment', which refers to playing only at specific points defined by the game, and monetary patterns include 'monetised rivalries', and there was no mention of either by the players in this work. Moreover, there is no discussion of social capital-based dark patterns.

One explanation for the difference between prior categorisations of dark patterns in technology and the player-perceived problematic microtransactions could be in fact the very gap this thesis set out to fill. Both of the referred to patterns were developed top-down by researchers, by consulting existing literature and UX practitioners. How accurately can experts in design identify when design becomes deceptive, and is this information more valid than the opinions of those who interact with the final product of this design? The idea of dark patterns in gaming in particular has already been criticised [179], in part due to not being 'backed by empirics on players' actual moral evaluations'. This thesis presents such moral evaluations, and conclusions can be drawn that players find certain design patterns more problematic than others which might be more salient to researchers.

Possible harms linked to interaction with 'game dynamics designed to drive spending'

The possible problems associated with playing games with 'dynamics designed to drive spending' are linked to known harms of gambling and symptoms of gaming disorder (see Chapter 3 Discussion for an in-depth comparison). However, given the lack of evidence for a relationship between playing such games and spending on microtransactions within them in chapter 4, it seems that this relationship may not be universal. There are several possible explanations for this discrepancy, some of which are addressed in the Limitations section further down.

This section will explore these findings in relation to two particular explanations: need satisfaction in gaming disorder, and the difficulty in making a distinction between what players believe to be truly problematic as *opposed* to *frustrating* to their gameplay experience.

One angle in literature which explains why some people may experience disordered gaming in situations and games where others will not is that of need satisfaction. Many studies highlight that gaming disorder symptoms are more likely to be seen in players who are not experiencing need satisfaction in their lives [251]–[253]. It is established that three basic psychological needs are competence, relatedness, and autonomy [254], and that video games have the potential to satisfy these needs [255].

These findings also tie into Vallerand's theory of passion [256]. According to the theory, activities for which passion is developed fulfil basic needs, resulting in strong attachments to the activities which can be functional or dysfunctional. *Harmonious* passion occurs voluntarily, brings positive reinforcement, and can exist in harmony with other activities. *Obsessive* passion is driven by negative reinforcement and is a response to lack of fulfilment of these needs, meaning one's self-esteem may be directly dependent on this passion. The theory of passion has been proposed as an explanation for why some individuals may develop disordered gaming patterns while others do not [257], and studies have found that obsessive passion for video games is associated with lower well-being and more video game-related negative consequences [258], [259].

The above parallel explains the theory generated in chapter 3: that the feeling of achievement is a primary driver of over-engagement with games by vulnerable people, and by extension, wellbeing problems. The need for achievement can be alternatively conceptualised as 'need for competence', and the current 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. As such, vulnerable individuals may be ones who are not experiencing need satisfaction in their daily lives, and are therefore susceptible to design elements in games which offer need satisfaction in

return for payment. This theory also joins the above research in providing a distinction between healthy and disordered gameplay based on motivation.

In this way, it is an illustration of the value of qualitative work, primarily such work which is angled around understanding the lived experience of users of technology. An example of this is provided by Karhulahti et al. [260], who, using an interpretative phenomenological analysis (an in-depth qualitative methodology), found that this group experienced feelings of guilt and regret, struggled to regulate their gaming, and (particularly in adolescence), viewed gaming as a form of escapism. This was in contrast to healthy heavy gamers, for whom gaming was a meaningful part of routine and who had an awareness of its potential to become excessive.

The closest work to the current thesis is that of Gibson et al. [261] who also used an interpretative phenomenological analysis to address the research question of "How do videogame players relate microtransaction use to problems with gambling and problematic gaming behaviour?" Their themes included feeling tricked and cheated by microtransactions, and guilt and regret. Both were present in my qualitative work also.

Problematic or frustrating?

Game monetisation exists within a broader context of societal and player expectations which might cause players to identify microtransactions as problematic.

Monetisation as one facet of moral panic

The negative discourse around microtransactions is not a standalone debate. It can be seen in the broader discussion of 'games are bad', which has previously encompassed ideas such as violent games leading to aggression [262]. Indeed, the particular debate around games and violence was so high profile that the American Psychological Society released a statement in 2005 saying that exposure to violent media increases feelings of hostility and thoughts about aggression [263], which was later supported by a meta-analysis in 2015 [264]. However, this relationship has been challenged by researchers, who point out methodological issues with the

analysis and the studies considered, as well as the conclusions drawn [265], [266]. Orben [143] describes this phenomenon as 'the Sisyphean cycle of technology panics', whereupon a new technology creates societal concern, which wanes and is soon replaced by an alternative new development.

This is to say, it is not the first time that games have been under scrutiny, and although microtransactions and their effects are a current cause for concern, they will not remain so forever. Ultimately, all commercial games are products which in their core are created to make revenue and therefore need to be monetised in some way to be financially viable. As discussed in the literature review, the creativity of making games is inseparable from money, and games themselves are closely linked to global economic and social forces [35]. With this in mind, what is the point at which the mechanisms for bringing revenue into games become problematic, rather than reasonable revenue generation - and is there such a point?

Biases, norms and expectations

Sales tactics in other domains are not dissimilar from those used in games. For example, core principles of marketing psychology include 'scarcity' - saying there is a limited amount of stock left, or a limited amount of time to buy something when in reality this is not the case [267]. This is also used in games in the form of limited time offers (see Chapter 1). However, limited time offers in games are perceived negatively, whereas the use of scarcity in other domains is labelled as 'an essential tool for marketers' [268].

Christopher Paul [81] discusses how expectations also play into perception of microtransactions based on varying platforms, using the examples of *Fortnite* and *Harry Potter: Hogwarts Mystery.* The former is a free-to-play battle royale, originally available for desktop and console. The latter is a role-playing mobile game. Coverage of Fortnite has been largely positive, and in fact, its success is attributed in part to the free-to-play model, which is interpreted as a factor in large uptake. While free-to-play, Fortnite's business model follows 'accepted' monetisation for similar desktop titles, including *League of Legends,* which monetises largely through cosmetics, customisation, and self expression, rather than affecting success in the game. Hogwarts

Mystery, on the other hand, was described as tapping into player nostalgia for the Harry Potter franchise for a result which was cited in one review as 'the worst example of free-to-play game design in recent memory' [269]. In the same review, Jagneaux reveals that part of his discomfort with the game comes from the fact that it is not like other games he plays. Paul concludes that Fortnite's success is due to its way of allowing play 'within expected norms and pushing expectations in a new direction', whereas *Harry Potter: Hogwarts Mystery* 'violated the norms of video games… provoking a strong reaction because it was different in a way that the game community had a hard time accepting'.

Similarly, the mobile game *Candy Crush* received varying reviews across PC and mobile-focused websites. One article, titled 'What To Play Instead Of Candy Crush Saga', was written on the website 'Rock, Paper, Shotgun' - which has the subtitle 'PC Gaming since 1873'. The author criticises Candy Crush while promoting other titles with alternative (and in his opinion, better, monetisation). Meanwhile, an article on TouchArcade (which has more of a focus on mobile games), says that the game 'completely redefined the meaning of App Store success' and that 'It's become part of pop culture' [270]. The discrepancy is clear, and it is likely it has something to do with the expectations of those more comfortable with desktop games as opposed to mobile games. Players and critics of desktop games expect upfront payments, not microtransactions. Players of mobile games, however, are familiar with microtransactions and can appreciate a game which implements them successfully.

The magic circle

Another example of player expectations within games is the 'magic circle': that is, an in-game state of play which is shielded from economic concerns. The rules of play only exist within the circle, which is disrupted once one steps out of the moment [271]. Early games scholars like Huizinga [271] and Caillois [272] insisted that play is non-productive, contained within a closed space.

'Game dynamics designed to drive spending' may be considered by players to be problematic because of the disruption to their expectations of this protected space of play. Ball and Fordham

[132] discuss that the introduction of modern microtransactions has had a fundamental impact on player relationships with video games as a medium, claiming that “while the content of video games is important, it is also important to recognize that this content can be reduced to a mere delivery mechanism for microtransactions when such monetization methods are introduced.” This was also a prominent theme in the findings of Lin and Sun (2011), whose subjects discuss issues of fun, quality, and the gameplay balance in the context of player self-perception as consumers rather than players once the magic circle is disrupted by economic concerns.

This may explain why some players across the studies in this thesis disliked microtransactions as a whole, and particularly why they had negative views of ‘games designed to drive spending’, the nature of which means purchasing decisions have to be made constantly throughout gameplay. Arguably, player perceptions of ‘problematic’ microtransactions are influenced by these thwarted expectations. If someone approaches a game expecting pure gameplay, without financial considerations interrupting this experience, any such disruption will be seen through a negative lens. Blame may also be placed on the developer, placing them in a negative light and framing the incorporation of microtransactions as intentional manipulation because the players may expect a different game to what they actually play.

Wardle [133] takes an updated perspective on the magic circle. She writes, “Notions of a closed system of players engaging in an activity which doesn’t produce anything may still hold true for informal, non-commercial forms of game play; the type of play you do with your kids or with your families. But in the context of twenty first-century capitalist economies, and the rapid growth of digital gaming markets, it’s difficult to support this.” Similarly, Duncan [273] says “Play has become display and communities have become markets.”

These scholars draw attention to the fact that games have changed since original definitions of what it means to play. Technological and financial progression, decentralisation, platforms - these are all developments which have taken games with them. In 2023, games are inseparable from microtransactions. That might be the new normal, but the players may take time to adjust

to it, creating a discord between expectations of play and how monetisation fits into that model.

Political leanings

Besides expectations of platform and genre norms and structures of play, sociopolitical contexts may also affect what players consider to be problematic. At the time of writing, the government in the UK is conservative (right-wing), and the games industry has been advised to self-regulate on the issue of loot boxes. This is reflective of other trends in the same government, including how the COVID-19 pandemic was handled, in which the onus of responsibility on protecting oneself and others was placed on the individual - this was the general trend across right-wing governments, who favoured fewer restrictions [274].

In general, right-wing governments are more focused on the economy [275] and the games industry is immensely profitable in this respect. By contrast, a socialist government would be more focused on collective ownership and wellbeing, and generally has more involvement in different sectors. It is possible that stricter regulatory measures would have been imposed on loot boxes, given their potential for harm.

In this way, a libertarian player might have a far more relaxed attitude to microtransactions, given that one of the tenets of such political beliefs is personal and economic freedom. They might argue that no microtransactions could truly be considered problematic given that nobody is being required to play a game, and players can stop at any point if they dislike the way it is being monetised. (Indeed, some players did express this opinion in chapter 1). When presented with the same game, a conservative might appreciate the business value of the microtransactions, and a socialist might dislike the artificial social discrepancy created by mechanics like ‘pay to win’. While these are extremes, and a lot of people exist more centrally on the political spectrum, this illustrates how opinions on things broader than games might affect whether players perceive microtransactions to be problematic.

Defining problematic microtransactions

The above section outlined the difficulties of distinguishing what players perceive to be problematic from what is truly so. While providing a 'one fits all' definition of what and whether microtransactions could be truly harmful to anyone who encounters them may be difficult based purely on this work, I can offer some thoughts as to what characteristics of microtransactions could be perceived as potentially problematic based on the studies conducted for this thesis, and the reasons behind this. These guidelines will allow for a more structured assessment of how microtransactions might be regulated, and provide starting points for games companies in terms of ethical revenue generation.

Tangibility

Firstly, problematic microtransactions have a *tangible* aspect: they are specific design elements which can be objectively identified and measured within the game. For example, one can clearly see in the case of wait timers ('pay or skip', within the 'game dynamics designed to drive spending' category) how long one must wait if one does not pay, and that gameplay cannot be progressed with if a player does not pay or wait.

Another example is that of in-game currency. Players raised issues with multiple currencies, as they felt this multiplicity disguised the true cost of items. A game that contains multiple currencies can be easily identified, and because of the tangibility of this design element, can also be controlled. In the specific case of currencies, game companies could simply also present the real-world price of every purchase alongside the cost in any virtual currency, which gives players an indication of the actual cost of the in-game transaction they are making.

Some subjectivity of course remains here - with DLCs, some players may argue that is the core part of the game being locked behind a paywall, whereas others will see it as additional content. This is where confidence in whether a microtransaction is problematic would grow with the

sample size: even in the case of subjective player perspectives, the opinion of 50 players who see the same part of a game negatively carries more weight than that of one person.

Consequences

Secondly, truly problematic microtransactions will have *consequences,* and by virtue of that statement, it will be possible to measure these consequences. This therefore directly ties into the previous point about tangibility. If a microtransaction is perceived by players as being problematic but then has no effect on their person, that is of an entirely different category to a microtransaction which is perceived as being problematic and then affects one's wellbeing, financial circumstances, etc., outside of the game also. (There is also a third option, in which a microtransaction does have consequences but is not perceived by players as being problematic).

Chapter 3 identified possible harms which link to a specific subset of game features; yet chapter 4 did not quantitatively support these findings. This points to a need for continuing research into those and other microtransactions from chapter 1, using longer and more complex analytical methods so it can clearly be identified whether certain microtransactions can lead to measurable harms.

A softer alternative - given current difficulty in obtaining causal data to do with spending on microtransactions, such as to do with conflicts of interest in industry collaboration (e.g. [276]) - is that the focus ought to be on disproving that microtransactions could be linked to problems for wellbeing, by demonstrating there is no significant relationship between the two.

That is not to say that something which is perceived by players as being problematic and yet only affects the player *within* the game is not worthy of regulatory attention. Such microtransactions could be problematic along a different axis, that of player experience. As mentioned briefly above, players tend to engage with a game for the gameplay experience: often defined in terms of immersion, flow, and positive affect [124]. While one must also note that this perception of player experience has in part been shaped by established game design

norms stemming from upfront payments, the shift from focus on enjoyment and expression of values to revenue generation values could still be disruptive to the 'magic circle' if players enter a game with the expectation of being shielded from economic concerns.

Choice

This can be further exemplified by drawing a distinction between *optional* and *forced* microtransactions. Games which allow for play without the need to spend anything and in which microtransactions simply enhance the experience are traditionally perceived better than those where progress is worse or unattainable without any payment (see Biases, norms and expectations). Besides the above point about the integrity of the player experience, this brings to light ideas about the importance of player agency and choice in choosing whether to engage with an in-game payment. Indeed, an example of a game which was highly positively received was Nintendo's *Rusty's Real Deal Baseball* [277], which only charged only for additional content after the player had already been playing for a while, and even *allowed players to interact with the in-game characters to haggle down the price of this content* [81]. Although the eventual price may have been the one intended all along, and Nintendo may have simply been employing a clever marketing technique, the presentation of the transaction in this way allowed the player to retain their perception of the economic upper hand.

Suggestions for regulation

In the United Kingdom at the time of writing of this thesis (2023), the government has advised the games industry to self-regulate, rather than imposing any top-down regulations. Mistry [278] writes that "self-regulation has been a hallmark in other branches within the entertainment industry. To some degree, self-regulation has also kept the government from becoming unnecessarily involved in the business and affairs of the entertainment industry. More significantly, self-regulation has allowed creators-producers, filmmakers, musicians, artists, and game developers, to name a few-to continue making creative works and consumers to continue enjoying those works." Directing the games industry towards an ethical design

framework will therefore hopefully foster a mutually beneficial relationship between developers and players, and indeed, this has already been a proposed direction by other authors [279].

However, self-regulation will not be an easy road: different branches of the industry monetise differently, have different business models and use different technologies. On the basis of the findings from this thesis, I can offer some starting core suggestions - or values - for how games companies can incorporate microtransactions in an ethical way.

One criticism of the very idea of 'problematic' microtransactions is that it is difficult to define 'fairness', which holds different meanings in different contexts. However, my work shows that players identify and negatively categorise microtransactions which create unnecessary division between paying and non-paying players (see Chapter 2). The first core value is therefore **equality.** Fundamentally, game progression should be the same with and without payment. A player should be able to reach the end of the game without spending anything or feeling like there are parts of the game included which are irrelevant to the gameplay and integrated purely to persuade the player to spend. Microtransactions should be offered for additional rather than core content.

This ties into prior ethical discussions around microtransactions. For example, Neely [17] discusses fairness in the context of universalization in *World of Warcraft*, whereupon players can play any of the specialisations and know that they will do equal damage. Neely writes, "These specialisations are designed to do roughly the same amount of damage, so that gamers will have a similar ability to perform regardless of which they choose." (p. 232).

Players should have the **agency** as to whether they want to spend money on the game, rather than making the payment integral to the gameplay experience. Agency is valued by players as a core part of any gameplay [280], [281], and microtransactions which force payment would minimise this. Moreover, agency is linked to autonomy, the need for which may lead players to gaming in the first place - particularly in the case of more vulnerable individuals [251].

Restricting this freedom of choice for the player in games may link to dysfunctional gaming patterns, connecting games to problems for players. Payment in games should therefore be for "experience and extras which you value, depending on your profile, the type of achievements in the game genre, etc." [282], rather than for access to the game, without which gameplay is limited.

Furthermore, developers should take care to not incorporate features into their game which are solely designed to drive spending without offering an output of quality in return for the player money. The output of any spending should match the **value of the invested money**, and should not be gained through unfair means like psychological manipulation. One of the eight domains of player-perceived problematic microtransactions identified in Chapter 1 was 'product does not meet expectations', of which an example is 'sale of useless products or duplicates'. Players believe aspects of microtransaction design to be predatory which do not provide them with something they can use or enjoy at the end of the transaction.

This taps into the next suggestion for design: **transparency.** One of the things that players value most in microtransaction design is honesty on the part of the developer, and when this honesty is not met, players perceive microtransactions to be problematic. Transparency is a recommended measure more generally for building trust with consumers. Kang and Hustvedt found that consumers' perceptions of a corporation's efforts to be transparent directly affected consumer trust and attitudes toward the corporation, which was then linked to purchasing behaviour [283]. Indeed, transparency has been recommended as a social responsibility measure in the implementation of loot boxes [279]. Particular attention has been given to the disclosure of loot box odds, which has spilled over into regulation [284]. This also ties back into the idea of *thwarted expectations:* players don't like not receiving what they paid for ('sale of useless products or duplicates'), spending more than they wanted to ('in-game currency disguises actual price'), or installing a game to find it is nothing like the adverts they have seen ('unrealistic presentation of product') (see Chapter 1). Providing consumers with appropriate

information can be seen as a top priority for companies who want to build strong relationships with players.

Going further?

The suggestions provided above are a starting point for minimising problematic microtransactions in games. However, such microtransactions are not isolated, and exist in a broader business ecosystem. Going further to address the problem at its core, I believe the next step is to re-assess the use of player data for targeted behavioural profiling. The use of such data currently is inherent to the success of modern games [285], and can lead to many fascinating insights around what choices players make and how they make the game their own. However, in some cases, this data collection is used in ways that might be considered unethical, to target specific players in ways that will lead to revenue for the company. King et al. [18] describe this situation in their paper analysing video game patents:

"In the case of an individual having a particular behavioural repertoire (e.g., an identified regular pattern of play, such as daily use for 2 h) but does not spend money on microtransactions, the system may draw upon its population data (i.e., other players with comparable characteristics) to determine the possible price sensitivity of this non-spending player based on otherwise comparable players who do spend money. The system is therefore capable of knowing a lot about the player's actions to the extent that it generates a predictive model of this individual in absolute terms." (p. 138).

King et al. [18] discuss in their paper how personalised targeting based on player data creates information asymmetry between the player and the game. The more the player plays, the more the data the game has to personalise purchases. This is taken to particular extremes by mobile games and social casino games. Zynga, a company which makes slot and poker games, assigns account managers to players identified by their data as 'VIPs' (high-spending players). If the VIPs show changes in their behaviour, personal communication is used to understand why and encourage them to continue engaging with playing and spending [154].

At the time of this thesis being written (April 2023), the UK digital games regulatory climate is experiencing particular pressure around protecting children in games from such behavioural profiling. A report by the Information Commissioner's Office for game creators published in February 2023 recommended providers to "identify if players are under the age of 18 with a reasonable degree of certainty, and discourage false declarations of age" and "turn off behavioural profiling for marketing by default" [164]. Although these decisions are designed with child protection in mind, it is hopeful that they will set a good precedent for reducing targeted monetisation in games. At the very least, such data-based profiling should be used more thoughtfully.

Developer perspectives and intent

The above sections have discussed suggestions for good microtransaction design. These have been based on the player experience and perspective, as has been the angle of this thesis. However, the player is not the only stakeholder in this issue. Another key stakeholder is the games companies themselves. While the voice of the player is imperative in this conversation, especially given the power dynamics of corporations, who already hold a seat at the table, the viewpoints of companies should also not be ignored. For many people who create games, this is a creative pursuit, and one that they engage in to provide a good product for their players.

Alha [3] highlights the distinction between unintentionally clumsy and deliberately malicious unethical game design. While both may lead to spending, only intentional malicious design is more likely to be specifically targeting players [136], and as such might have very different implications for their wellbeing. Moreover, many game developers implement monetisation as part of a bigger context of design or production which also varies across cultural contexts, balancing creative autonomy with economic responsibility [286]. Developers themselves often hold the perspective that monetisation models could be bad if not executed properly, which is particularly true for indie and premium companies [47].

As such, microtransaction design occurs not as a linear result of 'developer wanting to take player money and implementing manipulative techniques to do so'. However, this is largely the perception held by players in this thesis: the very idea that some games are 'designed to drive spending' insinuates developer intent. This may not be fair to developers who design microtransactions into games because they feel it best suits the gameplay narrative. Moreover, ensuring a game brings in enough revenue is essential for sustaining developer salaries and livelihoods; as well as keeping the game in circulation [137].

Limitations

While there are explanations for the findings of this thesis, which fit into existing literature, it is important to be cautious about possible limitations of the approaches used.

Biases in working with players

The use of player perspectives as the primary data source in this thesis was a deliberate choice. This choice was made because players are the primary stakeholder: all and any conversations around microtransactions are directed through a lens of player protection. Who better to work with to figure out how to protect players than the players themselves?

That said, the limitations of working with player perspectives must also be acknowledged. Primarily, players are human, and like all humans have their own subjective opinions and viewpoints. That means that when one is relying on players to understand what is a 'problematic' microtransaction, these biases inevitably come into play. Firstly, players may not notice certain microtransactions, or pay more attention to those which frustrated them the most, or they had a particularly bad experience with. They may also be affected by their moods, time of day, and alternative events. This means that there is a degree of error around saying that the microtransactions identified in this thesis are the *only* possible problematic microtransactions in games - although given the processes followed in identifying these elements, I can say with certainty that the ones that were identified really do exist. The same applies to figuring out how prevalent microtransactions are using player reviews. Players may

talk more about microtransactions that were more salient to them, for a variety of possible reasons . In this way, using players as a data source increases the likelihood of false negatives, as certain microtransactions may not be mentioned if they are not relevant to the players at the point of research.

Working with players is also linked to biases from and about different demographics. It is the case that women gravitate to mobile games more so than desktop games. Mobile and free-to-play games have a lower barrier to entry [81], making them more accessible to women who might engage in gaming alongside other life activities like childcare, being able to put down and pick up the game in a more casual way whenever they want, rather than committing to a play session of 30+ minutes at a desk. Even though gaming has become more accessible to women, gender norms continue to be perpetuated across games. Casual games often incorporate productive activities, such as shopping or cooking (e.g. *Project Makeover*), which Shira Chess argues stems from existing ideologies around male and female roles [287]. This proliferation of gender-specific activities, coupled with increased female presence in mobile games, has led to a negative reception from critics and players who compare them to 'traditional' desktop games.

The aim of the current thesis was to investigate microtransactions (most commonly found in free-to-play models), and furthermore, 3 out of 4 studies were specifically on mobile games. This means it is not unlikely that a certain proportion of the negative perceptions around the microtransactions and games in the sample comes from established player opinions around what monetisation is and is not ethical and 'right'. It ties back into the idea that players who talk about the game are often not the ones enjoying it [141]. This means that, for example, in Chapter 2, which analysed player reviews for mentions of microtransactions, the reviews may have been written by a predominantly male audience. This may have skewed their opinions of the microtransactions in mobile games.

Sampling

In the context of the work conducted for this thesis, sampling was only possible from standard populations, for example, Reddit and Prolific. It is possible that players who experience problems linked to playing games designed to drive spending are not found on these platforms - maybe even because of the problems they are experiencing. The relationships between the game, excessive spending and playtime, and problems, may exist in players at the edges of the distribution. Such players may be best accessed via a clinical population, for example, the National Centre for Gaming Disorders. Future work should aim to work with more targeted samples.

Subjective data

Working with players meant the data collected was largely subjective. Although I supplemented it with objective data as much as possible, like the screenshot evidence in Chapter 4, even this method of participant data donation would have allowed participants to present themselves however they wished, if they chose to only share a portion of the true screenshots. Future work should build on the subjective data elicited from player perspectives presented in this thesis to supplement its findings with objective gameplay and spend data. This could be done by a fusion of self-reported wellbeing measures with objective behavioural data to draw more accurate references about the true state of player interaction with a game. An example of this is the work of Vuorre et al. [144], who linked objective gameplay data from a large sample of players and supplemented it with self-reported wellbeing data. Given the design of this experiment, Vuorre et al. were able to make conclusions around the causality between gameplay and wellbeing.

Causality

Because of the way the data was collected and analysed, causal inferences cannot be drawn about any relationships. In the grounded theory in Chapter 3, there is no way of establishing objectively whether the problems that players discuss come as a direct result of them playing 'games designed to drive spending'. These problems may have co-occurred, or even had a reverse effect. The same would have been true for Chapter 4, had any relationships been

significant.

Future work should address this by designs and analytical methods which allow causality to be determined. A good starting point would be longitudinal methods: collecting data over a period of time can establish the temporal order of variables, and the comparison with a control group shows whether there is a significant difference in the outcome variable [288]. This has already been proposed as a way to increase the quality of microtransaction literature [289].

Another methodological change which would facilitate causal inference would be gameplay studies which study ecologically valid lengths of gameplay, while using games that could feasibly be played outside of the research environment and represent issues of interest, such as specific microtransactions. This could be achieved by creating bespoke video games that isolate features of interest - for example, 'pay or wait' mechanics in game environments which could be experienced by players regularly outside of research.

'No effect found' does not mean 'no effect exists'

Although there was no evidence of a significant link between player psychoenvironmental characteristics, time and financial investment into games, and problems related to wellbeing, the analytical methods used also do not allow the conclusion that there was no link at all. The only conclusion that can be drawn is that there is an absence of evidence for this effect in the current thesis, and true falsification is not possible. This is because there may be a 'surprisingly small' effect present, one which the studies were not powered to detect. Follow-on work could use equivalence testing, which can reject the presence of this smallest possible effect size of interest [290]. Being able to conclusively say that there is in fact no link between games players perceive as 'designed to drive spending' and wellbeing would be highly valuable for regulatory conversations around these games.

Limitations of a mixed-methods approach

Qualitative research stems from paradigms which see reality as being one of multiple possible

options, depending on whose perspective is taken, and a phenomenon which is in part constructed by the individual and by society around them [291]. Some researchers believe that qualitative research is therefore capturing relationships and processes which cannot be reduced to operationalised variables and the objective study of phenomena [292]. There is an ongoing debate in social science research around whether the epistemological foundations underpinning quantitative and qualitative research are too different to combine the two to study the same phenomena. Simultaneously, a pragmatic approach is often taken which advocates for using quantitative methods to support qualitative theories via a process of integration [293]. This is the approach - the mixed-methods approach - adopted in this thesis, whereupon the grounded theory of Chapter 3 was tested quantitatively in Chapter 4.

The distinction between the goals and methods of qualitative and quantitative methodologies could be one of the reasons why the results of a grounded theory were not replicated quantitatively. However, Gelo et al. [291] argue:

“The scientific investigation of the mind is a very complex issue… It also requires the reference to multiple level of analysis, both at an intra-individual level (e.g. the interconnections between biological and psychological structures and functions, the relationships between motivational, emotional, cognitive and behavioural schemes, the different ways of attributing meanings to situations and events) and at an inter-individual level (e.g. the bio-psychosocial adaptation to the environment, the quality of interpersonal relationships within familiar, social and cultural contexts). For these reasons, we believe that the development of an adequate theory of mind requires the cycling between approaches which, striving for integration, avoid dichotomous (either reductionistic or relativistic) and therefore partial accounts of phenomena.”

I agree with this sentiment. Human behaviour is indeed complex, and therefore I believe my decision to approach wellbeing-related problems that stem from playing games possibly designed to drive spending using a combination of the two paradigms was essential. Moreover, the difference in findings between the qualitative and quantitative studies could also be

explained exactly by the granularity of these approaches. Players in Chapter 3 may have felt the problems they were describing were significant to them on a personal level, however, when measured quantitatively on a larger scale these problems were minimal. This would be a reassuring finding, as it would suggest that while experiencing distress, the impacts on individual well being would be low.

Contributions

Study 1 presents a comprehensive player-led categorisation of problematic microtransactions in games. This is, to my knowledge, the first such categorisation based on player perspectives, and adds to the research landscape on game monetisation by providing an overview of the microtransaction landscape. Study 2 builds on this by assessing to what extent these microtransactions are found in top-grossing mobile and desktop games.

This information can be used by regulators in making decisions around consumer protection (and indeed, there is evidence to suggest this is happening (e.g. [294]). It can also be used by players themselves, if they want more information and agency in understanding in-game purchases. In the case of a specific popular game, someone with the information from studies 1 and 2 would be able to check whether it had possibly problematic microtransactions, and to understand what these microtransactions are and why they may be problematic.

Study 3 provides evidence that some players may experience harms which are linked in some way to playing games that contain specific microtransactions. This is the first known understanding of problems linked to microtransactions besides loot boxes. A need to understand these harms is regularly expressed by regulators in the UK and internationally [167], [295].

However, study 4 contrasts with study 3, and from study 4 one can conclude that there is not enough evidence to suggest a player sampled from an average population will experience harm after playing games which have dynamics designed to drive spending. Nonetheless, one should

also note from chapter 3 that some players do experience problems linked to these games, and as such, they are not entirely harmless.

The discussion presents ways of distinguishing a problematic microtransaction from a frustrating one, and suggestions for monetisation design and regulation based on these distinctions.

Altogether, I hope that this thesis is helpful to anyone who wants to know more about game monetisation, who is concerned about the harms of microtransactions, and who wants to know how to best protect themselves or others when playing games that they feel may be designed to drive spending.

Conclusions

The work presented in this thesis contributes to knowledge across two main themes. The first theme was understanding the landscape of player-perceived problematic microtransactions in games. I developed a categorisation of problematic microtransactions in mobile and desktop video games, according to how they were perceived by players. The result was 35 types of problematic microtransactions. I then used player reviews to see how often discussion of these categories occurred across top grossing mobile and desktop games. I found that mobile games seemed to contain more problematic microtransactions in players' eyes.

A recurring theme was that some games are 'designed to drive spending', which meant players perceived some games as specifically made by developers with the intention of maximising player spending rather than enjoyment. Fifty-two percent of mobile games studied were characterised as such. 'Games designed to drive spending' seem to share some similarities with gambling design in terms of maximising player spend and player engagement. This led to the conceptualisation of the latter part of the thesis: understanding whether games identified by players as 'designed to drive spending' are linked to problems outside of gaming.

First, I developed a grounded theory of possible harms linked to playing such games based on interviews with players. I discovered that not all players will experience harms, and distinguishing characteristics may be in psychological and environmental characteristics of players, including poor life satisfaction, high levels of stress and low self esteem. These characteristics mean players experience low need satisfaction in their lives and turn to games designed to drive spending, which are engineered to provide players with that feeling of achievement, but in return for payment or time investment. Because of this, players may experience problems across several life areas: financial, emotional, at work or in education, and problems sleeping. I then tested this theory quantitatively, on a larger sample, and found no evidence of a difference in problems experienced between players of games designed to drive spending and other games, nor evidence to suggest players with higher levels of certain characteristics would be more likely to experience these problems.

All in all, I conclude that it is clear that some problematic microtransactions exist besides loot boxes, and they are used by top-grossing and popular mobile and desktop games. These microtransactions are doubtlessly problematic at least in the sense that they are noticed by players and commented on negatively. There is some evidence to suggest that some players may experience tangible harms outside of games which are linked to these microtransactions. However, the thesis was unable to confirm that these problems may apply to a broad sample of players. Thus, the question of to what extent microtransactions are truly problematic as opposed to perceived as such by players remains. Nonetheless, these tangible harms may exist, and future work should try to establish more specifically who and why may experience them.

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Appendix A: materials from Chapter 1

Survey of what microtransactions players had found unfair, misleading, or aggressive

This section will ask some general questions about your video game preferences and gaming habits. This will allow us to have a better understanding of participant relationships with gaming to contextualise our research.

1) How often do you play video games?

2) How long have you been playing video games?

3) Please give one or several examples of games which you have been playing a lot recently.

4) Please give one or several examples of your favourite games. Why do you like these games?

The next section will ask you about your experiences with monetary transactions in video games. These transactions, and how they affected both you and your relationship with the game, are the main interest of our research.

1) Think of any games you have played where you encountered lootboxes - items in video games on which you can spend real-world money and which provided a randomised reward of uncertain value.

   Please name as many games as you can remember.

The next section will ask you about any in-game transactions you may have encountered besides lootboxes.

1) Think of any features you may have encountered in games, the end goal of which was a transaction of real money, that you feel misled you - *gave you the wrong idea or impression* - in order to promote the transaction.

Please list any such features you can think of and give some details on your experience, along with the games that you experienced them in.

2) Choose one example from the features you outlined above. Please describe how you felt after encountering this feature in the game.

3) Think of any features you may have encountered in games, the end goal of which was a transaction of real money, that you felt to be aggressive or unfair - *not adhering to the principles of equality or justice.*

   Please list any such features you can think of and give some details on your experience, along with the games that you experienced them in.

4) Choose one example from the features you outlined above. Please describe how you felt after encountering this feature in the game.

5) As an estimate, how much would you say you have spent through such transactions in the past year?

List of subReddits used for recruitment

World of Tanks Blitz - https://www.reddit.com/r/WorldOfTanksBlitz/

Crossout - https://www.reddit.com/r/Crossout/

GTA - https://www.reddit.com/r/gtaonline/

Football Manager - https://www.reddit.com/r/footballmanagergames/

Age of Empires II (2013) - https://www.reddit.com/r/aoe2/

Brawlhalla https://www.reddit.com/r/Brawlhalla/

Sid Meier's Civ - https://www.reddit.com/r/civ/

Left 4 Dead 2 - https://www.reddit.com/r/l4d2/

Space Engineers - https://www.reddit.com/r/spaceengineers/

Far Cry 5 - https://www.reddit.com/r/farcry/

EVE Online - https://www.reddit.com/r/Eve/

World of Warships - https://www.reddit.com/r/WorldOfWarships/

Path of Exile - https://www.reddit.com/r/pathofexile/

Killing Floor 2 - https://www.reddit.com/r/killingfloor/

Yu-Gi-Oh! Duel Links - https://www.reddit.com/r/yugioh/

Clicker Heroes - https://www.reddit.com/r/ClickerHeroes/

Smite - https://www.reddit.com/r/Smite/

Don't Starve Together - https://www.reddit.com/r/dontstarve/

MrLove - schedule Include [PROMO] in post title

War Thunder - https://www.reddit.com/r/Warthunder/

TEKKEN 7 - https://www.reddit.com/r/Tekken/

SCP: Secret Laboratory - https://www.reddit.com/r/SCPSecretLab/

Candy Crush - https://www.reddit.com/r/candycrush/

Divinity: Original Sin 2 - Definitive Edition - https://www.reddit.com/r/DivinityOriginalSin/

DBZ Dokkan Battle: /DBZDokkanBattle/

Unturned - https://www.reddit.com/r/unturned/

Township - https://www.reddit.com/r/TownshipGame/

Walking War Robots - https://www.reddit.com/r/walkingwarrobots/

Sky - https://www.reddit.com/r/SkyGame/

Fire Emblem Heroes - http://reddit.com/r/fireemblemheroes

AC Pocket Camp - https://www.reddit.com/r/ACPocketCamp/

The Binding of Isaac: Rebirth - https://www.reddit.com/r/bindingofisaac/

7 Days to Die - https://www.reddit.com/r/7daystodie/

PES mobile - https://www.reddit.com/r/pesmobile/

Slay the Spire - https://www.reddit.com/r/slaythespire/

Squad - https://www.reddit.com/r/joinsquad/

One Piece Bounty Rush - https://www.reddit.com/r/OPBR/

Ingress - https://www.reddit.com/r/Ingress

Black Squad - https://www.reddit.com/r/BlackSquad/

Battle Cats - https://www.reddit.com/r/battlecats/

Mobile Legends: Bang Bang - https://www.reddit.com/r/MobileLegendsGame/

Starlight Stage - https://www.reddit.com/r/StarlightStage/

Monster Strike - https://www.reddit.com/r/MonsterStrike/

Trove - https://www.reddit.com/r/Trove/

Dominations - https://www.reddit.com/r/Dominations/

Arknights - https://www.reddit.com/r/arknights/

Witcher - https://www.reddit.com/r/witcher/

Clash of Clans - https://www.reddit.com/r/ClashOfClans/

Dark Souls - https://www.reddit.com/r/darksouls/

Yokai Watch - https://www.reddit.com/r/yokaiwatch/

Predatory monetisation techniques in digital games from the stakeholder perspective - Codebook

Coders should code each technique that they can identify within player responses - one response may describe several techniques.

General presence of microtransactions

Some players generally feel that any additional transactions in games with upfront payments are predatory, as are their implementations.

1. **Payment mechanisms in paid products**

Players feel that having paid for a game to begin with should mean that they will not have to carry out any additional transactions.

2. **Microtransactions as a business model.**

Players dislike the very idea of revenue being generated via uncapped microtransactions rather than one upfront payment.

3. **Overpricing**

The pricing set on in-game transactions is viewed by some players to be objectively too high for what the product is.

Monetisation of basic quality of life.

Players discuss aspects of games which are central to what they imagined their experience of playing a game to be, but which they cannot access without a transaction.

4. **Game unplayable without spending money**

The player is literally unable to play the game further than a specific point without performing a transaction.

5. **Parts of game content locked behind paywall**

Being unable to access parts of the game without paying (although paying for the content is not directly required to progress through the game).

6. **'Core' aspects of game monetised**

Parts of the game which players feel should be an integral part of the game they set out to play are inaccessible without spending.

7. **Limited inventory space without paying ('stash tabs')**

Some games restrict the amount of inventory space which is available in the game for storing things acquired through gameplay without spending money.

Game dynamics designed to drive spending

Players feel aspects of the game have been designed especially to encourage spending, rather than primarily for the game experience.

8. **Game builds dependency on transactions**

As players progress through the game, they feel pressured to spend progressively more and more to have a good gameplay experience.

9. **Pay or grind**

Players are given the 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.

10. **Pay or wait**

Players are given the choice of waiting some time before being able to progress in the game, or paying some money to skip it (e.g. cooldown timer).

11. **Nerf cycle**

The item in question is reduced in strength or general value at a point after the transaction. Sometimes it is highlighted as being a continuous process: a new item being released, then nerfed in preparation for another new release.

12. **Unfair matchups**

Players who are playing using only free in-game items are consistently matched against opponents who have an advantage from buying items.

13. **Free game experience underpowered.**

Free items are made purposely underpowered, so that players will have a worse experience without spending money and feel driven into purchases. *(Players comment specifically on the **downside** of the free experience, rather than the **advantage** gained from paying in code 16.)*

14. **Payment needed to avoid negative consequences**

The game forces the player to spend money so they do not lose something they already have, such as content, progress, or rewards.

Pay to win

Transactions the outcome of which gives players an advantage towards being successful in the

game, often at the expense of other players.

15. **Boosts**

Paying to be able to progress through the game quicker.

16. **Advantage over other players**

Having the option to pay for products which are distinctly better than free items and thus give an advantage over players who have not carried out any transactions.

17. **Subscription features**

Paying some money in a subscription fashion (e.g. monthly) to receive additional features which provides an advantage over other players.

18. **Pay to play competitively**

Although players are technically able to play the game without buying anything, in order to stand a chance in competing against other players they feel pressured to spend.

Predatory advertising

Advertising or product descriptions which present incorrect, incomplete, or skewed pictures of what the product entails. Sometimes the way in which this advertising is presented is also seen as problematic.

19. **Unrealistic presentation of product**

The product is presented as being better or more attractive than it actually is, for example, through explicit deceit, or tactical highlighting of certain features.

20. **Lack of information about conditions of product**

The product is being promoted without discussing some additional conditions or aspects that accompany the transaction.

21. **Aggressive advertising/pestering**

Frequent or inconvenient pestering of players to make purchases within the game.

In-game currency

Virtual currency which can only be used within the context of the game world and has no value outside of it.

22. **General existence of in-game currency.**

Some players generally dislike the presence of in-game currency.

23. **In-game currency disguises actual price.**

The concept of having in-game currency in the first place, rather than just using real money, is seen as being deceitful because it obscures the true price of in-game items and makes it harder to make decisions.

24. **Fixed purchase rates are unfair.**

Players feel that some games have designed the way in-game currency can be purchased tactically, in order to maximise profits.

25. **Multiple currency types cause confusion.**

Players find multiple in-game currencies confusing, and believe that the intent behind this is once again to disguise the true price of the transaction.

Product does not meet expectations

This covers the sale of products which do not serve their purpose in the way the player expects before engaging with a transaction.

26. **Separate re-release of product as free, cheaper, or easier to get.**

The product is released separately (normally cheaper) outside of the original purchase setup, or is made free and publicly available.

27. **Buying something not wanted to get desired product**

Purchases (e.g. discounts, upgrades, etc.) which are only available as a consequence of buying something else.

28. **Monetisation strategy changes part way through the game lifecycle.**

Microtransactions are introduced into a game which did not have them before, or introduced in additional amounts.

29. **Early access content - end up with something different to what was paid for.**

Spending money on early access content, but ending up with a different full version of a game to the one promised, or having to wait a long time for the rest of the game (which sometimes does not actually get completed).

30. **Product does not incorporate everything the player believes**

The product does not match created expectations, or has to be blindly purchased due to lack of information.

31. **Sale of useless products or duplicates**

The item does not work in the expected way because of some of the characteristics of the player's existing items or game setup, or being a duplicate.

Other

32. **Teasers**

This refers to receiving an initial part of an in-game item for free, such as through gameplay, but not being able to fully use it without spending money.

33. **Limited time offers**

Products which are promoted as being only available for a set amount of time, creating a sense of urgency around them to drum up anxiety through fear of missing out in players so that they engage with the transaction.

34. **Battle passes**

Paying for a time-specific set of content, which provides within itself additional rewards that can be acquired either by playing the game or in some cases, paying even more additional money.

35. **Dark interface design patterns**

The user interface is designed in such a way as to manipulate users into carrying out transactions.

Appendix B: materials from Chapter 2

Final codebook

Coders should code each technique that they can identify within player responses - one response may describe several techniques.

General presence of microtransactions

Some players generally feel that any additional transactions in games with upfront payments are predatory, as are their implementations.

1. **Payment mechanisms in paid products**

Players feel that having paid for a game to begin with should mean that they will not have to carry out any additional transactions.

2. **Microtransactions as a business model.**

Players dislike the very idea of revenue being generated via uncapped microtransactions rather than one upfront payment.

3. **Overpricing**

The pricing set on in-game transactions is viewed by some players to be objectively too high for what the product is.

Monetisation of basic quality of life.

Players discuss aspects of games which are central to what they imagined their experience of playing a game to be, but which they cannot access without a transaction.

4. **Game realistically unplayable without spending.**

Although payment is not officially required to progress through the game, it is realistically impossible to play without spending.

5. **Core parts of game content locked behind paywall (DLCs)**

Parts of the game which players feel should be integral to the game experience are inaccessible without spending.

6. **Limited inventory space without paying ('stash tabs')**

Some games restrict the amount of inventory space which is available in the game for storing things acquired through gameplay without spending money.

Intentional design to drive spending

Players feel aspects of the game have been designed especially to encourage spending, rather than primarily for the game experience.

7. **Game dynamics designed to drive spending**

General discussion of how the game feels like it has been made to manipulate players into spending, as opposed to a genuinely good product for the user. Often, this is discussed in the context of developer greed.

8. **Escalating payments**

As players progress through the game, they notice they are having to spend more and more to be able to have a good time playing.

9. **Pay or grind**

Players are given the choice of either investing an unreasonably large amount of time and effort into completing a portion of the game, which is seen as encouragement to complete a transaction to avoid having to invest the same amount of time and effort.

10. **Pay or wait ('energy bars')**

Players are given the choice of waiting some time before being able to progress in the game, or paying some money to skip it (e.g. cooldown timer).

11. **Nerf cycle**

The item in question is reduced in strength or general value at a point after the transaction. Sometimes it is highlighted as being a continuous process: a new item being released, then nerfed in preparation for another new release.

12. **Unfair matchups**

Players who are playing using only free in-game items are consistently matched against opponents who have an advantage from buying items.

13. **Payment needed to avoid negative consequences**

The game forces the player to spend money so they do not lose something they already have, such as content, progress, or rewards.

Pay to win

Transactions the outcome of which gives players an advantage towards being successful in the game, often at the expense of other players.

14. **Game experience better if paying**

Payment makes progress through the game quicker, easier, and more pleasant - paying customers have a better experience playing the game. Players will have a worse experience without spending money and feel driven into purchases.

15. **Advantage over other players**

In **multiplayer or competitive** situations, having the option to pay for products which are distinctly better than free items and thus give an advantage over players who have not carried out any transactions.

16. **Subscription features**

Paying some money in a subscription fashion (e.g. monthly) to receive additional features which provides an advantage over other players.

Predatory advertising

Advertising or product descriptions which present incorrect, incomplete, or skewed pictures of what the product entails. Sometimes the way in which this advertising is presented is also seen as problematic.

17. **Unrealistic presentation of product**

The product is presented as being better or more attractive than it actually is, for example, through explicit deceit, misinformation about the product, or tactical highlighting of certain features.

18. **Lack of information about conditions of product**

The product is being promoted without discussing some additional conditions or aspects that accompany the transaction.

19. **Aggressive advertising/pestering**

Frequent or inconvenient pestering of players to make purchases within the game.

In-game currency

Virtual currency which can only be used within the context of the game world and has no value outside of it.

20. **General existence of in-game currency.**

Some players generally dislike the presence of in-game currency.

21. **In-game currency disguises actual price.**

The concept of having in-game currency in the first place, rather than just using real money, is seen as being deceitful because it obscures the true price of in-game items and makes it harder to make decisions.

22. **Fixed purchase rates are unfair.**

Players feel that some games have designed the way in-game currency can be purchased tactically, in order to maximise profits.

23. **Multiple currency types cause confusion.**

Players find multiple in-game currencies confusing, and believe that the intent behind this is once again to disguise the true price of the transaction.

Product does not meet expectations

This covers the sale of products which do not serve their purpose in the way the player expects before engaging with a transaction.

24. **Separate re-release of product as free, cheaper, or easier to get.**

The product is released separately (normally cheaper) outside of the original purchase setup, or is made free and publicly available.

25. **Spending in an unwanted way to get desired product**

Purchases (e.g. discounts, upgrades, etc.) which are only available as a consequence of buying something else, or having to pay money to get back something already owned.

26. **Monetisation strategy changes part way through the game lifecycle.**

Microtransactions are introduced into a game which did not have them before, or introduced in additional amounts.

27. **Early access content - end up with something different to paid for.**

Spending money on early access content, but ending up with a different full version of a game to the one promised, or having to wait a long time for the rest of the game (which sometimes does not actually get completed).

28. **Product does not incorporate everything the player believes**

The product does not match created expectations, or has to be blindly purchased due to lack of information.

29. **Desired product not received**

The in-game item does not work in the expected way due to either a condition of the player's setup that was not made clear in the transaction, fails after money has been exchanged, is a duplicate, or is simply not received.

Other

30. **Teasers**

This refers to receiving an initial part of an in-game item for free, such as through gameplay, but not being able to fully use it without spending money. Can also apply to being able to play the first part of a game for free and then paying to progress past a point.

31. **Limited time offers**

Products which are promoted as being only available for a set amount of time, creating a sense of urgency around them to drum up anxiety through fear of missing out in players so that they engage with the transaction.

32. **Season passes**

Paying for a time-specific set of content, which provides within itself additional rewards that can be acquired either by playing the game or in some cases, paying even more additional money.

33. **Game is broken**

The game itself stops working in a way which means the player loses their money.

34. **Stealing money**

Money being taken from the player without their consent, refunds are refused in situations where a product is not as expected, or anything else which might be labelled as a 'scam'.

35. **Dark interface design patterns**

The user interface is designed in such a way as to trick users into carrying out transactions (e.g. automatic transactions unless cancelled, easy to accidentally click payment buttons, hidden cancellation options, etc.)

Full database of monetisation techniques across games (desktop)

Game	Developer	Genre	Monetisation techniques	Number of techniques	N0 reviews per technique
War Thunder	Gaijin Entertainment	Vehicular combat MMO game	Pay or grind	4	4
			Game experience better if paying		9
			Advantage over other players		6
			Game dynamics designed to drive spending		4
Total War: Warhammer 2	Creative Assembly	Turn-based strategy and real-time	Core parts of game locked behind paywall (DLCs)	1	14

		tactics			
Destiny 2	Bungie Inc	Multiplayer first-person shooter	Core parts of game locked behind paywall (DLCs)	2	4
			Other - removing things which have been paid for (game is broken)		4
Cities: Skylines	Paradox	Single-player, open-ended, city-building simulation	Core parts of game locked behind paywall (DLCs)	2	7
			Overpricing		7
Stellaris	Paradox Interactive	Sci-fi grand strategy game	Core parts of game locked behind paywall (DLCs)	2	4
			Overpricing		2
Elder Scrolls Online	Bethesda Game Studios	MMORPG	Game experience better if paying	2	2
			Subscription features		2
Fallout 76	Bethesda Game Studios	Online action role-playing game	Game dynamics designed to drive spending	3	7
			Core parts of game locked behind paywall (DLCs)		2
			Subscription features		2
American Truck Simulator	SCS Software	Truck simulator game	Game dynamics designed to drive spending	1	2
Final Fantasy XIV	Square Enix	MMORPG	Game is broken (players who have spent money unable to sign in)	1	5
Planet Zoo	Frontier Developments	Construction and management simulation	Core parts of game locked behind paywall (DLCs)	2	2
			Overpricing		2
Black Desert Online	Pearl Abyss	Sandbox-oriented MMORPG	Game dynamics designed to drive spending	3	3
			Game experience better if paying		2
			Game is broken (purchase histories wiped)		4
Crusader Kings 3	Paradox	Grand strategy/role-playing	Core parts of game locked behind paywall (DLCs)	2	9
			Overpricing		3

Mount & Blade 2: Bannerlord	Taleworlds Entertainment	Strategy action role-playing	Early access content - end up with something different to paid for.	1	8
Borderlands 3	2k games	Action role-playing first-person shooter	Game dynamics designed to drive spending	2	5
			Season pass		2

Full database of monetisation techniques across games (mobile)

Game	Developer	Genre	Monetisation techniques	Number of techniques	N0 reviews per technique
Lord's Mobile	I Got Games	Strategy MMO	Unrealistic presentation of product	2	6
			Game experience better if paying		5
Coin Master	Moon Active	Casual	game dynamics designed to drive spending	1	3
Candy Crush Saga	King	Match 3 puzzle game	Unrealistic presentation of product	4	9
			game dynamics designed to drive spending		3
			Game realistically unplayable without spending		4
			Aggressive advertising		3
			Pay or grind		2
Homescapes	Playrix	Narrative game with match-3 mechanics	game dynamics designed to drive spending	3	3
			Game experience better if paying		2
			Unrealistic presentation of product *(although legally these ads should have been removed now)*		6
Star Trek Fleet Command	Scopely	Strategy game	Game experience better if paying	4	7
			Overpricing		3
			Pay or grind		2
			game realistically unplayable without spending		2

Miniclip 8 ball pool	Miniclip	Mobile pool game	Game is broken	1	2
Top War	River Games	Strategy game	Unrealistic presentation of product	3	27
			Game experience better if paying		4
			game realistically unplayable without spending		2
Harry Potter Puzzles & Spells	Zynga	Match 3 puzzle game	Escalating payments	1	2
Gardenscapes	Playrix	Puzzle game	Unrealistic presentation of product	1	3
Cash Frenzy Casino	SpinX Games Limited	Casino game	Escalating payments	7	4
			game dynamics designed to drive spending		6
			Game experience better if paying		2
			Unrealistic presentation of product		2
			Stealing money		2
			game realistically unplayable without spending		2
			Game is broken		2
Toon Blast	Peak	Puzzle game	game realistically unplayable without spending	2	2
			game dynamics designed to drive spending		4
Solitaire Grand Harvest	Playtika	Card	Escalating payments	6	3
			Overpricing		8
			game dynamics designed to drive spending		5
			Game is broken		2
			Game experience better if paying		2
			game realistically unplayable without spending		4
Marvel Strike Force	Scopely	Turn-based role-playing game	game dynamics designed to drive spending	9	5
			Overpricing		5

			game realistically unplayable without spending		7
			Game experience better if paying		12
			Pay or grind		5
			Unfair matchups		2
			Desired product not received		2
			Unrealistic presentation of product		2
			Game is broken		2
Merge Dragons	Gram Games Limited	Puzzle game	Game is broken	5	2
			Unrealistic presentation of product		2
			Pay or grind		2
			Desired product not received		3
			Game realistically unplayable without spending		2
Zynga Live Poker	Zynga	Casino game	Escalating payments	4	2
			game dynamics designed to drive spending		11
			Aggressive advertising		5
			Desired product not received		2
Rise of Empires: Ice and Fire	Long Tech Network Limited	Strategy game	Stealing money	5	3
			Unrealistic presentation of product		12
			Game experience better if paying		8
			game realistically unplayable without spending		2
			game dynamics designed to drive spending		2
AFK Arena	Lilith Games	Role-playing game	Game experience better if paying	5	2
			Aggressive advertising		5
			Unrealistic presentation of product		7
			game realistically unplayable without spending		2

			Stealing money		2
Evony: the King's Return	TG Inc	Strategy	Unrealistic presentation of product	1	14
Raid: Shadow Legends	Plarium Games	Role-playing game	Game experience better if paying	4	10
			Aggressive advertising		6
			Overpricing		2
			game dynamics designed to drive spending		2
Fishdom	Playrix	Match 3 puzzle game	Unrealistic presentation of product	1	14
Klondike Adventures	Vizor Apps Ltd	Farm & city simulator	Unrealistic presentation of product	5	9
			game realistically unplayable without spending		4
			Pay or wait		5
			game dynamics designed to drive spending		2
			Overpricing		3
EverMerge	Big Fish Games	Puzzle/world-building game	Overpricing	2	2
			Game is broken		2
Pokemon Go	Niantic	Augmented reality game	Limited inventory space without paying	1	2
Empires & Puzzles: Epic Match 3	Small Giant Games	Match 3 puzzle game	Game experience better if paying	3	11
			game dynamics designed to drive spending		12
			Monetisation strategy changed partway through game life cycle		2
War and Order	Camel Games	Strategy game	Game is broken	4	2
			Game experience better if paying		11
			Unrealistic presentation of product		8
			Game dynamics designed to drive spending		2

Puzzles & Survival	37Games	Match 3 puzzle game	Unrealistic presentation of product	2	25
			Escalating payments		2
Township	Playrix	Farm & city simulator	game dynamics designed to drive spending	4	3
			Unrealistic presentation of product		4
			Monetisation strategy changed partway through game life cycle		3
			game dynamics designed to drive spending		2
Mafia City	Yotta Game	Strategy game	Unrealistic presentation of product	2	13
			Game experience better if paying		2
Star Wars: Galaxy of Heroes	Electronic Arts	Role-playing game	game dynamics designed to drive spending	5	4
			Game experience better if paying		6
			game realistically unplayable without spending		5
			Pay or grind		4
			Overpricing		4
Guns of Glory: the Iron Mask	Century Games	Strategy game	Unrealistic presentation of product	4	4
			Stealing money		2
			Game experience better if paying		4
			Overpricing		2
Project Makeover	Magic Tavern	Makeover game	game realistically unplayable without spending	3	5
			game dynamics designed to drive spending		4
			Game experience better if paying		2
Kings of Avalon: Dominion	Century Games	Strategy game	Unrealistic presentation of product	2	22
			game dynamics designed to drive spending		2
WWE SuperCard	Cat Daddy Games	Collectible card battle game	Game experience better if paying	3	8
			game dynamics designed to drive spending		2

			Pay or grind		2
Last Shelter: Survival	Long Tech	Massive multi-player, real-time strategy war game	Game experience better if paying	3	2
			Overpricing		4
			Unrealistic presentation of product		2
Matchington Mansion	Firecraft Studios	Match 3 puzzle game	game dynamics designed to drive spending	1	5
Harry Potter: Hogwarts Mystery	Jam City	Role-playing game	Pay or wait	3	7
			game realistically unplayable without spending		2
			game dynamics designed to drive spending		2
Rise of Kingdoms: Lost Crusade	Lilith Games	Strategy game	Game experience better if paying	1	11
Golf Clash	Playdemic	Real-time multiplayer sports game	game dynamics designed to drive spending	2	9
			Game experience better if paying		3
State of Survival: the Walking Dead	KingsGroup Holdings	Strategy game	game dynamics designed to drive spending	3	5
			Unrealistic presentation of product		3
			Advantage over other players		2
Bingo Blitz	Playtika	Board game	game realistically unplayable without spending	3	4
			game dynamics designed to drive spending		5
			Game is broken		2
Clash of Clans	Supercell	Strategy game	Unfair matchups	1	2
Genshin Impact	miHoYo	Role-playing game	game dynamics designed to drive spending	1	2
Call of Duty Mobile	Proxima Beta	Shooter game	Stealing money	1	2
Slotomania	Playtika	Casino game	Overpricing	4	3
			game dynamics designed to drive spending		10
			Stealing money		2

			game realistically unplayable without spending		2
				3	
				9	

Full breakdown of frequencies of problematic microtransactions by developer (desktop)

Developer	Counts	Techniques (total)	Techniques (average)
Square Enix	1	4	4
Creative Assembly	1	1	1
SCS	1	1	1
Paradox	3	6	2
Taleworlds	1	1	1
Pearl Abyss	1	3	3
Gaijin	1	4	4
Bungie Inc	1	2	2
Bethesda	2	5	2.5
Frontier	1	2	2
2K	1	2	2

Full breakdown of frequencies of problematic microtransactions by developer (mobile)

Developer	Counts	Techniques (total)	Techniques (average)
I Got Games	1		
Moon Active	1		
King	1		
Playrix	3	9	3.00
Scopely	2	13	6.50
Miniclip	1		
River Games	1		

Zynga	2	5	2.50
SpinX Games	1		
Peak	1		
Playtika	3	13	4.33
Gram Games	1		
Long Tech	2	8	4.00
Lilith Games	2	6	3.00
TG Inc	1		
Plarium Games	1		
Vizor Apps	1		
Big Fish Games	1		
Niantic	1		
Small Giant Games	1		
Camel Games	1		
37 Games	1		
Yotta Games	1		
EA	1		
Century Games	2	6	3.00
Magic Tavern	1		
Cat Daddy	1		
Firecraft Studios	1		
Jam City	1		
Playdemic	1		
Kings Group Holdings	1		
Supercell	1		
miHoYo	1		
Proxima Beta	1		

Appendix C: materials from Chapter 3

Interview questions

List of interview questions at the start of the interview process

- You self-identified as a player of 'X' game - tell me about how and why you first started playing this game…
- How often/how long do you play the game?
    - What makes you want to play it?
    - What makes you want to stop playing it?
    - Do you ever spend more time on the game than you want to?
        - Why?
        - How do you feel after this happens?
        - Are there any consequences of this?
        - What are the consequences?
- Have you encountered elements in the game which you believe were trying to get you to spend money?
    - Have you ever spent money on this game?
    - Do you ever spend more money on the game than you want to?
    - Why? How do you feel after this happens?
        - Are there any consequences of this?
        - What are the consequences?
- Have there been any significant changes to any area of your life since you started playing game X?
- What makes you want to keep playing it?
- 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

- What do you do for a living/what's your job like?
- You self-identified as a player of 'X' game - tell me about **how** and **why** you first started playing this game…
- How often/how long do you play the game?
    - How does the game fit into your daily routine?
- **Why** do you/did you play the game?

    - How did playing it make you feel?
- How do you feel when you achieve something in the game?
    - Is this difficult to do?
    - Does it happen often?
- Are you happy with your life right now?
    - What would you change?
- Do you ever spend more time or more money on the game than you'd like?
    - Why?
- How do you feel when this happens?
- [Are there aspects of the game that you believe drive you to do this?]
- (How do you think the game has affected you? What consequences have there been? - *same questions as before*).

List of games perceived by players as 'designed to drive spending'

Coin Master

Candy Crush Saga

Toon Blast

Solitaire Grand Harvest

Marvel Strike Force

Rise of Empires: Ice and Fire

Homescapes

Raid: Shadow Legends

Klondike Adventures

Empires & Puzzles: Epic Match

War and Order

Township

Star Wars: Galaxy of Heroes

Project Makeover

Kings of Avalon: Dominion

Matchington Mansion

WWE SuperCard

Harry Potter: Hogwarts Mystery

Golf Clash

State of Survival: the Walking Dead

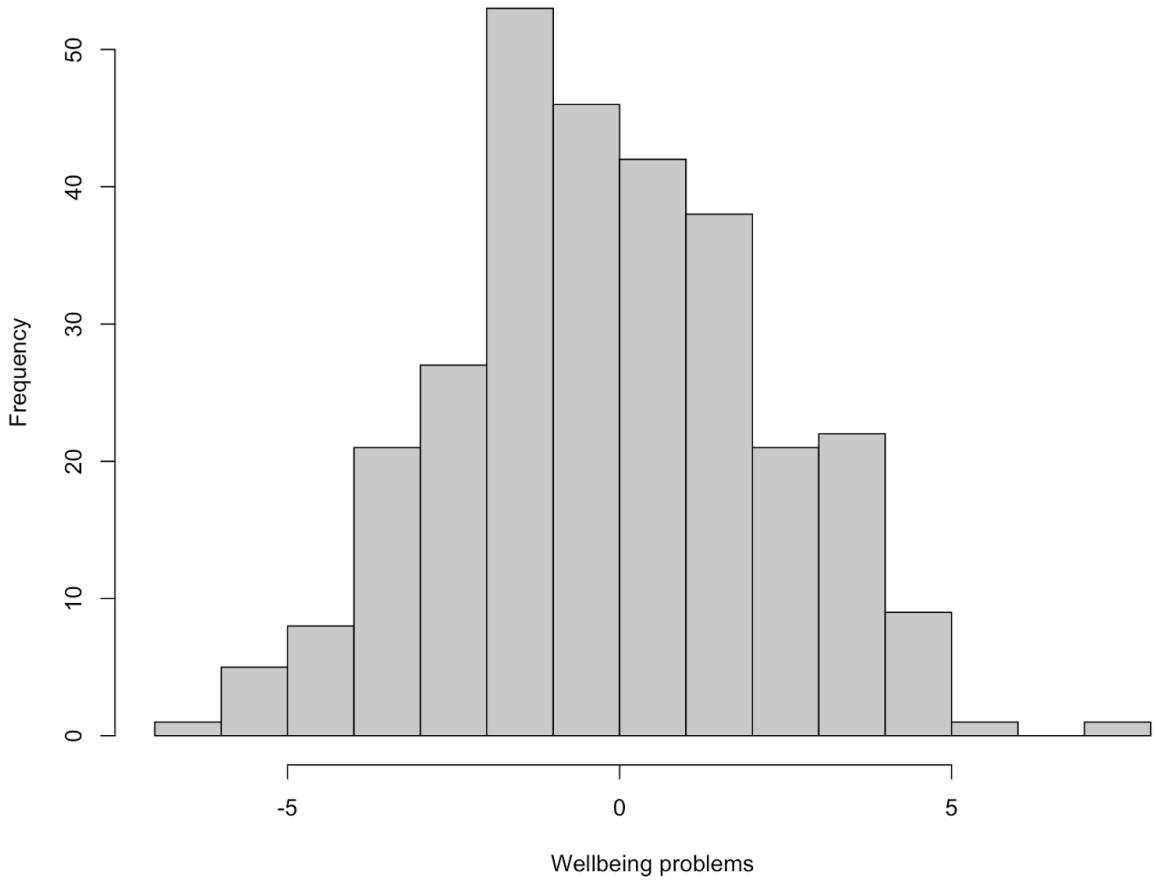
Bingo Blitz

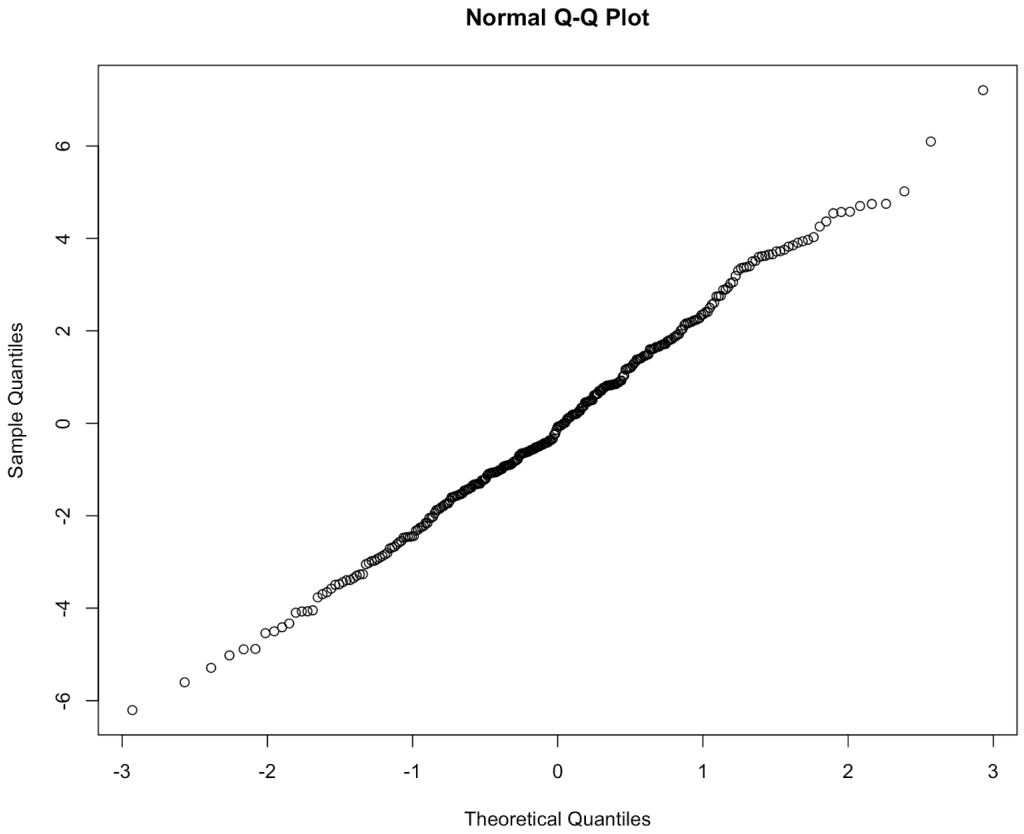
Genshin Impact

Appendix D: materials from Chapter 4

Figures to illustrate assumptions of the ANOVA

Histogram of response variable to check for normality




Normal Q-Q Plot
Sample Quantiles
Theoretical Quantiles
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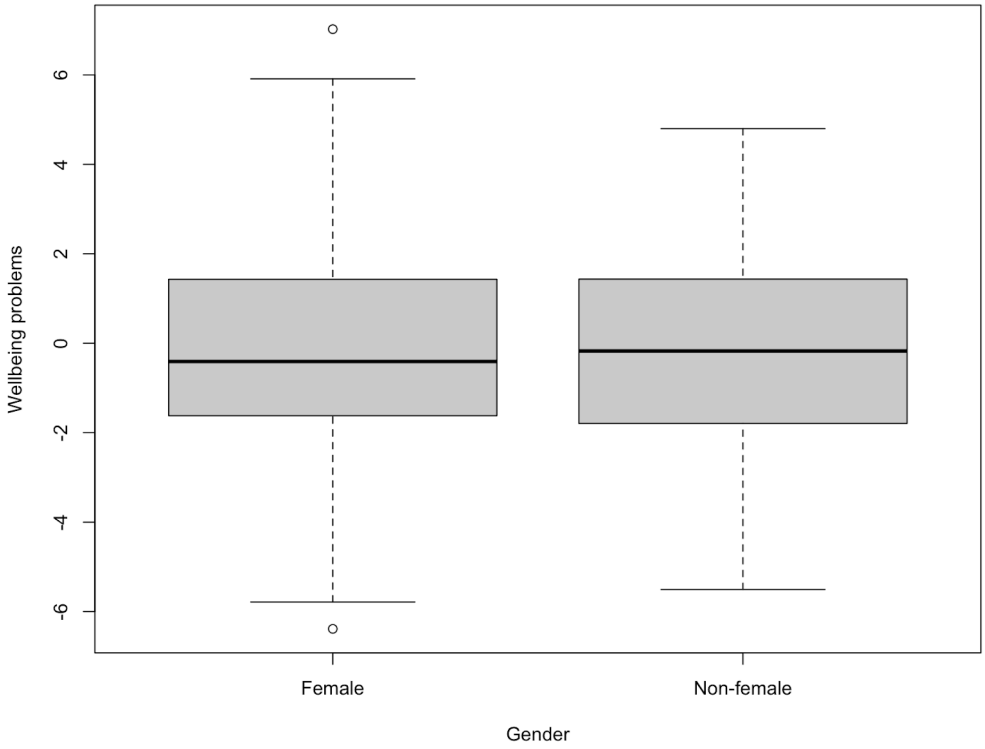
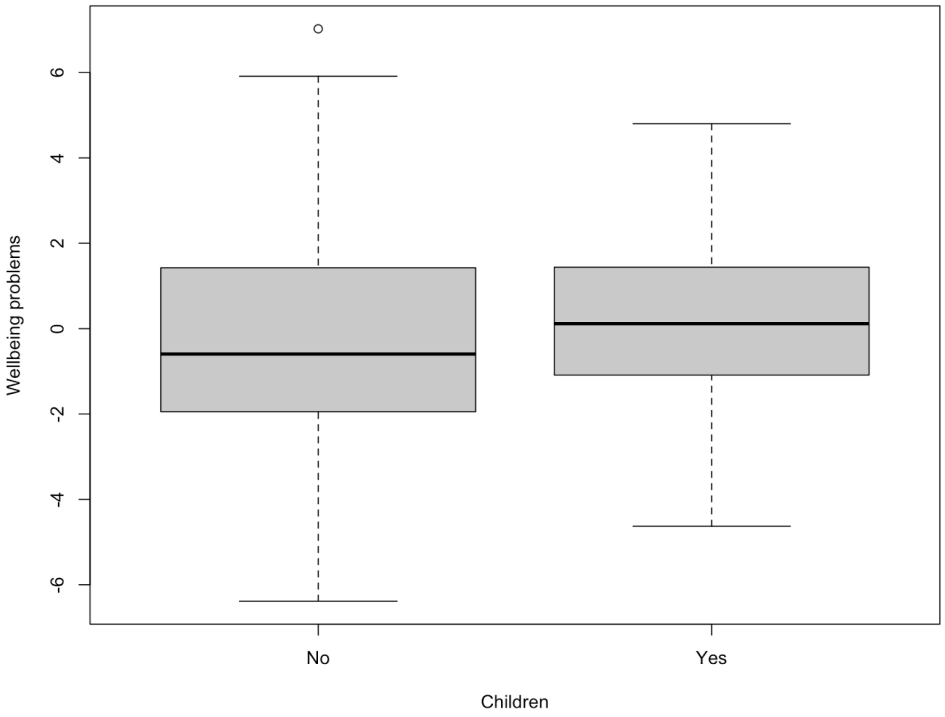
-4
-2
0
2
4
6
-3
-2
-1
0
1
2
3

Box plots to test equality of variance




Wellbeing problems
6
4
2
0
-2
-4
-6
No
Yes
Children

Appendix E: materials from Chapter 5

Control games

Lord's Mobile

Star Trek Fleet Command

Harry Potter Puzzles & Spells

Gardenscapes

Merge Dragons

AFK Arena

Evony: the King's Return

Fishdom

EverMerge

Pokémon Go

Puzzles & Survival

Mafia City

Guns of Glory: the Iron Mask

Last Shelter: Survival

Rise of Kingdoms: Lost Crusade

Clash of Clans

Call of Duty Mobile

Thanks for reading!