Exploring Motivations for Videogame Micro-transaction Use and their Relationship with Problem Gaming and Problem Gambling

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"*It's the job that's never started as takes longest to finish…*"

- Samwise Gamgee, from *The Lord of The Rings*

by J.R.R Tolkien, 1954

Abstract

Micro-transactions are a popular form of monetisation in videogames, suggested to be a convergence between gaming and gambling. Following the implementation of micro-transactions into games, there has been debate about their psychological impacts, including their associations with problem gaming and gambling behaviour. However, there has been limited academic research concerning a broad range of micro-transactions, beyond the most discussed form, loot boxes. Of interest to the present thesis is the underlying motivations that drive micro-transaction use. Specifically, this thesis aims to explore motivations for micro-transaction use and their relationship to problem gaming and gambling behaviour.

An initial systematic review investigated existing findings relating to micro-transactions and their relationship to both problem gaming and problem gambling. Following a literature search, 19 cross-sectional studies were reviewed based on several inclusion criteria. The most consistent finding of the review was that frequency of micro-transaction use is a key factor in the relationship between micro-transactions, problem gaming and problem gambling. The review highlighted the need for more methodologically diverse and explorative research concerning micro-transaction use, providing justification for the empirical chapters within the present thesis.

The first empirical chapter of the present thesis, a qualitative investigation into the experience of videogame players with micro-transactions, utilised interpretative phenomenological analysis to analyse transcripts from 11 participants who use or had previously used micro-transactions. Six super-ordinate themes were identified. These were: (i) self-control vs. impulsivity, (ii) motivations for micro-transaction use, (iii) obligation to play after purchases, (iv) guilt and regret, (v) feeling tricked or cheated, and (vi) comparing micro-transaction use and gambling. Participant experiences were discussed in relation to motivation, utilising self-determination theory (Ryan & Deci, 2000a, 2000b, 2000c). The chapter highlighted the need for further investigation of the complex relationship between motivation, needs satisfaction and frustration, micro-transaction engagement and problem gaming and gambling behaviour.

Subsequently, the second empirical chapter of the present thesis utilised structural equation modelling methods to explore this complex relationship. Key findings were that frequency of micro-transaction use partially explained the relationship between extrinsic

gambling motivations and problem gambling behaviour and fully explained the relationship between extrinsic gaming motivation and problem gambling behaviour. The findings were discussed with a focus on the rapid reward processes involved in the use of micro-transactions and the similarities between micro-transaction reward schedules and gambling. The chapter highlighted that a novel psychometric measure of motivations for the use of a broad range of micro-transactions was necessary to further explore the findings.

The final empirical chapter of the present thesis aimed to develop and validate the Motivation for Micro-transaction Use Scale (MMUS) utilising a mixed methods approach. The resulting 16-item MMUS consisted of five subscales: (i) achievement and advancement, (ii) social status, (iii) personality expression, (iv) fanship, and (v) non-motivation. The scale showed good reliability and validity overall, with subscales suggested to be related to self-determination theory concerning aspirations and goals.

This research has important implications for the future study of micro-transactions, as well as wider fields relating to online spaces. The research also has practical applications for videogame companies and developers, as well as in healthcare settings for the prevention of gaming and gambling related harm, or for the treatment of problematic behaviour. The research presented in the present thesis suggests that some micro-transaction users may have motivational profiles more associated with problem gaming and gambling behaviour. Consequently, the present thesis contributes to the dearth of academic literature concerning micro-transaction use and may be beneficial for the development of policy and regulatory measures to prevent potential harm from micro-transaction use.

Declaration

The present thesis comprises the candidate's own original work. The work has not been submitted to this or any other University for a degree. All studies included in the thesis were designed and analysed by the candidate. Publications occurring as a result of the thesis were the candidate's own work.

Publications Stemming from the Present Thesis

Gibson, E., Griffiths, M. D., Calado, F., & Harris, A. (2022). The relationship between videogame micro-transactions and problem gaming and gambling: A systematic review. *Computers in Human Behavior*, *131*, 107219. https://doi.org/10.1016/j.chb.2022.107219

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Pipeline Outputs

Chapter 6: The Development and Validation of the Motivation for Micro-transaction Use Scale (MMUS) will be submitted for publication in *Technology in Society* following submission of the present thesis.

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Chapter 1. Introduction to Micro-transactions, Ethical Concerns and Problematic Behaviour

1. Chapter Overview

The present chapter introduces the reader to micro-transactions, providing contextual basis for the present thesis. The chapter also introduces the main concepts discussed throughout the thesis, including gambling and problem gambling, gaming and problem gambling, and motivation. The chapter concludes with a summary of the main aims of the thesis and provides an overview of the remaining thesis chapters.

1.1. Micro-transactions

1.1.1. Defining Micro-transactions

In videogame playing, micro-transactions are defined as small, or 'micro' purchases made in-game, ranging from small amounts of money (i.e., 99p) to larger amounts (i.e., over £100). Micro-transactions gained popularity in online games in South Korea in the early 2000s, following South Korean videogame developer *Nexon*'s success with the micro-transaction monetisation method (Vayne, 2015).

In Western areas of the world, micro-transactions were introduced into videogames as part of an industry shift to 'games as a service', whereby videogame companies no longer released 'complete' gaming experiences for a set price and instead, continuously update games, often adding content for an extra cost (Ball & Fordham, 2018). United States videogame publisher *Bethesda* are often credited with the release of the first micro-transaction in Western games in 2006, releasing horse armour for the single-player console game *Elder Scrolls 4: Oblivion* for the cost of £1.50 (GameCentral, 2024). To date, micro-transactions are suggested to generate up to 67% of all revenues of mobile games (Petrovskaya et al., 2022), often operating using a

'free-to-play' model whereby the game itself costs nothing to download and play, but in-app purchases are used as the sole form of monetisation. Similarly, paid-for games such as *FIFA* and *Call of Duty* offer in-game purchase options, generating revenue beyond the initial purchase of the game.

Common micro-transaction types available can vary across games, with common forms including in-game currency (i.e., coins, gems, gold), single-purchase cosmetic items (i.e., skins, clothing and hairstyles, non-functional weapons), expiration-based items (i.e., extra lives, level skips, extra time), loot boxes (i.e., crates or boxes containing 'random' rewards; typically unlocked using real-world or in-game currency or 'keys' found during gameplay), and battle passes (i.e., mechanisms that track player experience points or in-game goals to unlock increasingly 'rare' rewards when experience point thresholds have been met or goals have been achieved). Micro-transactions can typically be made directly using real-world money, or indirectly using in-game currency, often called *double currency* (Alha et al., 2014).

1.1.2. The Problem with Micro-Transactions: Ownership, Fairness and Negative Impacts

Following the conception of micro-transactions, the concept of videogame companies offering non-tangible items to players for real-world money has been met with criticism. Firstly, virtual game items exist only within the bounds of the videogame in which they are valuable. While the player may be able to trade or sell items, either in the game or using third-party platforms, the player does not solely own the item they have paid for (Kwong, 2011), rather, the player is paying for access to use the item and access to the item can be revoked by the videogame company at any time. It can be argued that players who decide to make micro-transactions are fully informed of their ownership rights in videogame terms of use content, with game companies often describing virtual items as having 'no value' in their terms of service (King et al., 2019). However, players may place greater value on items other than monetary value, particularly in relation to items they own (or perceive they own), consequently

influencing decisions to make more micro-transactions, regardless of the external value placed virtual items by the company and the lack of consumer protection surrounding ownership (Fantini, 2023).

Moreover, the inclusion of in-game currency and the ability to make transactions using in-game currency has ethical concerns. In-game currencies are purchased using real-world money or earned during gameplay and differ greatly across games. The value of in-game currency, or the conversion rate of real-world money to in-game currency is also varied across games and is set by the company or developer, leading to potential confusion about the real-world value of in-game items (Ivanov et al., 2021) and decreased salience when making transactions, particularly for younger players who may not have the ability to judge the real-world value of items (King & Delfabbro, 2018).

Additionally, the inclusion of functional micro-transactions (i.e., items that impact gameplay) in videogames has been subject to discussion concerning fairness and the concept of 'predatory' monetisation efforts by videogame companies. In single-player games, players may wish to advance quickly in the game, avoiding the time expenditure and investment needed to complete the game or to gain experience points. While this poses no initial ethical concern, due to transaction being the player's own choice, Neely (2021) suggested that the player is then vulnerable to the 'sunk cost' fallacy (i.e., that they must invest more in the game, either through time or monetary expenditure, as they do not wish to 'waste' their prior investments). In multiplayer videogames, it is argued that the 'sunk cost' effect may impact other players, through the spectating of the perceived benefits other players' have obtained by investment (King & Delfabbro, 2018).

Functional items are suggested to pose further ethical concerns in multiplayer games; the nature of competition and ability to 'pay to win'. In other words, depending on the player, the

ability to spend on functional in-game items, where other may have to expend considerable time and energy on playing the game, or 'grinding' in the game could be perceived as unfair (Palmeira, 2021), particularly for those in lower socioeconomic positions (Neely, 2021). Although the ability to play a game for free is argued to be inclusive, allowing more access to games for those who do not have the disposable income to buy games for a set price, the nature of pay-to-win micro-transactions may highlight a division between those who are wealthy enough to be 'better' at the game and those who cannot afford to be (Evans, 2016). In mainstream media and among gaming communities online, the fairness of micro-transactions has been heavily discussed. In 2017, the *Electronic Arts* (*EA)* game *Star Wars Battlefront II* was criticised by for its inclusion of pay-to-win micro-transactions, in which players could pay to obtain credits to unlock characters that could impact gameplay (called 'hero' characters in the game); players argued that it would require 40 hours of gameplay to unlock a 'hero', whereas those who paid could instantly unlock the character (BBC, 2017). In 2018, *EA* removed the gameplay altering loot boxes, and instead, loot boxes were made to be purely cosmetic (Gault, 2018). Cosmetic forms of micro-transactions are suggested to be more ethical in nature, as they do not alter gameplay and consequently, all players have the opportunity to build skill through continued play of the game (Neely, 2021).

However, it is argued that even cosmetic micro-transactions can be ethically ambiguous, depending on how they are obtained. By 2017, popular games of numerous genres like *Overwatch* (i.e., an online multi-player first-person shooter game), *Middle-earth: Shadow of War* (i.e., a single-player action-adventure game) and *Forza Motorsport 7* (i.e., a single or multi-player racing game) included randomised rewards as a monetisation feature, in the form of loot boxes (McCarthy, 2017). Loot boxes, or loot crates, are locked virtual boxes that are typically opened directly using real-world money, or indirectly using in-game 'keys'. The visuals associated with the loot box differs per game (i.e., these may also look like card packs,

bundles or chests) but the mechanism remains the same; the player does not know what they may 'win', items can be cosmetic or functional, typically vary in 'rarity' (i.e., items are commonly obtained, or less commonly obtained) and rewards are seemingly random (Griffiths, 2018).

A taxonomy of randomised reward mechanisms in games was developed by Sato et al. (2020) following the review of 108 free-to-play and pay-to-play games. The taxonomy is summarised in Table 1.1. The audio-visual presentation of randomised reward mechanisms is of particular importance in relation to the potential negative impacts of micro-transactions. As presented in Table 1.1, several audio-visual presentations of rewards are presented similarly to forms of gambling (e.g., roulette, slot machine, scratch card). Subsequently, following the widespread inclusion of randomised reward mechanisms into games in 2017, academic literature aimed to analyse if the similarities extended beyond audio-visuals. Emergent literature initially focused on the regulation of the loot box and classifying random reward mechanisms as gambling (Drummond & Sauer, 2018; Griffiths, 2018; Schwiddessen & Karius, 2018), with concerns surrounding the accessibility of gambling-like mechanisms to children and adolescents (Griffiths, 2019a; Zendle, Meyer, et al., 2020).

Additionally, the potential development of problem gambling and gaming behaviour (see Section 1.2 of the present chapter) as a consequence of micro-transaction use was called into question (Brooks & Clark, 2019; Drummond & Sauer, 2018; King & Delfabbro, 2018, 2019; Zendle et al., 2019; Zendle & Cairns, 2018, 2019). However, academic literature concerning the potential 'gateway' effect of micro-transactions is limited; research focuses primarily on loot boxes, subsequently not acknowledging the potential psychological impacts of other forms of micro-transaction. Furthermore, emergent literature is not methodologically diverse and is primarily correlational in nature. Chapter 2 of the present thesis reports an in-depth systematic review of available literature concerning the relationship between a broad range of micro-

transactions, problem gaming and problem gambling to identify the key research gaps that aim to be addressed in the present thesis.

1.1.3. The Regulation of Micro-transactions

Following their inclusion in mobile and console games, discussion concerning the need to regulate micro-transactions have become increasingly common, with the aim of protecting consumers from unethical and potentially harmful practice. Regulatory measures are not synonymous globally and instead differ per country. To date, numerous countries have developed micro-transaction regulatory measures, primarily focusing on random reward mechanisms and other loot box equivalent forms (Antepenko et al., 2022; Straub, 2020).

One of the first countries to regulate micro-transactions was Japan. In 2012, Japan declared Gacha-based random reward mechanisms to be illegal, focusing on the need to continually purchase loot boxes in order to progress in the game. Other forms of micro-transaction are currently not regulated. In 2016, China followed Japan in the regulation of loot boxes, requiring that drop rates were disclosed to players (see Table 1.1; open visibility). By 2019, China had further regulated loot box use, requiring all videogame companies to publicly disclose loot box-related outcomes (Simmons & Simmons, 2019). Moreover, limitations were placed on the number of loot boxes a player could purchase in one day, with daily loot box purchases capped at 50 boxes total per day and games must clearly display the number of box openings a player has left (Fong, 2019). In 2023, China announced additional micro-transaction regulations, setting spending limits for online games and limiting games from rewarding players for first-time and consecutive spending, as well as for playing a game daily (Ye, 2023).

The Netherlands followed in the regulation of loot boxes in 2018, concluding that rewards obtained in games that can be traded outside of a game had market value, and consequently,

should be considered as a form of gambling. However, loot boxes in games with no external trading system did not classify as a form of gambling (Straub, 2020).

Belgium also regulated loot box use in 2018, concluding that loot boxes purchased using real-world money were considered forms of gambling due to the element of chance involved in their use, and subsequently, paid-for loot boxes should be removed from games (BBC, 2018). However, it was reported that the ban enforced by the Belgian Gambling Commission appeared to be ineffective. In 2023, paid loot boxes were still available in many *iPhone* games in Belgium, including games that were rated suitable for ages 12 years and over (Xiao, 2023).

In other countries, the regulation of loot boxes is a highly debated and ongoing issue. For many jurisdictions globally, loot boxes are only regulated if they meet the requirements to be classed as a form of gambling. One such requirement is the ability to 'cash out', or to make real-world money. In many games that use loot boxes as a form of monetisation, this is not possible, even with the inclusion of in-game marketplaces. Videogame company *EA* have been the subject of numerous lawsuits globally, related to their inclusion of loot boxes, or equivalent mechanisms in their games. This is particularly in relation to their *FIFA* game series, in which players must build 'skilled' teams of football players with 'cards' to win, most of which are obtained by loot boxes or traded in an online marketplace with other players for in-game currency. However, *EA* has argued that rewards obtained from their loot boxes cannot be directly converted into money from the game, irrespective of third-party sites allowing players to profit from their rewards, with varying outcomes. For example, in 2020, the Court of The Hague ruled that *FIFA Ultimate Team* packs broke Dutch gambling law, ordering *EA* to pay a €10 million fine (Sinclair, 2020). In 2022, this ruling was appealed by *EA* and the Dutch Administrative Jurisdiction Division overruled the judgement, deciding that *EA* had not broken the gambling law in the Netherlands (Phillips, 2022). Alternatively, in 2023, a regional court in Vienna ruled that *FIFA Ultimate Team* packs violate Austrian gambling laws, ordering *EA* to

pay €10, 800 to Austrian gamers who bought packs, with *EA* deciding not to appeal the decision (Dring, 2023).

In 2020, the United Kingdom government called for evidence concerning loot boxes and gambling behaviour, following recommendations that loot boxes be considered a form of gambling under the 2005 Gambling Act. The 2022 government response highlighted numerous loot box-related harms, particularly for children and young people, although noted that overall, the findings were not consistent (Woodhouse, 2024). These included: (i) gambling-related harms, (ii) financial harms, and (iii) mental health-related harms. The response failed to identify loot boxes as a form of gambling as a result of the lack of 'cash out' and real-world monetary value of loot box rewards, but highlighted that maladaptive motivations for their use may contribute to gambling-related harms (Department for Digital, Culture, Media & Sport, 2022).

Taken together, global regulations concerning micro-transaction use have primarily focused on loot boxes, and are complex, often limited by the lack of real-world monetary value attributed to rewards. The developing landscape of micro-transactions, their potential psychological impacts and the motivational drivers behind their use are still largely under researched. Therefore, the aim of the present thesis is to contribute to the emerging body of literature concerning a broad range of micro-transactions, problem gaming and problem gambling and to provide novel and valuable insights to contribute to harm prevention and social responsibility measures surrounding videogame play.

Table 1.1

A Taxonomy of Randomised Reward Mechanisms

Layer	Definition	Classification
Type of embeddedness	Real-world economy impact	Purchasable Advertisement only Both purchasable and through advertisements
Trigger condition	How the reward is triggered	Purchasable and non-purchasable in-game currency Direct purchase with real-world money Non-purchasable in-game currency after watching an advert Directly after watching an advertisement
Drop rate visibility	If chances of rewards are visible	Open drop rate Closed or hidden drop rate
Type of random procedure	How randomness occurs	Constant, non-changing chance or closed but implied equal chance Consecutive or increasing chance triggered after reaching a threshold Consecutive with a guaranteed 'rare' reward after reaching a threshold Item can only be obtained once from a conceptual 'box' Step-up/step-down (i.e., decreased chances after a rare reward) Redraw or 're-roll'
Audio-visual implementation	How the random procedure is presented	Roulette wheel (reward is not visible) Spin wheel (reward is visible) Slot machine (rotating visible rewards) Scratch card Loot box (a chest, crate, or box is unlocked to reveal the reward) Card packs (rewards are revealed one by one) Enemy (reward is visible after defeating an enemy) Gacha (varied but based on toy-capsule machines; one reward at a time)
Type of reward	The type of reward that can be obtained	In-game currency Consumables (i.e., both single use and extended time use) Skins (cosmetic; not impacting gameplay) Cosmetic items other than skins Abilities (new skills, spells or attacks; impact gameplay) Equipment (affecting gameplay) Characters or cards (may impact gameplay)

Note. Adapted from "An Empirical Taxonomy of Monetized Random Reward Mechanisms in Games" by Y. Sato, S. Brückner, S. Kurabayashi, and I. Waragai, 2020, *Proceedings of DiGRA 2020 Conference: Play Everywhere*.

1.2. Defining Key Concepts: Gambling, Gaming and Motivation

1.2.1. Defining Gambling

Gambling activities can be based purely on chance (i.e., a random outcome), or can involve a level of skill (i.e., an individual can influence chances of winning but the outcome remains partially random) but crucially, involve the betting of money (or equivalent) on an unknown outcome (Griffiths, 1995). Social characteristics (i.e., the level of engagement with other players) and structural characteristics (i.e., event frequencies, payout intervals and audio-visual queues) of gambling activities differ (Griffiths et al., 2006; Holtgraves, 2009). Gambling can be social and involve playing against other players (i.e., poker), or solitary where games are typically played alone (i.e., slot machines). Moreover, gambling activities such as lotteries or some types of sports betting have delayed outcomes or lower event frequencies, whereas gambling on electronic gambling machines allows for placing of bets and higher event frequencies (Harris & Griffiths, 2018).

The drive to engage in, and continue gambling, is suggested to have two main components; situational characteristics (i.e., things in the gambling environment that may influence gambling such as advertising and marketing), argued to impact why an individual initially engages in gambling activities, and the structural characteristics of the gambling activity, argued to impact why an individual continues to gamble (Griffiths et al., 2006). With the development of the internet and online gambling environments, the accessibility of gambling activities increased, enabling individuals to engage in gambling globally and at any time on any day by betting real-world money in online environments (Griffiths & Parke, 2002). As a result of the increased access to gambling, academic literature has focused on how and why highly accessible gambling environments may impact the development of excess and potentially problem gambling behaviour (Griffiths, 2003).

1.2.2. Defining Problem Gambling

While for some, gambling is an enjoyable pastime, with limited negative consequence, for others, problem gambling behaviour can develop, resulting in harm, or negative consequences, to an individual, an individual's family or friends, or even extending to an individual's wider community (Clarke et al., 2006). In the academic literature, the terms *problem gambling* and *gambling disorder* are often used to describe the behaviour associated with negative gambling consequences, with suggestions that problem gamblers are those that are sub-clinical (Welte et al., 2015), not necessarily meeting the four DSM-5 criteria (American Psychiatric Association, 2013) needed to be classified as someone with a gambling disorder. With the DSM-5, pathological gambling was renamed to *gambling disorder* and was reclassified as a behavioural addiction, reflecting the similarities between indicators of substance abuse and problem gambling (Clarke et al., 2006).

A recent systematic review (Ghelfi et al., 2024) investigating risk factors associated with problem gambling concluded that online problem gamblers were more likely to be younger, male, have a lower education level, have lower income, be unemployed or have 'lower' job status, be single or unmarried, and have dependent children. Moreover, online problem gamblers were more likely to have gambling motivations related to financial gain, coping and for the benefits of anonymity and accessibility that online gambling provides.

1.2.3. Defining Gaming

Videogames have been accessible in homes since the 1970s and the invention of the first console system (Ivory, 2015). The development of the internet, similar to with online gambling activities, created more accessible gaming environments, in which players could engage in both single- and multi-player games with anyone across the world at any time through console or computer (Crawford et al., 2011). Traditionally, videogames were purchased for a set price,

with the expectation that the player received a fully completed game. However, in recent years, increasing numbers of videogame companies are releasing 'free-to-play' games, across numerous platforms. Consequently, videogames are highly accessible; anyone with access to a smart phone, console, or computer can engage in videogame play. In 2024, it was estimated that globally, 2.6 billion people reported playing a form of videogame (Clement, 2024).

The impact of gaming on players has been highly debated. Research concerning the potential positive impacts of gaming focuses particularly on modern forms of gaming, where games comprise complex virtual worlds with their own social systems (Granic et al., 2014). Across genres, videogames are suggested to have numerous benefits including for cognitive functioning (i.e., visual attention, short-term memory, working memory, and reaction time), physical health and social behaviour (Brilliant et al., 2019).

Research concerning the negative impacts of gaming have focused on the potential development of aggressive behaviour as a consequence of playing violent games (Elson & Ferguson, 2014), interference with academic performance and employment through lack of sleep (Sublette & Mullan, 2012), and the development of problem gaming behaviour (Griffiths et al., 2012).

1.2.4. Defining Problem Gaming

While some have suggested that problem gaming is defined by excessive time spent playing games (Marchica et al., 2022), it has been argued that problem gaming should instead be defined by the negative consequences arising from engagement and involvement in gaming (Griffiths, 2010). In other words, an individual may play videogames excessively, but may not be addicted, or experience negative consequences.

Problem gaming was included in the appendix of the DSM-5 (American Psychiatric Association, 2013), and termed *internet gaming disorder* as an area for future research and a draft diagnostic criteria was produced, based on the diagnostic criteria for substance use disorders (Luo et al., 2022). More recently, gaming disorder was included in the 11th revision of the *International Classification of Diseases* (World Health Organization, 2022), with diagnostic criteria relating to impaired control over gaming (including frequency, intensity and duration of play), priority given to gaming over other activities, and escalating gaming irrespective of negative consequences.

Risk factors suggested by Kuss (2013) to be associated with the problem gaming behaviour include personality traits (i.e., neuroticism, aggression, hostility, and sensation seeking), gaming motivations (i.e., for coping and escapism, online relationships, mastery and control, recognition, challenge, completion and excitement), and structural characteristics of games (i.e., online gaming, positive reinforcement, finding rare in-game items, watching game cutscenes and superiority through virtual avatar). Additionally, being male, having poor sleep hygiene, depressive symptoms and having attention-deficit/hyperactivity disorder (ADHD) are suggested to be potential risk factors (Dong et al., 2024).

1.2.5. Models of Addictive Behaviours

Both problem gambling and problem gaming are suggested to be behavioural addictions (i.e., those that do not involve the use of a substance) (Alavi et al., 2012). Potential models of, or pathways to, the development of problem or addictive behaviours have been discussed, particularly in relation to their similarities with substance addiction (Griffiths, 2017). The components model of addiction (Griffiths, 2005) suggests that addictions, including behavioural, have six core underlying factors. These are (i) salience (i.e., the activity dominates an individual's life), (ii) mood modification (i.e., the activity results in a shift in mood, either positive or negative), (iii) tolerance (i.e., the individual's need to increase engagement in the

activity to achieve the same effect as when they first started), (iv) withdrawal symptoms (i.e., negative feelings when the individual no longer engages with the activity), (v) conflict (i.e., the activity negatively impacts the individuals' relationships, occupation and/or education, or an individual feels a loss of control), and (vi) relapse (i.e., an individual quickly repeating previous patterns of behaviour when engaging with the activity after a period of time).

However, criticisms of the components model of addiction (Griffiths, 2005) have suggested that the use of substance addiction-related criteria (e.g., salience, tolerance) are not necessarily appropriate in non-substance-related addictions. That is, what may constitute as problematic symptoms related to substance use, may not be as harmful in different contexts and may not persist over time (Kardefelt-Winther, 2015). For example, without contextual understanding, professional athletes could be considered to have behavioural addictions due to the level of preoccupation or excessive engagement with exercise, health and fitness that is required to become a professional (Kardefelt-Winther et al., 2017). Consequently, it has been argued that utilising substance addiction-related criteria without an in-depth understanding of the potential problem behaviour could lead to pathologizing behaviour that does not cause significant detrimental impact to an individual and that behaviours should not be classified as addiction without the prevalence of both functional impairment and the persistence of the behaviour (Billieux et al., 2015).

In contrast, Griffiths (2019b) argued that every addiction, even those categorised utilising the components model of addiction, has its own characteristics. One such example given by Griffiths (2010) highlighted the nuance involved in defining behavioural addiction by examining the differences between two video game players, both playing video games for up to 14 hours a day yet reporting different underlying motivations for doing so. Motivation has been argued play a key role in the development and maintenance of problem and pathological behaviours, with a progression from social engagement with an activity to problematic

behaviour often being accompanied, or potentially driven by, a change from more internal motivations (e.g., enjoyment, skill-building) to external forms like avoiding negative emotions or escapism and monetary gain (Bányai et al., 2019).

A comprehensive theory or model of addiction was developed by West and Brown (2013), which highlighted the importance of motivation in the development and maintenance of addiction, whereby motivation forms the root of addictive behaviour, and suggested that diagnosis of addiction should assess the underlying motivational factors involved in the behaviour to determine the 'strength' of an addiction. The theory defines addiction as a motivation disorder through which there is repeated motivation to engage in behaviour for reward that has the potential to cause significant and often unintended harm or consequences. The theory is informed by a synthesis of motivation theory, which posits that an individual's motivational system is formed by five key and interacting subsystems, any of which can function abnormally in addiction. Each subsystem is suggested to exist in a hierarchy (West, 2009). The lowest level is the response subsystem (i.e., starting, stopping or changing actions) whereby responses are generated by the balance between competing impulses or inhibitory forces (i.e., pathways to behaviours that can be experienced as urges), which can be directly stimulated by motives (i.e., feelings of want, need or desire), which can be triggered by reminders or evaluations of beliefs (i.e., what can be considered good or bad). The highest level is the planning subsystem, defined by an individual's self-conscious intentions to carry out a behaviour in the future, but which must be generated by an initial evaluation of beliefs at an appropriate time to influence the behaviour. The motivational system responds to both internal and external inputs, but external environmental inputs like stimuli or information must be experienced and interpreted by an individual to be involved in the motivational system.

West and Brown (2013) further outlined three types of interacting abnormality that underly addiction. These relate to abnormalities in an individual's motivational system, or biology, that

exist outside of an addictive behaviour (e.g., higher sensitivity to reward, impulsivity, mood disorders), psychological abnormalities that occur from the addictive behaviour itself (e.g., habituation or drive acquired from engaging in the behaviour), and abnormalities in an individual's social or physical environment (e.g., external pressures to engage in an activity). In this sense, an activity can be addictive based on the extent to which it interacts with an already unbalanced motivational system, in an environment that is already unbalanced, or it impacts the motivational system to bypass processes that prevent problematic behavioural patterns from developing. Consequently, an individual may experience one or more abnormalities that could result an otherwise regular or social behaviour like playing video games or gambling to become problematic or pathological.

Another commonly utilised addiction pathway model was developed by Blaszczynski and Nower (2002), specifically in relation to problem gambling. The original model highlighted three distinct pathways to the development of problem gambling, resulting in three subgroups of problem gambler. These are (i) behaviourally conditioned gamblers (i.e., characterised solely by conditioning, distorted cognition and bad or poor judgement), (ii) emotionally vulnerable gamblers (i.e., characterised by pre-morbid conditions, poor coping skills and negative familial relationships or experiences), and (iii) anti-social impulsivist gamblers (i.e., a sub-group of pathway two gamblers, but are further characterised by higher levels of impulsivity, personality disorder or attention deficit). An updated version of the three pathways model (Nower et al., 2022) highlighted that pathway three gamblers are distinct from pathways two gamblers and are suggested to be motivated by finding purpose in life.

Across all of the three pathways to problem gambling, operant conditioning (i.e., reinforcing behaviour to increase the chances of repetition or punishing behaviour to decrease the chances of repetition) is suggested to play a role in the development or maintenance of problematic or addictive behaviour (Begun & Murray, 2020). Operant conditioning and reward reinforcement

is also suggested to play an important role in explaining excessive gaming, particularly in relation to concurrent variable-ratio (i.e., random reinforcement) and fixed-interval (i.e., non-random reinforcement) reward schedules; players are able to respond rapidly, subsequently having fewer pauses following reinforcement (King et al., 2011).

Problem gaming specific pathway models have also been discussed. Marchica et al. (2022) analysed subgroups of problem gamers in relation to Blaszczynski and Nower's (2002) pathways model, finding six distinct classes of problem videogame player, four of which aligned with the three subgroups of the original pathways model, and two of which were linked to milder forms of pathways two and three. Class one aligned with pathway one (i.e., behaviourally conditioned; exhibiting symptoms of problem gaming but with no psychopathology). Classes four and five related to pathway two (i.e., emotionally vulnerable; moderate/high aggression levels and moderate/high depression and anxiety levels). Class six related to pathway three (i.e., anti-social/impulsivist; high levels of all emotional and behavioural symptoms, and high levels of delinquency). Classes two and three were linked with pathways two and three, at much lower levels of depression, anxiety, aggression, and delinquency. Marchica et al.'s (2022) findings may indicate the relevance of the three pathways model to other behavioural addictions, including problem gaming.

1.2.6. Motivation

As discussed in Sections 1.2.2 and 1.2.4 of the present chapter, motivation is suggested to play a role in the development, or maintenance, of problem behaviours. Motivation can be defined as the reason or driving force underlying an individual’s behaviour and actions. Motivation guides initial and continued engagement with activities, or behaviour, with the aim of achieving a specific goal (Bandhu et al., 2024).

One of the earliest and most prominent theories of motivation concerns basic human needs arranged in a hierarchy; once a goal or need is achieved, the next goal is focused on (Maslow, 1943). Maslow proposed that survival needs must be satisfied before psychological needs can be met, and psychological needs must be met before self-fulfilment needs can be met. In order, the proposed basic human needs are: (i) physiological needs (e.g., food, water, shelter), (ii) safety and security (e.g., health, employment, property, social ability), (iii) love and belonging (e.g., friendship, family, connection), (iv) self-esteem (e.g., achievement, confidence, uniqueness), and (v) self-actualisation (e.g., creativity, purpose, acceptance, potential). Although originally reported as a rigid structure, Maslow later discussed the flexibility of the structure, suggesting that human motivation is multi-faceted and dependent on the individual and their environment (Maslow, 1987).

Alternative theories of motivation propose that at a basic level, humans are driven by reward or positive outcomes, or an absence of reward and negative outcomes; behaviour is more likely to be repeated if positive outcomes are received (Skinner, 1958). The theory of reward reinforcement is suggested by Bandhu et al. (2024) to be complemented by theories related to intrinsic motivation (i.e., internally driven based on personal interest), extrinsic motivation (i.e., based on external rewards and pressures) and amotivation (i.e., a lack of motivation), whereby individuals may be motivated to engage in an activity even if they are not intrinsically motivated to do so, based on external reward or avoiding punishment.

Self-determination theory (SDT) is a macro-theory that encompasses theories of need, reward reinforcement, intrinsic motivation, extrinsic motivation and amotivation. According to Deci and Ryan (2000) behaviour is driven by basic psychological needs for autonomy (i.e., the need to feel in control of one's own behaviour), competence (i.e., the need to achieve desired outcomes and experience mastery), and relatedness (i.e., the need to feel connection to others)

and satisfaction of these basic needs positively impacts well-being, whereas a frustration or lack of these basic needs being met facilitates passivity, poor well-being and defensiveness.

Satisfaction of the three basic psychological needs is suggested to be a crucial factor in maintaining intrinsic motivation, but this process can be undermined by the type of reward received for engaging in a behaviour or action (Ryan & Deci, 2017). For example, positive feedback is suggested to satisfy and individuals' need for competence, whereas obtaining an external reward for, or avoiding punishment by engaging in a behaviour reduces an individuals' autonomy, leading to feelings of being controlled, rather than having control (Vansteenkiste et al., 2020).

When external rewards are introduced into the motivation process, an individuals' motivation can become less internalised and intrinsic, following a continuum of internalisation (or self-determination) of motivation (Ryan & Deci, 2000a). The continuum moves from amotivation, or a lack of motivation (completely non-self-determined), to extrinsic (non-self-determined to somewhat self-determined) and finally, to intrinsic (completely self-determined). Extrinsic motivation is suggested to comprise four forms of regulation (Ryan & Deci, 2020), the most self-determined extrinsic motivation is integrated regulation (i.e., externally regulated behaviour that holds personal value to an individual or is coherent with their identity but is not inherently enjoyed), followed by the somewhat self-determined identified regulation (i.e., an individual recognises the value of the behaviour; 'I *should*' engage in a behaviour, but do not inherently want to), then, the somewhat non-self-determined introjected regulation (i.e., engaging in a behaviour is crucial for an individuals' ego, or to avoid guilt and shame) and finally, external regulation, the most non-self-determined extrinsic motivation (i.e., engaging in a behaviour for tangible regards or to avoid punishment; most strongly related to the theory of operant conditioning and reward reinforcement).

SDT can be applied to theories and models of problematic behaviour to explain progression from non-problematic to problematic engagement in an activity. Griffiths and Delfabbro (2001) highlighted that social gambling can progress to pathological gambling when reasons or motivations for gambling change. As suggested by Ryan and Deci (2000c), external rewards can undermine initial intrinsic motivation to engage in an activity, resulting in less internalised and less self-determined motivation to continue engaging in an activity. In this sense, it may be the case that some gamblers or videogame players engage in behaviours, and then obtain external rewards through reward reinforcement schedules, resulting in the development of problematic behaviour (Carruthers et al., 2006).

Academic literature concerning theories of motivation and micro-transaction use is limited, with literature focusing on motivations for micro-transaction use in its relative infancy. Consequently, Chapters 4, 5 and 6 of the present thesis further explore self-determination theory in relation to micro-transaction use, problem gaming and problem gambling.

1.3. Summary

The present chapter provided a brief history of micro-transactions, highlighting key ethical concerns surrounding their inclusion in videogames. The chapter then defined they key concepts discussed throughout the thesis. As suggested throughout the chapter, there is a dearth of literature focusing on a broad range of micro-transactions in relation to the key concepts of problem gambling, problem gaming, and motivation.

1.4. Research Aims of the Present Thesis

The aims of the present thesis are: (i) to assess the currently available research concerning micro-transaction use, problem gaming and problem gambling (Chapter 2), (ii) to contribute methodologically diverse research to the growing body of academic literature concerning micro-transactions (Chapters 4 and 5), problem gaming and problem gambling and, (iii) to

contribute applicable research to promote social responsibility, harm prevention and ethical businesses practices in the videogame industry.

1.5. Overview of the Thesis Chapters

1.5.1. Chapter 2. The Relationship Between Videogame Micro-Transactions and Problem Gaming and Gambling: A Systematic Review

The present chapter of the thesis presented key ethical concerns surrounding the implementation of micro-transactions in videogames, highlighting the limited body of research available concerning a broad range of micro-transactions. Chapter 2 comprises as a systematic review to establish the current knowledge base concerning micro-transaction use and problem gaming and gambling, including: (i) the types of micro-transaction that have been studied, (ii) demographics associated with micro-transaction use, and (iii) theoretical arguments concerning micro-transaction use, problem gaming and problem gaming. Chapter 2 also provides regulatory recommendations to prevent harm to videogame players and discusses areas for future micro-transaction related research. Consequently, Chapter 2 forms the basis for the methodological decisions and research process of the present thesis.

1.5.2. Chapter 3. Evaluation of Methodology

Chapter 3 evaluates the methodological decisions and research process related to the empirical studies (Chapters 4, 5 and 6) of the present thesis. The chapter comprises a discussion of the philosophy of research and the theoretical basis of the studies included in the present thesis, focusing on the philosophical assumptions of mixed-methods research. A rationale for the qualitative methods used in Chapter 4 is provided, alongside and explanation of and rationale for the use of the quantitative measures used in Chapters 5 and 6 of the present thesis.

1.5.3. Chapter 4. Videogame Player Experiences with Micro-Transactions: An Interpretative Phenomenological Analysis

Chapter 4 comprises the first empirical study of the present thesis. The chapter presents qualitative interviews with videogame players who use or have previously used micro-transaction and utilises interpretative phenomenological analysis to explore the experiences of videogame players with a broad range of micro-transactions. The chapter introduces key theories of motivation involved in the use of micro-transactions. Chapter 4 also establishes a rationale for the further study of the role of micro-transactions in the relationship between motivation types and problem behaviour (Chapter 5).

1.5.4. Chapter 5. The Role of Videogame Micro-Transactions in the Relationship Between Self-Determined Motivations and Problem Gaming and Gambling Behaviour

Considering the findings of Chapters 2 and 4, the study of self-determination theory (Ryan & Deci, 2000a, 2000b) in relation to frequency of micro-transaction use, problem gaming and problem gambling was identified as key for the development of micro-transaction use theory. Consequently, Chapter 5 comprises the second empirical study of the present thesis. The chapter involves the use of advanced statistical modelling methods to develop a theoretical model to assessing the role of micro-transaction use frequency in the relationship between self-determined motivations for gaming and gambling and problem gaming and gambling behaviour. Chapter 5 also highlights the rationale for a novel psychometric measure of motivations for micro-transaction use to further assess the findings of the chapter (Chapter 6).

1.5.5. Chapter 6. The Motivations for Micro-transaction Use Scale: Development and Validation

Chapter 6 comprises the final empirical study of the present thesis. The study was developed as a result of the findings of Chapters 4 and 5 of the present thesis. The study utilises both

qualitative and quantitative methods to develop and validate a novel psychometric scale measuring motivations for micro-transaction use. The chapter also discusses the numerous applications of the developed scaled, including for use in the future study of micro-transaction use and to develop targeted harm prevention measures and interventions associated with micro-transaction use, problem gaming and problem gambling behaviour.

1.5.6. Summary of Findings and Conclusions

Chapter 7 summarises the research aims of the thesis, alongside a summary of key findings of the empirical chapters. The chapter also discusses the implications, applications and future research areas following the studies presented in the present thesis. The strengths and limitations of the thesis are acknowledged and discussed.

Chapter 2. The relationship between videogame micro-transactions and problem gaming and gambling: A systematic review

2. Chapter Overview

Following the general introduction to micro-transactions and the key concepts discussed throughout the present thesis (Chapter 1), the present chapter presents a systematic review of the relationship between videogame micro-transactions and both problem gaming and gambling. The chapter aims to identify key research findings and to highlight the need for the empirical studies of the present thesis.

2.1. Background

It has been estimated that the global videogame market made $159 billion in 2020, with over 70% of the revenue being generated from in-game micro-transactions (Strickland, 2020). Micro-transactions are defined as in-game payments for items or unlockable content made directly from real-world money or indirectly through the buying of virtual currency (Schwiddessen & Karius, 2018). These micro-transactions have gained both academic and media attention due to their potentially similar features to gambling activities (King & Delfabbro, 2020). However, there is less regulation in the gaming industry compared to gambling, meaning potentially vulnerable videogame players are exposed. Subsequently, it has been questioned whether the use of these micro-transactions could lead to problem gambling or excessive gaming-related harm.

While there is increasing research examining the relationship between gaming and gambling (Derevensky & Griffiths, 2019a), there has been little research examining the specific micro-transactions available to videogame players and the psychological impact these may have. A variety of micro-transactions are now available in videogames, including virtual currency (i.e.,

a currency that can only be used in the specific videogame in which it is purchased. It is commonly used to buy cosmetic items or extra videogame 'lives'), skins (i.e., cosmetic items to change the look of avatars or in-game items), battle passes (i.e., tiered level systems, where each level achieved rewards the player, with levels getting increasingly hard to achieve as the player 'ranks' up), and loot boxes (i.e., a virtual box or chest that is opened to reveal a random pick of in-game items or currency). Items included in loot boxes can be purely cosmetic or game-enhancing, including weapons or unlockable characters (Griffiths, 2018). It is worth noting that in some videogames, these micro-transactions can also be 'purchased' using experience points (XP) earned through completing in-game levels or challenges. A summary of common videogame micro-transactions and their features can be found in Table 2.1.

Both gambling addiction and videogame addiction have been categorised as behavioural addictions because there is no ingestion of psychoactive substances. According to Griffiths (2005), behavioural addictions have six key components (i) salience, (ii) mood modification, (iii) tolerance, (iv) withdrawal symptoms, (v) conflict, and (vi) relapse. Salience refers to the activity becoming the sole focus of the individual's life, leading to cravings to engage in the activity and potentially distorted behaviours and thoughts surrounding the activity. For example, when not engaging in the activity, the individual may become preoccupied by thoughts about how to obtain money to engage in the activity or when they can next engage in the activity (Griffiths, 1995). Mood modification refers to the individual engaging in the activity to experience specific positive feelings (e.g., excitement or a 'buzz') or to cope with and escape negative feelings (Griffiths, 1990). Tolerance refers to the individual's need to continually increase their engagement with the activity to feel the same mood modification effects as when they first engaged with the activity. For example, Griffiths (1996) discussed the concept of tolerance in relation to non-regular gamblers and their need to gamble with increasing amounts of money to feel the same 'high' as regular gamblers. Withdrawal

symptoms relate to the potential negative or unpleasant psychological (e.g., irritability) or physical effects (e.g., headaches) the individual may experience as engagement with the activity is reduced (Griffiths, 2004). Conflict refers to the individual's experience of internal conflict due to loss of self-control and inability to stop engaging with the activity, or conflict experienced within personal relationships due to the amount of time or resources spent engaging with the activity (Griffiths, 2005). Finally, relapse refers to the individual quickly returning to previous patterns of engagement with the activity after attempts to completely cease engagement with the activity (Alavi et al., 2012). It is asserted by Griffiths (2005) that a behavioural addiction cannot be classified as 'genuine' without all the above components.

The convergence of gaming and gambling through these monetisation methods and the escalating financial components involved in videogames has brought the distinction between problem gaming and problem gambling into question. If micro-transactions in videogames could lead to problem gaming and gambling behaviour and subsequently addiction or if they are particularly harmful to those at risk of developing such addictions (Drummond & Sauer, 2018; Griffiths, 2019a), it is necessary to assess their potential contributions to each of these components and their relationships to problem gambling and videogame playing.

2.1.1. Micro-transactions and problem gambling

As 'paid-for' features of videogames, micro-transactions have the potential for a negative psychological impact on those who purchase them. With gambling addictions, more so than with gaming addictions, there is a motivation for financial gain (Griffiths, 1991). In the case of videogame micro-transactions, there are limited options for gaining real-world financial rewards. However, it is suggested that instead, specific features of micro-transactions share structural similarities with popular forms of gambling and the use of real money to purchase these may lead players to move to monetary forms of gambling (Drummond & Sauer, 2018). With loot boxes, a specific form of micro-transaction found in videogames (see Table 2.1), the

randomised events of paying to win 'loot' or in-games items of varying value shows similar features to slot machines through the process of revealing the items won. Often, upon opening a loot box, 'near misses' are shown to the player. These near misses show the player what they could potentially have won. Near misses in gambling games have been shown to increase the desire and motivation for continued play due to the players' perception that they are close to a win, which can potentially trigger the same psychological reward process as an actual win. This reinforcement can subsequently lead to excessive and problematic gambling (Parke & Griffiths, 2004). If it is the case that specific micro-transactions have similarities to forms of gambling by using gambling-like features, the potential for gambling-related harm must be assessed.

Additionally, there are other features of videogames that, structurally, are like gambling games in their methods to provide continuous reward reinforcement for players. In some popular videogames, such as the *FIFA* series, integrated marketplaces allow for the selling of in-game items received from loot boxes for in-game currency. Whilst there is no real-world financial gain in integrated marketplaces (unlike external marketplaces, where items and player accounts can be sold for real-world money), it could be suggested that players may be motivated to continuously purchase micro-transactions to gain 'profit' and to purchase further in-game items. Although different to 'cash out' options available in gambling, which allow players to settle their bets earlier at a potentially lower value (Lopez-Gonzalez & Griffiths, 2017), marketplaces may lead to players' perception of micro-transaction value increasing. By allowing players to believe that they can 'earn' some in-game currency back (even if the value earned back is less than most of the initial micro-transaction itself) through selling their items, they may be more inclined to make purchases in higher frequencies, as they do not perceive their loss to be as great. The ability to then sell items on the games' marketplace (and often with 'instant sell' options) may shorten the length of time between pay out intervals, which is

suggested by Griffiths (1999) to be a fundamental factor in the addictiveness of gambling games.

Table 2.1

A Summary of Popular Micro-transaction Types

Micro-transaction type	Description	Purchase method	Examples of games that include micro-transaction type
In-game currency	A form of money connected to a specific game or game series, used for in-game purchases. Once purchased, it cannot be exchanged back into real-world currency.	Real-world currency	*Fortnite (VBucks); FIFA Series (FUT coins); Overwatch (Credits)*
Loot boxes	Virtual crates, boxes or card packs that are opened to reveal a random selection of in-game items	Real-world currency; in-game currency; in-game items	*FIFA Series (Packs), Overwatch, Counter-Strike: Global Offensive*
In-game items	A virtual item that can be purchased from a videogame store or integrated marketplace. These can be used to customise in-game avatars or provide advantages to gameplay	Real-world currency; in-game currency	*Fortnite (Skins, weapons); Overwatch (skins, emotes, victory poses); World of Warcraft (pets, mounts)*
Battle Pass	An in-game tiered level system present for a set amount of time (seasons). Players can unlock in-game rewards as they progress through levels of the battle pass. Battle pass tiers are usually unlocked through acquiring experience points (XP) or through completing challenges. Tiers may also have a 'pay to win' option.	Real-world currency; in-game currency	*Fortnite, Call of Duty: Modern Warfare, Rocket League (Rocket Pass)*

2.1.2. Micro-transactions and problem gaming

Multiple features of micro-transactions (Table 2.1) may cause players to increase their play time and become at-risk of developing gaming disorder (King & Delfabbro, 2020). The continuous need to gain experience points (XPs) to purchase these micro-transactions could lead to an increase in videogame play time which, in turn, may increase the risk of videogame addiction/gaming disorder. Motivational models associated with gaming disorder highlight that frustration with daily needs or lack of need fulfilment in real life is positively correlated with internet gaming disorder (IGD). Need fulfilment can fall into three categories: autonomy (i.e., internally driven actions, based on personal choice), relatedness (i.e., how connected individuals are to others), and competence (i.e., the ability to carry out actions successfully or with skill) (Mills & Allen, 2020). Those who play videogames to fulfil their psychological needs may be more motivated to increase their play time when being continuously rewarded by micro-transaction that are purchased using in-game currency or XPs. For example, in the case of the 'battle pass' micro-transaction, the initial battle pass is purchased using in-game currency. Then, the player gains XPs to unlock rewards at increasing levels. These rewards are ranked in 'quality or 'rarity'. The higher the XPs gained, the higher the level of rewards unlocked. The reinforcement schedule of these rewards and the need to unlock these levels in a set amount of time could be suggested to address each of the three categories. Whilst external rewards (i.e., specific loot from micro-transactions) may be a motivating factor, an individual's own need for achievement, or to obtain autonomy, could be a driving factor for the continued use of XP-based micro-transactions. Further to this, there are social factors involved in gaming and therefore the purchase of micro-transactions that may lead to the fulfilment of the relatedness need. Finally, players may feel like they are gaining skills or 'mastering' the game by completing tier levels, and in turn, fulfilling the competence need.

2.1.3. Micro-transactions, public policy, and regulations

To date, several regulations surrounding specific micro-transactions (most notably loot boxes) have been implemented in various countries, typically reflecting the gambling law of the location and lacking consistency globally. The controversy surrounding loot boxes became prominent in 2017, with the Electronic Arts (EA) videogame *Star Wars Battlefront II* receiving criticism for its use of game-advancing loot rewards (Good, 2018). Investigation into loot boxes in popular games, conducted by the Belgian Gaming Commission, found that loot boxes did not give players their 'money's worth' and so these were categorised as unlicensed gambling. The games investigated in this instance were *Overwatch*, *FIFA Ultimate Team* and *Star Wars Battlefront II.* Similarly, the Netherlands fined EA for their use of loot boxes, and they were removed from the game. In the UK, it was suggested by the House of Lords Gambling Committee that loot boxes should be identified as games of chance. This would enable them to be covered by the Gambling Act 2005 and be regulated as such (BBC, 2020).

However, these regulations are only specific to loot boxes and do not consider other forms of micro-transactions and how these may lead to the risk of harm in videogame players, as well as their potential impact on problem gaming behaviour. Therefore, a more thorough examination of the relationship between a more varied selection of micro-transactions and problem gaming and gambling is necessary to establish any regulatory needs, which could be implemented consistently worldwide.

2.1.4. The present review

The potentially negative psychological impacts of gaming, gambling, and the association between the two have been explored in the academic sphere (e.g., Griffiths, 1999; Griffiths, 2005; Kim & King, 2020). However, a specific focus on micro-transactions within the playing of videogames and the potentially addictive nature of these is an emerging research area. To

the researcher's knowledge, there has been no systematic review of the relationship between a larger range of micro-transactions, gaming, and gambling. To address this research gap, the present chapter reviewed current knowledge concerning the potential psychological and physiological effects of micro-transactions in videogames on those buying in-game items. For the present review, micro-transactions are defined as purchases made in-game, which can comprise of either content expansion or useable in-game items (Evers et al., 2015). Consequently, the present review is not limited to research solely focusing on loot boxes and explores a variety of micro-transactions available in-game and their respective relationships with gaming and gambling behaviours.

The aims of the review were to: (i) explore the empirical research literature concerning the relationship between micro-transactions in videogames and problem gaming and gambling behaviours. (ii) evaluate potential at-risk demographics, as well as risk factors associated with the purchasing of micro-transactions and (iii) discuss the findings and implications of these studies for public policy concerning the use of micro-transactions in videogames as well as for future research.

2.2. Method

The present systematic review followed the PRISMA guidelines for the identification, screening, and eligibility stages of the review process (Moher et al., 2009).

2.2.1. Eligibility criteria

The inclusion criteria for this paper stated that any studies included in the present review must: (i) assess the relationship between micro-transactions, problem gaming and/or problem gambling, (ii) include primary and empirical research, (iii) be written in English, (iv) be peer-reviewed, and (v) be published after 2010 (micro-transactions developed from simple customisation options to their more commonly recognised complex forms in the late 2000's to

early 2010's and so studies before this date were excluded). Studies were also excluded if they solely assessed consumer psychology (i.e., business models relating to micro-transactions in videogames), ethical issues and/or regulatory issues concerning micro-transactions in videogames. Study collection ended in July 2021.

2.2.2. Sources

Studies for the review were searched for on electronic databases. These were *PsycINFO, Web of Science, Scopus,* and *Pubmed*. Reference lists of relevant studies were also hand searched to identify any additional studies for inclusion. Following best practice guides (Siddaway et al., 2019), the review followed several stages to ensure a high-quality systematic review. These stages were: (i) formulating research questions, (ii) identifying relevant literature, (iii) assessing literature eligibility, (iv) analysing eligible literature and (v) reporting the results of the review.

2.2.3. Search strategy

To identify studies analysing the relationship between in-game micro-transactions (such as loot boxes, cosmetic items and battle/season passes) and problem gaming and gambling behaviours, the following search terms were used: (micro-transaction OR micro transaction Or loot box* OR battle pass OR skin gambling OR purchasable content OR in-game buying* OR in-game item* OR virtual goods* OR surprise mechanic* OR moneti*ed gaming activit* OR gaming moneti*ation scheme OR simulated gambling active*) AND (video game* OR videogame* OR gam* OR mobile gam* OR game play OR esport*) AND (gambling behavi*r* OR addict* OR problem gambling OR pathological gambling OR increased spending OR bet* OR wager* OR self-regulation OR impulsivity* OR risk* behave*r*); Initially, the search term 'skin' was used. This was later changed to 'skin gambling' to exclude non-relevant papers relating to biological skin reactions and exposure during experiments. Consequently, the search

term yielded 1011 results. Of these 1011, 13 papers were identified as duplicates. A total of 998 papers were assessed for eligibility.

2.2.4. Data collection process

An initial total of 1019 studies were assessed for eligibility, after duplicates were removed. Studies were deemed as relevant through the analysis of titles and abstracts in accordance with the inclusion criteria. Studies that did not meet the eligibility criteria included: (i) studies not related to videogames, micro-transactions, or problem gaming and/or gambling and (ii) papers that did not include empirical research. A total of 998 studies were excluded from the searched literature. Full-text copies of the remaining 21 papers were then examined for eligibility using the inclusion criteria. During the full-screen process, four papers were removed as they were not relevant to the outcomes of the present review. An additional two papers found from other sources were assessed for eligibility and subsequently included in this review. In total, 19 studies were included in the present review. The paper selection process is depicted in Figure 2.1.

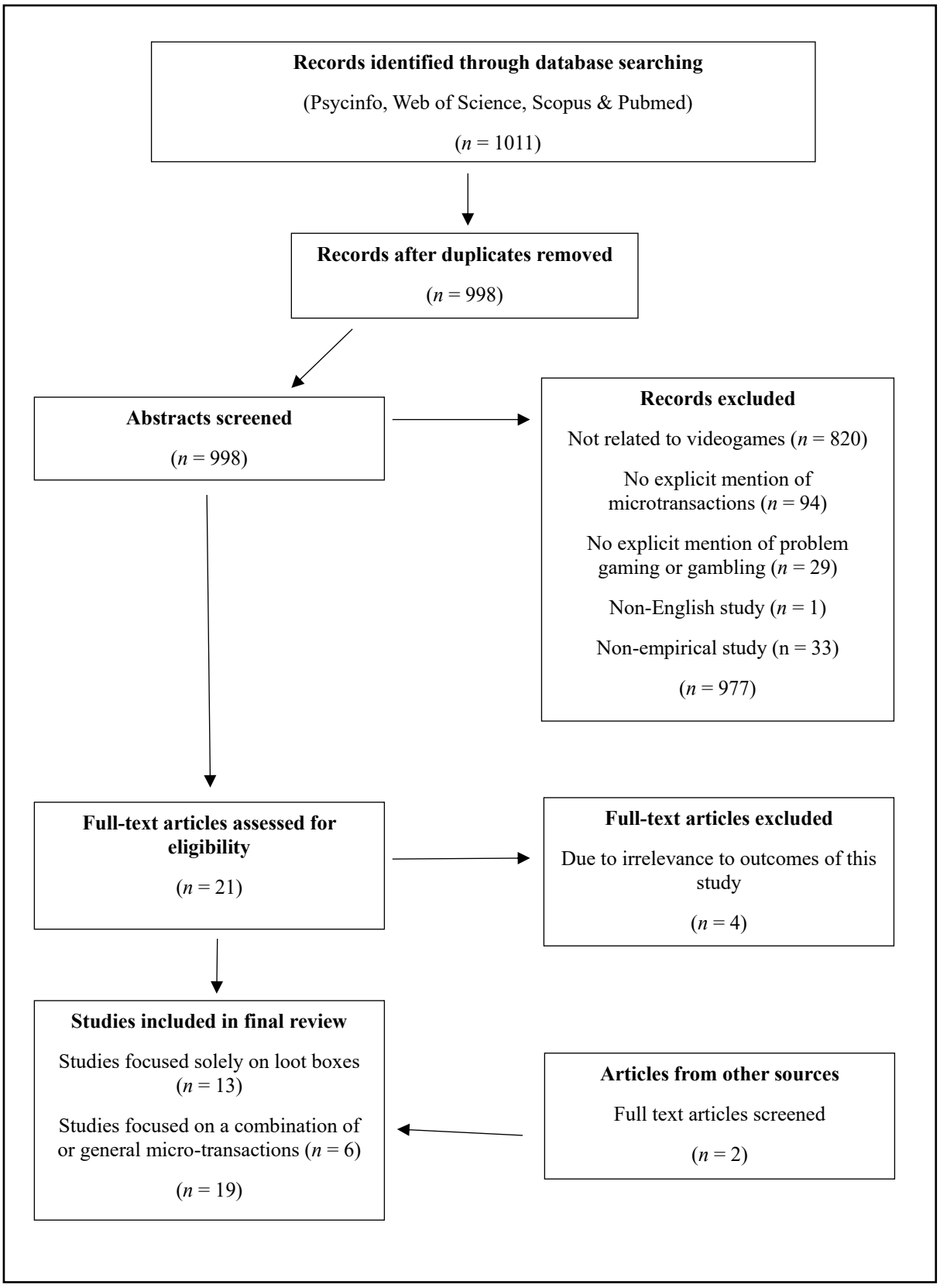
2.3. Results

The 19 studies included in the present review were divided into three overarching categories. These were: (i) loot boxes, problem gaming and gambling, (ii) pay-to-win micro-transactions, problem gaming and gambling, and (iii) multiple micro-transaction types, problem gaming and gambling. A total of eight studies assessed were included in the *loot boxes* category, two were included in the *pay-to-win* category, and the remaining eight were included in the *multiple microtransaction type* category. Each of these categories had sub-sections based on the variable they assessed. These were solely problem gaming, solely problem gambling, or both problem gaming and gambling.

Of the eight studies that solely assessed loot boxes, two examined the physiological similarities between opening a loot box and gambling games. Four of the studies assessed the relationship between loot boxes and problem gambling. The remaining two studies assessed the relationship between loot boxes and both problem gaming and gambling. Of the two studies assessing pay-to-win micro-transactions, one solely examined problem gaming and one examined both problem gaming and gambling. Of the nine studies that assessed more than one micro-transaction type, one solely examined problem gaming, five solely examined problem gambling and the remaining three studies examined both problem gaming and gambling.

Figure 2.1

PRISMA flow chart depicting the literature selection process



2.3.1. Loot boxes and their relationship to problem gaming and problem gambling

2.3.1.1. Physiological similarities between purchasing and opening loot boxes, problem gaming and problem gambling. Both studies that examined physiological changes (Brady & Prentice, 2019; Larche et al., 2021) (see Table 2.2) focused on adult populations of a specific subset of gamers. One study (Brady & Prentice, 2019) examined the galvanic skin response (GSR) and heart rate of experienced *FIFA* players (n = 25) as they opened the least expensive form of loot box in the *FIFA Ultimate Team* game. The results of this study suggested that those with higher Gaming Addiction Scale (Lemmens et al., 2009) scores had less of an increase in GSR when opening loot boxes. GSR was found to increase from an established baseline while the sample both played a game of *FIFA* and opened loot boxes. However, this result was not statistically significant. The heart rates of the sample did not significantly change when opening loot boxes.

The other study included in this category (Larche et al., 2021) examined self-reported arousal, valence, urge, and disappointment as well as the post-reinforcement pauses (PRPs), skin conductance response (SCR), and force exerted in a mouse-click of *Overwatch* players who attended the University of Waterloo (Canada) across two studies (n = 47, n = 46). The first study solely assessed self-reported arousal, valence, and urge in participants after they are shown a clip of a short sequence of a loot box being opened. The results indicated that loot boxes that had a higher objective reward rating (i.e., 'rare', 'epic' and 'legendary' boxes, where rare boxes cost the least amount of in-game currency and legendary cost the highest amount of in-game currency) were rated by participants to be higher in subjective value, arousal, and valence. Loot boxes that contained at least one 'legendary' item showed the greatest arousal scores compared to 'epic' and 'rare' rated loot boxes. The participants also rated higher levels of an urge to keep opening loot boxes for higher objectively rated loot boxes. However, a statistically significant main effect of urge across all objective reward tiers was identified.

The results of Larche et al.'s (2021) second study mirrored the first for ratings of arousal, valence, subjective value, and urge to continue opening further loot boxes. Disappointment levels were found to increase as objective value ratings of loot boxes decreased. No significant difference was found in SCR for 'rare' and 'epic' loot boxes. However, there was a statistically significant difference in SCR for 'legendary' tier loot boxes. More specifically, when the participants opened a legendary tier loot box, they were reported to have greater SCR levels. Reports of the force of click at each level of loot box opening mirrored findings for SCR levels. Additionally, PRPs were assessed after participants watched clips of the loot boxes being opened. It was found that larger PRPs were reported for 'legendary' and 'epic' tier loot boxes. This was a statistically significant relationship. Finally, it was reported that arousal levels increased during the anticipatory period in the loot box opening process.

Although the findings of both Brady and Prentice (2019) and Larche et al.'s (2021) studies highlight the potential physiological similarities between loot box opening and problem gaming and gambling, the respective limitations of each of the studies must be considered. First, Brady and Prentice (2019) only assessed male participants between the ages of 21 and 30. While this sample is suggested to be reflective of a population who prefer to gamble for excitement and consequently may be more likely to play games and pay more (Brady & Prentice, 2019; Kuss & Griffiths, 2012; Lee et al., 2007), the study excludes populations of loot box users who have different sociodemographic characteristics and potentially different motivations to gamble or engage with loot boxes. For example, gambling to cope or escape and gambling to chase losses have been suggested to be motivations associated with problem gambling among undergraduate university students (Rodriguez et al., 2015). Therefore, the findings of Brady and Prentice's (2019) study may not provide a holistic understanding of the physiological similarities between opening loot boxes and problem gambling for a wider population of loot box users.

Additionally, for both Brady and Prentice (2019) and Larche et al.'s (2021) studies, participants were assessed in environments and utilised stimuli that were non-naturalistic. That is, in both cases, participants did not use their own money to open the loot boxes and were aware they that would not obtain loot box rewards during each experiment. For example, Brady and Prentice (2019) utilised a pre-loaded *FIFA* game and only allowed participants to buy loot boxes worth one Euro, whereas Larche et al. (2021) utilised pre-recorded video footage of *Overwatch* loot boxes being opened. Consequently, the lack of ownership of loot box rewards and limited personal choice concerning amount spent on loot boxes given to participants in both Brady and Prentice (2019) and Larche et al.'s (2021) studies may have resulted in findings that are not representative of the levels of arousal that occur in natural environments.

2.3.1.2. Loot boxes and their relationship to problem gambling. Of the four studies solely assessing loot boxes and problem gambling (see Table 2.2), one examined adult participants aged 18-40 plus (n = 1200) (Zendle, Cairns, et al., 2020) and one examined adult *Heroes of Storm* players aged over 18 years (n = 112) (Zendle, 2019). The final two studies examined British 16–24-year-olds (n = 3,549) (Wardle & Zendle, 2021) and Danish adolescents aged 12-16 years old (n = 1137) (Kristiansen & Severin, 2020).

The first study (Zendle, Cairns, et al., 2020), a survey examining loot box spending habits and participants' scores on the Problem Gambling Severity Index (PGSI) (Ferris & Wynne, 2001), found a significant positive association between loot box spending and problem gambling. The greater the loot box spend, the more severe the problem gambling classification. This relationship had a moderate to large effect size. The ability to cash out strengthened this association. However, the effect size for this relationship was small and the relationship between loot box spending and problem gambling remained significant even when controlling for the ability to cash out. Further to this, pay-to-win (P2W) options, as well as showing near misses and using in-game currency to purchase loot boxes also strengthened associations

between loot box spending and problem gambling. However, the effect sizes for all these factors were small. Crate and key mechanics, as well as item exclusivity, did not moderate the relationship between loot box spending and problem gambling. The amount of money made from selling loot box items significantly moderated the relationship between loot box spend and problem gambling. However, it weakened associations between the two.

The second loot box and problem gambling study (Zendle, 2019) examining adult participants focused specifically on *Heroes of Storm* players. The study assessed loot box spending levels, as well as scores on the PGSI (Ferris & Wynne, 2001) at two periods of time. The first, when loot boxes were included in the *Heroes of Storm* game, and the second after they were removed. Results reported that no significant difference in spending was found among non-problem gamblers, low-risk gamblers, and moderate-risk gamblers. A significant reduction in spending was reported among problem gamblers, with spending being reduced by a small to moderate amount. However, when Bonferroni corrections were applied to these results, a significant relationship was no longer observed.

In their survey-based investigation of British 16–24-year-olds, Wardle and Zendle (2021) assessed loot box spending habits, as well as problem gambling severity and impulsivity scores. Of the sample surveyed, 12.1% had purchased a loot box in the previous 12 months. Loot box purchasers were more likely to have gambled in the previous 12 months (62.8%). Those who did not purchase loot boxes were less likely to gamble (39.7%). Loot box purchasers were also more likely to spend more money on gambling a week, as opposed to those who did not purchase loot boxes (£19.20 vs. £15.50). Moreover, loot box purchasers were more likely to experience problems with gambling (16.9%) than those who did not purchase loot boxes (1.8%). Even when controlling for socio-demographics, impulsivity and gambling participation, loot box purchasers were 4.4 times more likely to experience problems with gambling. Mean impulsivity scores were higher for those who purchased loot boxes (2.6) than

those who did not (2.2). Overall, loot box purchasers were reported to more likely be younger and male. Loot box purchasing was found to be more strongly related to problem gambling than common types of gambling, like slot machines and online betting.

The final study focusing solely on loot boxes and problem gambling was a survey examining Danish adolescents aged 12-16 years (Kristiansen & Severin, 2020). The study found that 56% of participants had engaged in loot box-related activities at some level. Of those who engaged in loot boxes, more than 40% had earned loot boxes, 20% had purchased a loot box and 10% had sold items from a loot box. Similar to the findings of Wardle and Zendle (2021), young loot box users were more predominantly male. Furthermore, Kristiansen and Severin (2020) found that the largest proportions of problem gamblers (4.9%) and those at risk of problem gambling (7.8%) were found to be among those who had sold items from a loot box. As was found in all of the studies focusing solely on loot boxes and problem gambling, it was reported that there was a statistically significant positive association between loot box engagement and problem gambling severity.

2.3.1.3. Loot boxes, problem gaming and problem gambling. The remaining two studies (see Table 2.2) examined loot boxes and their relationship to both problem gaming and problem gambling. The first (Brooks & Clark, 2019) consisted of two studies, the first examining North American adults aged 21 years and older (n = 144) and the second examining students from the University of British Columbia aged 19 years and older (n = 113). The survey assessed problem gambling severity, symptomology of Internet Gaming Disorder (IGD), financial risk-taking, gambling related cognitions and beliefs around luck. As an outcome of the study, Brooks and Clark (2019) developed the Risky Loot-box Index (RLI), which assessed risky loot box engagement levels. The results indicated that 88.9% of the North American adult sample and 94.8% of the student sample had opened loot boxes. Around half of each sample (49.3% in Study 1 and 60.3% in Study 2) had reported purchasing a loot box before. A similar

skew was found for those who had spent time playing videogames to earn loot boxes. Those who preferred games with integrated marketplaces were more likely to buy loot boxes with the specific aim of selling items. Around a quarter to one-third (27.8% of the North American sample and 39.7% of the student sample) reported selling items loot boxes. Study 1 found a moderate to strong relationship for the association between scores for the RLI and problem gambling severity, the RLI and gambling-related cognitions and the RLI and three of the beliefs surrounding luck subscales. This was mirrored in the second study. However, a smaller effect size was observed. It was reported that across both studies, risky loot box use was more strongly correlated with problem gambling measures, as opposed to problem gaming measures.

Li et al. (2019) conducted a survey amongst adult videogame players (n = 686) assessing problem gaming and gambling behaviours, as well as mental distress. Their results indicated that 44% of the sample had purchased a loot box in the previous 12 months. In regard to demographics of loot box purchasers, it was reported that loot box purchasers were typically older than non-buyers, married or with partners, and reported higher levels of mental distress than non-buyers. Loot box purchasers were more likely to report significantly higher videogame engagement and gaming sessions, as well as being more likely to score higher on problem gambling measures and meet the criteria for IGD. Unlike Brooks and Clark (2019), the researchers found that loot box purchasing was significantly associated with problem gaming behaviours, even after controlling for videogame engagement. Online gambling frequency was found to partly explain the relationship between loot box purchasing and problem video gaming. However, loot box purchasing was not directly related to mental distress but was found to indirectly impact distress levels through the effect of problem gaming.

Table 2.2

A Summary of the Reviewed Literature

Paper	Aims	Sample	Micro-transaction type assessed	Behaviours/variables being assessed	Key Findings
Zendle and Cairns, 2018	To address the lack of research surrounding loot box purchase that require monetary outlay, and the spending associated with these loot boxes.	Adult gamers from across 95 countries (*n* = 7,422); Ages 18-45+	Loot boxes; non-specified other micro-transactions	Problem gambling	78% of the sample had bought loot boxes 17% of the sample had purchased other micro-transactions The more severe an individual's severity of problem gambling, the more they spent on loot boxes. This was a statistically significant relationship, with a small to medium effect size. There was also a statistically significant relationship between problem gambling and the purchase of other micro-transactions. This was less significant than the relationship between problem gambling and the purchase of loot boxes. The effect size for this relationship was five times smaller than that of loot boxes and problem gambling
Brady and Prentice, 2019	To evaluate the addictive qualities of micro-transactions based on increases in physiological arousal.	Experienced *FIFA Football* gamers; (*n* = 25, *M*= 24.56, SD = 3.5)	Loot boxes	Physiological arousal (GSR, HR); Problem gaming; problem gambling	Galvanic skin response (GSR) increased from an established baseline whilst participants played a game of FIFA and opened a loot box. However, this was not statistically significant. Heart rate (HR) did not change from the established baseline whilst participants opened loot boxes There was no statistical significance between higher Gaming Addiction Scale (GAS) scores and HR Those with higher GAS scores got less of an increase in GSR whilst loot box prizes were displayed
Brooks and Clark, 2019	To test the associations between loot box engagement and gambling behaviours	Study 1: North American adults (*n* = 144); Aged 21+ Study 2: Students from the	Loot boxes	Problem gambling; problem gaming	88.9% of study 1 sample had opened loot boxes; 94.8% of the study 2 sample had opened a loot box Approximately half (49.3%) of sample 1 had bought loot boxes and 60.3% of sample 2 had bought loot boxes A similar skew was reported for those who spent time trying to earn a loot box for both studies Moderate to strong relationships were observed in study 1 for correlations between scores for the Risky Loot Box Index (RLI) and

Paper	Aims	Sample	Micro-transaction type assessed	Behaviours/variables being assessed	Key Findings
		University of British Columbia (*n* = 113); Aged 19+			the Problem Gambling Severity Index (PGSI), the RLI and the Gambling Related Cognitive Scale (GRCS) and the RLI and three of the Darker and Freedman Beliefs Around Luck (BALS) subscales. The same relationship was observed in study 2, however the effect size was smaller Across both studies, gambling measures were more strongly related to risky loot box use than problematic gaming measures In study 1, 27.8% of loot box purchasers reported selling items from loot boxes. In study 2, 39.7% reported selling items from loot boxes. Those who preferred games with integrated marketplaces were more likely to buy loot boxes with the specific aim of selling items
Larche et al., 2019	To determine whether *Overwatch* players who use loot boxes treat loot boxes of varying values in similar ways to slot machine gamblers	Study 1: University of Waterloo students who played *Overwatch* (*n* = 47) Study 2: University of Waterloo students who played *Overwatch* (*n* = 46)	Loot boxes	Study 1: Arousal; valence; urge Study 2: Post-Reinforcement Pauses (PRPs); Skin Conductance Responses (SCRs); force; arousal; valence; urge; disappointment	Study 1: Subjective value ratings of loot boxes strongly correlated with positive valence and urge to open another loot box More valuable loot boxes were more arousing, positively valanced and urge inducing Value ratings were consistent with reward ratings at each reward tier Loot boxes containing at least one 'legendary' item showed the greatest arousal scores compared to 'epic' and 'rare' loot boxes. This relationship was statistically significant. As tier rankings increased, so did ratings of valance. This was a statistically significant relationship. As tier rankings increased, so did ratings of urge. This was also s statistically significant relationship. Study 2: Subjective ratings of value mirrored study 1 Disappointment increased as tier rankings of loot boxes decreased. The lower the ranking of loot box, the more disappointed participants were in the rewards There was no significant different in SCR between 'rare' and 'epic' rated boxes, however there was a significant difference for 'legendary' rated boxes

Paper	Aims	Sample	Micro-transaction type assessed	Behaviours/variables being assessed	Key Findings
					There was no significant difference found for force of click for 'rare' and 'epic' loot boxes, however a significant difference was found for 'legendary' boxes. Larger PRPs were reported for 'legendary' and 'epic' tier loot boxes. This was statistically significant. It was reported that there were increased levels of arousal during the anticipatory period in loot box opening
Li et al., 2019	To explore the experience of videogame players with loot box purchases. Also, to explore the relationship among loot box purchasing, videogame/gambling behaviours and mental distress.	Adult video gamers; (*n* = 686; M = 27, SD = 8.9)	Loot boxes	Problem gaming; problem gambling; mental distress	44% of the sample had purchased a loot box in the past 12 months Loot box purchasers were typically older (*M* = 28.5) vs non-buyers (*M* = 26.3), were likely to be married or with partners (74.7%) and reported higher levels of mental distress (*M* = 25) vs non-buyers (*M* = 10.6) Loot box purchasers were more likely to report significantly higher videogame engagement and longer gaming sessions (longer than 7 hours), score higher on problem gambling measures and meet the proposed criteria for Internet Gaming Disorder (IGD) Loot box purchasing was significantly associated with problem video gaming, even after controlling for videogame engagement The frequency of online gambling partly explained the effect of loot box purchasing on problem video gaming Loot box purchasing was not directly related to mental distress, however, was indirectly related through the effect of problem video gaming.
Macey and Hamari, 2019	To provide an overview of newly emergent behaviour in its relative infancy, thereby laying the groundwork for future study. Also, to form one of the first assessments of	eSports spectators who gamble; (*n* = 582; Ages 14-50+	Loot boxes; skins	Problem gambling	67.18% of the sample spectated eSports and gambled in the last 12 months (including purchasing loot boxes) 61.6% used multiple channels to gamble (including the purchase of loot boxes) 42.6% of sample stated that loot box purchasing was their most popular method of gambling. This was followed by videogame related gambling (19.8%) Loot box consumption had a significant negative relationship with eSports engagement

Paper	Aims	Sample	Micro-transaction type assessed	Behaviours/variables being assessed	Key Findings
	participation rates and prevalence of problem gambling behaviours from an academic perspective.				Of the total sample, 13 respondents opened loot boxes but didn't pay for them Three of the 13 respondents reported using skins obtained from loot boxes in other gambling related activities 121 of 177 loot box openers also used skins to gamble The PGSI had a strong associated with loot box engagement, but this relationship was not as strong as with online gambling and videogame related gambling Skin lotteries and the use of skins to access casinos was not as popular as expected by researchers Those who used more channels to gamble (including the purchase of loot boxes) were more likely to display problem gambling behaviours
Zendle and Cairns, 2019	To replicate the existence of a link between problem gambling and loot box purchase using a different methodology to the previous study	Adult US gamers (*n* = 1,172); Ages 18-40+	Loot boxes; non-specified other micro-transactions	Problem gambling	There was a significant link between PGSI scores and loot box spending, with a small-medium effect size Non-problem gamblers spent less, but there was no significant spending difference between low-risk, moderate-risk and problem gamblers There was a stronger relationship between problem gambling and other micro-transactions than the previous study However, this relationship was less significant than with loot boxes and problem gambling
Zendle et al., 2019	To investigate the size and importance of links between loot box spending and problem gambling in adolescents. To provide clarity as to whether specific features of loot boxes strengthen this link. Also, to outline	Adolescent gamers; (*n* = 1155); Ages 16-18	Loot boxes; non-specified other forms of micro-transaction	Problem gambling	A significant positive correlation between loot box spending and problem gambling was found, specifically the purchasing of loot boxes (as opposed to free to open options). The effect size of this relationship was moderate to large. Only two loot box features strengthened the link between loot box purchasing and problem gambling. These were items being available for a limited time only and giving away loot boxes for free. There was a positive correlation between loot box spending and impulsivity, however this was not statistically significant.

Paper	Aims	Sample	Micro-transaction type assessed	Behaviours/variables being assessed	Key Findings
	qualitative research asking how adolescents engage in loot box spending.				There was also a significant relationship between other micro-transactions and problem gambling, but this was four times smaller than the relationship between problem gambling and loot box spending. Eight distinct motivations for loot box spending were found. These were gameplay advantages (21.9%); to gain items/to build a collection (19.2%); For fun/excitement (16%); for appearance (15.3%); to support game developers (10.7%); the perception that the items were of good value (9.8%); time advantages (6.2%) and for profit (0.9%).
Zendle, 2019	Investigate which pathways are responsible for the observed relationship between loot box spending and problem gambling	Adult *Heroes of Storm* players (n = 112); Aged 18+	Loot Boxes	Problem gambling	No significant reduction in spending wax observed amongst either non-problem gamblers, low-risk gamblers, or moderate-risk gamblers A significant reduction in spending was observed amongst problem-gamblers, with mean spending dropping by a small to moderate amount This was not a statistically significant result once Bonferroni corrections were applied The more severe an individual's problem gambling, the more reduction in spending once loot boxes were removed from the game
King, Wong-Padoongpatt, et al., 2020	To empirically evaluate the possible co-occurrence of problem gambling and gaming behaviours in US emerging adult non-students. Also, to investigate the role that micro-transactions have in this relationship	Emerging adult non-students in the US (n = 300, M = 22.79)	A variety of micro-transactions including loot boxes	Problem gaming; problem gambling	57 participants played videogames with micro-transactions 55.4% of those spent money on micro-transactions each month 6.4% spent over $100 on a single videogame title, with two participants spending between $1000 and $2000 on a single title 31.4% of gamers in the sample reported experiencing problems with micro-transactions 37.1% reported having intensifying urges to purchase more micro-transactions as time went on Obligation to purchase micro-transactions as well as monthly spending rates had the strongest direct associations between IGD and GD severity

Paper	Aims	Sample	Micro-transaction type assessed	Behaviours/variables being assessed	Key Findings
					Micro-transaction purchase partially explained the relationship between the severity levels of IGD and GD Micro-transactions spending was more closely related to problematic gaming symptomology
King, Russell, et al., 2020	Address which psychosocial variables are the best predictors of Fortnite micro-transaction spending, as well as to what extent cognitive factors and social influences affect players micro-transaction spending. Also, to assess the extent to which Fortnite micro-transaction spending is associated with gaming disorder symptomology.	*Fortnite* players; (*n* = 428; *M* = 23.5, SD = 7.3); Ages 18-60+	Loot boxes; skins	Problem gaming	Micro-transaction spending was predicted by spending of participants' closest friend, greater access to *Fortnite* across multiple devices and having a higher in-game level Spenders scored more highly than non-spenders on scales measuring motivation to acquire in-game rewards and the perception of the items being good value Those who spent more were typically older, more likely to use more than one payment method, have a close friend who pays for micro-transactions and spend more hours playing *Fortnite* Gaming disorder symptoms were not associated with micro-transaction purchase *Fortnite* spending was more closely related to social influences, including belonging to a larger online social network more so than common gaming disorder symptoms, including impulsiveness.
DeCamp, 2020	To examine one dimension of potential similarities between loot box, downloadable content (DLC) and gambling: risk and protective factors. Also, to investigate similarities and dissimilarities of the	American Youth from the state of Delaware (*n* = 13,042); Ages 13-14 and 16-17	Loot boxes; DLC	Problem gambling	Loot box and DLC purchase was poorly predicted by gambling predictors Gender was the strongest predictor of loot box and DLC purchase in the sample There was a low prevalence rate of loot box and DLC purchase in both 8th grade and 11th grade students In the 8th grade sample, being bullied outside of school was associated with more loot box purchases In the 8th grade sample, DLC purchase was best predicted by depression, anxiety, cigarette use and being Hispanic

Paper	Aims	Sample	Micro-transaction type assessed	Behaviours/variables being assessed	Key Findings
	risk and protective factors for potentially related behaviours.				In the 11th grade sample, being bullied at school, cigarette use, vape use and marijuana use were significant predictors of loot box purchase In the 11th grade sample, depression and anxiety were more associated with DLC purchases
Drummond et al., 2020	To examine whether problem gambling or gaming symptomology made contribution to predicting loot box spending. Also, to examine the relationship between the Risky Loot Box Index (RLI), loot box spending and IGD symptomology.	Three national samples from Australia (*n* = 339), Aotearoa New Zealand (*n* = 323) and the US (*n* = 387). Total *n* = 1049.	Loot boxes; non-randomised virtual items	Problem gambling; excessive gaming; positive and negative mood; psychological distress	Participants with higher problem gambling symptoms and more risky loot box engagement spent more on loot boxes Participants with greater loot box spend experienced greater negative mood and psychological distress Increased loot box spending was associated with increased positive mood, although this was only of mild effect size. Participants with higher problem gambling severity also typically spent higher amounts on other micro-transactions Problem gambling symptoms and excessive gaming had a small association with loot box spending Risky engagement with loot boxes was associated with higher spending amounts, more so than any other variable.
Kristiansen and Severin, 2020	To explore loot box engagement patterns amongst young gamers. Also, to examine whether different levels and forms of engagement in loot box purchasing is associated with problem gambling.	Danish adolescents; (*n = 1137);* Ages 12-16	Loot boxes	Problem gambling	56% engaged in loot box activities at some level Young loot box users were found to be predominantly male (close to 70%) Of those engaged in loot boxes, more than 40% had earned a loot box, 20% had purchased a loot box and 10% had sold items from a loot box The largest portions of problem gamblers (4.9%) and those at-risk of problem gambling (7.8%) were found among those who had sold items from a loot box. There was a significant positive correlation between loot box engagement and problem gambling severity
von Meduna et al., 2020	To underpin the ongoing debate via results of a large-scale population	German online gamblers and play to	Loot Boxes; Pay-to-win micro-transactions	Problem gambling; Problem pay-to-win gaming	1508 of total sample were pay-to-win (P2W) gamers, 38.9% of which had purchased a loot box in the previous 12 months

Paper	Aims	Sample	Micro-transaction type assessed	Behaviours/variables being assessed	Key Findings
	survey helping to explain the user structure of loot boxes. Also, to evaluate usage intensity and related gambling problems and to understand the influences on purchase of loot boxes.	win gamers (n = 6000)			The average age of P2W loot box purchasers was 36.7; 55.3% were male P2W players who did not purchase loot boxes were older (47.2); 55.2% were female 48.3% of the P2W loot box purchasers were also gamblers. 95% of the 48.3% were classified as problem gamblers 68.2% of those who purchased loot boxes every day were male 81.8% of those who purchased loot boxes every day had problems with P2W gaming and 64.8% were classified as problem gamblers. These figures were less for those who did not buy every day (66.7% and 42.6% respectively) There was a significant positive relationship between both loot box purchasing and the frequency of loot box purchases with real money gambling spend Online sports betting and eSports betting participation had a significant negative relationship with loot box purchasing Casino gaming and lottery participation both has significant positive relationships with loot box purchase frequency Participation in gambling for play money (virtual currency) and the frequency of this gambling had significant positive relationships with both loot box purchasing and the frequency of these purchases Age was significantly negatively related to loot box purchasing but not the frequency of these purchases Being male significantly positively related to loot box purchase but there was no gender effect on the frequency of these purchases Lower education levels were significantly positively related to loot box purchasing Employment was significantly positively related to both the purchase of loot boxes and the frequency of the purchases Frequency of loot box purchase had a significant positive relationship with problem gambling when accounting for age and employment status Problems with P2W gaming had a significant positive relationship with loot box purchasing but not the frequency of the purchases In all models, problem gambling was significantly positively related to loot box usage

Paper	Aims	Sample	Micro-transaction type assessed	Behaviours/variables being assessed	Key Findings
Wardle and Zendle, 2021	To investigate the relationship between loot box purchasing and problem gambling within a high – quality online panel survey of 16–24-year-olds	British 16–24-year-olds (*n* = 3,549)	Loot boxes	Problem gambling	12.1% of the sample had purchased loot boxes in the previous 12 months Those who purchased loot boxes were younger and more likely to be male Impulsively scores were higher in those who purchased than those who didn't (2.6 versus 2.2) Loot box purchasers were more likely to have gambled in the previous 12 months versus those who did not purchase loot boxes (62.8% versus 39.7%) Loot box purchasers were more likely to spend more money on gambling in a week than those that did not purchase loot boxes (£19.20 versus £15.50) Loot box purchasers were more likely to experience problem gambling than those who did not purchase loot boxes (16.9% versus 1.8%) Even when controlling for socio-demographics, impulsivity and gambling participation, loot box purchasers were 4.4 times more likely to experience problem gambling Loot box purchasing wax more strongly related to problem gambling than other forms of gambling, like slot machines and online betting
Zendle, Cairns, et el., 2020	To replicate prior findings that people who purchase loot boxes are more likely to score high on a measurement of problem gambling behaviour. Also, to explore the moderating relationship on each	Adult sample; (*n* = 1200); 18-40+	Loot boxes	Problem gambling	A significant positive correlation between loot box spending and problem, gambling was found The ability to cash out strengthened links between loot box spending and problem gambling, however the effect size was small and loot box spend remained significant regardless of cash out The amount of money made from selling loot boxes weakened links between problem gambling and loot box spending The greater the loot box spend, the more severe the problem gambling classification. This had a moderate to large effect size. Pay-to-win options, as well as showing near misses and using in-game currency to purchase loot boxes strengthened links between

Paper	Aims	Sample	Micro-transaction type assessed	Behaviours/variables being assessed	Key Findings
	of the factors mentioned.				problem gambling and loot box spend, but the effect size for these links was small. Crate and key mechanics, as well as exclusivity of items were not moderators for the relationships between problem gambling and loot box purchase.
Lelonek-Kuelta et al., 2021	To estimate involvement in P2W games in Poland and to observe characteristics on P2W gamers. Also, to identify the behavioural patterns of playing P2W games and making payments, as to investigate their relationship with problem gaming symptoms.	Study 1: Adult Poles; (n = 2000, M = 45.6, SD - 1.46); Study 2: P2W gamers (n = 1702, M = 33.86, SD = 10.05)	Payments to gain in-game advantage	Problem gaming	Study 1: 1.7% played P2W games in last 12 months, 20% of which made payments while playing 13.1% played P2W games daily; 25.2% several times a week; 26.9% once a week; 17.6% less frequently Sample spent between PLN 10 and 100 on P2W games (*M = PLN 64.9)* per month P2W spenders included more women, more people from single person households and more families with children aged 7-14 Study 2: 67.9% of sample made in-game payments, 59.2% of which specifically to gain advantages in-game Only age was a significant factor P2W for women is based on monthly household income, whereas for men, it is based on education level P2W spenders played several times a week, bought add-on content once a month, spent PLN 11-18 and had average gaming sessions of 30 minutes to an hour. Five patterns of P2W behaviour were identified Severity of problem P2W gaming is concurrent with levels of involvement with the game
Steinmetz et al., 2021	Address what gamers motives are for purchasing pay to win products and what relevance these have to in-game advancement. Also,	German adults who had either gambled or purchased P2W	Pay to win micro-transactions	Problem gambling	55.4% of sample played P2W games. 54.1% of this group had made at least one payment in the previous year 1,508 out of the 54.1% made payments to advance in the game The most important motivations for making P2W purchases were identified as those relating to advancing in the game, especially increasing the chances of winning

Paper	Aims	Sample	Micro-transaction type assessed	Behaviours/variables being assessed	Key Findings
	to address demographics and socioeconomics surrounding P2W gaming. Finally, to address the relationship between P2W gaming and gambling	products (*n* = 6,000)			P2W gamers were identified as more commonly female, in their early forties and employed P2W purchasers who also gambled were more likely to be younger, less educated and have lower incomes than sole gamblers It was found that participation in certain forms of gambling increases the probability of involvement in P2W gaming Frequency of payments in P2W gaming is a strong predictor of higher frequency payments in other forms of gambling and vice versa Over-involvement in either P2W gaming or gambling predicts involvement levels in the other Those who are categorised as high-risk for P2W gaming are more likely to be categorised as high-risk for problem gambling Frequency of payment in either P2W gaming or gambling rather than cumulative spending and general participation is more influential in predicting participation and play frequency in the other

2.3.2. Pay-to-win micro-transactions and their relationship to problem gaming and gambling behaviours

2.3.2.1. Pay-to-win micro-transactions and problem gaming. One of the two studies (see Table 2.2) addressing pay-to-win micro-transactions focused on their relationship with problem gaming. Lelonek-Kuelta et al. (2021) examined two samples of adult Polish gamers (n = 2000, n = 1702), the second of which were specifically pay-to-win gamers. The results of the first study provided key demographic details for Polish pay-to-win gamers. Of the full sample for the first study, 1.7% had played pay-to-win games in the previous 12 months. A further 20% of which had made payments whilst playing these games. The first study found that pay-to-win gamers were more likely to be females from single person households but who had families with children aged 7-14 years old.

The results from the second study provided more in-depth details of pay-to-win gamers. Here, 67.9% of the sample had made in-game payments. 59.2% of the 67.9% identified that this was specifically to advance in the game. Their findings indicated that age was the only predictor of purchase and that predictors for purchase differed between males and females. For females, household income was a predictor but for males, education level was a predictor.

From these data, Lelonek-Kuelta et al. (2021) identified five different patterns of pay-to-win gaming were identified. These were *regular very involved/high payment* (i.e., played every day for an average of two to three hours, and paid to advance several times a times month with a spend of Polish zloty [PLN] 19-39); *regular involved/low payment* (i.e., played several times a week for an average of 30-60 minutes and paid once a week with a spend of PLN 11-18); *moderately involved/occasional payment* (i.e., played several times a month for an average of one to three hours and rarely paid but spent PLN 11-39); *regular uninvolved* (i.e., played every day for up to an hour and rarely paid but spent PLN 4-10) and *occasional uninvolved* (i.e.,

played several times a month for up to 30 minutes and rarely paid but spent less then PLN 4 if they did so).

More severe problem gaming symptoms occurred in the *regular involved/low payment* group, with nine out of ten symptoms appearing more intense than other groups. This pattern was also represented by the highest number of participants. The *regular very involved/high payment* group was the second most represented group, showing moderate to severe levels of symptom intensity. The *moderately involved/occasional* payment group showed a moderate level of symptom intensity, with the *regular uninvolved* group showing the least. Overall, their results indicated that the intensity of problem gaming symptomology was not related to play time but rather to the frequency of payment and involvement in the game.

2.3.2.2. Pay-to-win micro-transactions, problem gaming and problem gambling. One out of the two studies (see Table 2.2) focusing specifically on pay-to-win micro-transactions analysed their impact on both gaming and gambling behaviours. Steinmetz et al. (2021) investigated a sample of German adults who had either gambled or purchased pay-to-win products (n = 6000). Their results indicated that advancing in the game was the most prominent motivation for paying to win, particularly for increasing the chances of winning. Similar to Lelonek-Kuelta et al. (2021), Steinmetz et al. (2021) found that employed females aged in their early forties were more likely to be pay-to-win gamers but pay-to-win gamers who also gambled were more likely to be younger, less educated, and have lower incomes.

Those who participated in specific forms of gambling, such as slots, poker, and casino games were more likely to participate in pay-to-win gaming. The frequency of payments of pay-to-win gaming was found to be the strongest predictor of the frequency of payments in gambling games. This relationship also worked in the opposite direction; those who made higher frequencies of payments in gambling games were more likely to make higher frequencies of

pay-to-win payments. Overall, frequency of payment in either pay-to-win or gambling games, rather than cumulative spending amounts was more influential in predicting participation and play frequency in the other.

2.3.3. Multiple micro-transaction types and their relationship to problem gaming and gambling

2.3.3.1. Multiple microtransaction types and problem gaming. Of the eight studies assessing multiple micro-transaction types included in this review, one (King, Russell, et al., 2020) (see Table 2.2) assessed micro-transactions and problem gaming. The study investigated *Fortnite* players aged 18-60+ years (n = 428) and the purchase of both loot boxes and skins and how these may impact gaming behaviours. The results of the survey found that micro-transaction spending was most influenced by peers, particularly close friends and greater access to the *Fortnite* videogame across different devices. Those who spent more were typically older, had a close friend who also spent money on micro-transactions, were more likely to use more than one type of payment method, and spent more hours playing the game. However, King, Russell, et al. (2020) found that gaming disorder symptoms were not associated with micro-transaction purchase and instead were more closely related to social factors, including belonging to large online social networks. This result contradicts the findings of Li et al. (2019) who suggested that those who purchased micro-transactions were more likely to score higher on the IGD criteria. However, Li et al.'s research only addressed loot boxes, whilst King, Russell, et al.'s study addressed more than one kind of micro-transaction, which may explain the difference in findings.

2.3.3.2. Multiple micro-transaction types and problem gambling. Five of the studies in the present review assessed multiple micro-transaction types and problem gambling (see Table 2.2). One study (Macey & Hamari, 2019) assessed eSports spectators aged 14-50+

years (*n* =582), one study (Zendle et al., 2019) assessed adolescent gamers aged 16-18 years (*n* = 1155) and one study (DeCamp, 2020) assessed American youth from the state of Delaware aged 13-14 years and 16-17 years (*n* = 13042). One of the studies (Zendle & Cairns, 2019) assessed US adult samples (*n* = 1172) and the final study (Zendle & Cairns, 2018) investigated adult samples from a variety of countries (*n* = 7422).

Macey and Hamari (2019) investigated the impact of both loot boxes and skins. Their results indicated that 67.18% of the sample had both spectated esports and gambled in the previous 12 months, including loot box purchasing as a form of gambling. Of these, 61.6% had used multiple channels to gamble, including the purchase of loot boxes. Loot box purchasing was found to be the most popular form of gambling (with 42.6% participating), followed by videogame-related gambling (19.8%), which included betting. It was found that 121 of the 177 participants who opened loot boxes also used skins to gamble. Contrary to the researchers' hypotheses, loot box consumption had a significant negative relationship with esports spectating. Loot box engagement had a strong association with the PGSI. However, Macey and Hamari (2019) suggested that this relationship was not as strong as relationships between problem gambling and both online gambling and videogame-related betting. Their results also suggested that those who used multiple channels to gamble, including those used channels to purchase loot boxes, were more likely to display problem gambling behaviours.

Zendle and Cairns (2018) assessed the relationship between loot boxes and other non-specified micro-transactions and problem gambling in a large-scale survey. Of the total sample, 78% had purchased loot boxes and 17% had engaged in other forms of micro-transaction purchases. The results indicated that the more severe an individual's loot box spending, the more severe their problem gambling score. This was a statistically significant relationship of small to medium effect size. The relationship between other micro-transaction purchases and

problem gambling was also statistically significant but the effect size for this relationship was found to be five times smaller than that of loot boxes and problem gambling.

In an attempt to replicate their earlier findings, Zendle and Cairns (2019) conducted an online survey, once again investigating the relationship between loot boxes and other micro-transactions and problem gambling severity. Similar to their earlier results, it was found that there was a significant association between PGSI scores and loot box spending, with a small to moderate effect size. In this study, the relationship between other micro-transaction purchases and problem gambling was significantly stronger. However, once again, this relationship was not as strong than between loot box purchase and problem gambling. Moreover, their results indicated that there was no significant spending difference between low-risk, moderate-risk, and problem gamblers, but that non-problem gamblers did spend less money on loot boxes.

Zendle et al. (2019) investigated loot boxes and other non-specified micro-transactions (any paid for in game items). As with previous studies (Kristiansen & Severin, 2020; Wardle & Zendle, 2021; Zendle, 2019), their results indicated there was a significant positive association between loot box spending and problem gambling (more specifically, the purchase of loot boxes, as opposed to free to open loot box options) The effect size of this relationship was found to be moderate to large, suggesting a significant real-world impact. Out of the loot box features assessed (i.e., cash-out options, for gameplay advantages, showing 'near misses', can only be bought using in-game currency, given away for free, the ability to 're-invest loot box content in further loot boxes and limited-time content), only two strengthened the associations between loot box purchasing and problem gambling. These were items in loot boxes only being available for a limited time and loot boxes sometimes being given away for free. From these findings, eight motivations for loot box purchasing were found. These were for gameplay advantages (21.9%), to gain items to build a collection (19.2%), for fun/excitement (16%), for

avatar appearance (15.3%), to support game developers (10.7%), the perception that items received were of good value (9.8%), for time advantages (6.2%), and to make a profit (0.9%).

Regarding the relationship between other non-specified micro-transactions and problem gambling, a significant relationship was found. However, the effect size was four times smaller than that of loot boxes and problem gambling.

Of the 19 studies discussed in the present review, DeCamp (2020) is the only study to investigate the risk factors associated with micro-transaction purchase and their similarities and differences to those for gambling. DeCamp's study investigated similarities in predictors between loot box purchasing, downloadable content (DLC) purchasing, and gambling. The sample comprised two age groups. These were 13–14-year-olds (8th grade) and 16–17-year-olds (11th grade). The study found that prevalence rates for both loot box and DLC purchasing were low in both samples, but that gender was the strongest predictor for these purchases. For the 8th grade sample, another significant predictor of loot box purchasing included being bullied outside of school, whereas for DLC purchasing, strong predictors included depression, anxiety, cigarette use, and being Hispanic. This differed from the 11th-grade sample, with strong predictors for loot box purchasing being bullied inside of school environments, cigarette, vape, and marijuana use. For DLC purchasing, strong predictors were depression and anxiety. Overall, loot box and DLC purchasing were poorly predicted by typical gambling predictors.

2.3.3.3. Multiple micro-transaction types, problem gaming and problem gambling.

Three of the studies (see Table 2.2) discussing multiple micro-transaction types investigated relationships with both problem gaming and problem gambling. Drummond et al. (2020) conducted an online survey with samples from Australia (n = 339), Aotearoa, New Zealand (n = 323) and the US (n = 387) assessing the relationship between loot boxes and non-randomised virtual items, and a variety of variables relating to both problem gaming and gambling (i.e.,

symptomology of problem gambling, excessive gaming, positive and negative mood, and psychological distress). They also examined the relationship between the RLI (Brooks & Clark, 2019) and IGD symptomology. Their results showed that participants with higher problem gambling severity spent more on loot boxes. However, they found that risky loot box engagement also contributed to this relationship. Moreover, participants with higher problem gambling severity were also more likely to spend higher amounts on non-randomised in-game items. Participants with higher loot box spending experienced greater negative mood and psychological distress but also experienced increased positive mood. However, the effect size of the relationship between higher loot box spending and increased positive mood was small. Excessive gaming was also found to have an association with loot box spending, although excessive gaming is not necessarily indicative of problematic gaming (Griffiths, 2010). Overall, risky loot box engagement was associated with spending higher amounts of money, more so than any other variable examined.

King, Wong-Padoongpatt, et al. (2020) investigated the co-occurrence of problem gaming and gambling in emerging non-student adults in the US and the role those micro-transactions play in this relationship. Their results indicated that 157 participants from the total sample (*n* = 300) played videogames that included micro-transactions. Of the 157, 55.4% spent money on micro-transactions each month, with 6.4% spending over $100 on one videogame title. Two of the 55.4% spent between $1000 and $2000 on a single title. Of the total sample, 31.4% reported having problems with micro-transactions and 37.1% reported having intensifying urges to purchase more micro-transactions as time increased. Of the variables examined, obligation to purchase micro-transactions and monthly spend had the strongest direct associations with IGD and disordered gambling. Micro-transaction purchase was found to partially explain the relationship between severity levels of IGD and disordered gambling. However, overall, micro-transaction purchase was more closely related to problematic gaming

symptomology. The results from this study align with those from Li et al. (2019) but contradict those of King, Russell, et al. (2020).

Von Meduna et al. (2020) assessed both loot boxes and pay-to-win micro-transactions and their relationships to problem gambling and problem gaming in a large-scale German population. Their results indicated that 1508 of the total sample (n = 6000) were P2W gamers. 38.9% of the 1508 had also purchased loot boxes in the previous 12 months. Demographic differences between loot box purchasers and P2W gamers were established. Similar to the findings of Lelonek-Kuelta et al. (2020), it was found that P2W gamers were more often female and older than those who purchased loot boxes. In terms of the frequency of purchase, the study identified that 81.8% of those who purchased loot boxes every day had problems with P2W gaming (assessed using an adapted form of the PGSI specifically for game related spending and time expenditure). A total of 64.8% of the sample who purchased loot boxes every day were classified as problem gamblers using the PGSI. However, of the group who did not purchase loot boxes every day, 66.72% had problems with P2W gaming and 42.6% were classified as problem gamblers.

The results of their survey also indicated a variety of statistically significant relationships. Age was negatively associated with loot box purchase but not the frequency of these purchases. This result is in alignment with other findings that loot box purchasers are typically younger (Wardle & Zendle, 2021; Steinmetz et al., 2021). Being male was also positively related to loot box purchasing but no significant relationship was found between gender and the frequency of loot box purchase. Like age, this finding is identified across as range of the reviewed literature (Kristiansen & Severin, 2020; Wardle & Zendle, 2021). Both lower education levels and employment status were positively related to loot box purchasing, with employment status also having a significant positive relationship with purchase frequency.

Looking at loot box engagement in relation to forms gambling, both loot box purchasing, and the frequency of these purchases were positively related to real money gambling spend. That is, the more an individual spent on real money gambling, the more they engaged with loot boxes. The only specific forms of gambling positively associated with loot box purchase frequency were casino games and lottery participation. Like the findings of Macey and Hamari (2019), online sports betting, as well as eSports betting were significantly negatively associated with loot box purchasing. Further to real money gambling spend, gambling with play money (virtual currency) was also assessed. Both loot box purchasing, and the frequency of these purchases were positively associated with gambling for play money. When accounting for age and employment status, frequency of loot box purchase had a positive relationship with problem gambling. Problems with P2W gaming also had a positive relationship with loot box purchasing but not frequency of purchase.

2.4. Discussion

The present chapter reviewed the literature published after the year 2010 within the field of problem gaming and gambling and the relationship between these and videogame micro-transactions. The present chapter considered empirical research investigating the different forms of micro-transaction, with loot boxes being the most common form of micro-transaction researched. The present review also discussed physiological similarities between opening a loot box and participating in gambling activities such as playing slot machines. As a result, the present review is currently the most comprehensive and contemporary review examining the relationship between videogame micro-transactions and both problem gaming and gambling.

From the research reviewed, a consensus of the relationship between loot boxes (whether through purchase or engagement in general) and problem gambling severity was observed. That is, that the higher-rated an individual scored on scales for problem gambling (with the

most used measure being the PGSI), the more likely they spent more money on purchasing loot boxes. In fact, 11 of the 19 studies reviewed found this relationship to be significant (Zendle & Cairns, 2018; Zendle, 2019; Zendle & Cairns, 2019; Zendle et al., 2019; Macey & Hamari, 2019; Brooks & Clark, 2019; Li et al., 2019; Kristiansen & Severin, 2020; Wardle & Zendle, 2021; Drummond et al., 2020; King, Wong-Padoongpatt. et al., 2020). This appeared to be the case across the samples, irrespective of demographic differences. Even in studies with younger participants (Macey & Hamari, 2019; Zendle et al., 2019; Kristiansen & Severin, 2020; Wardle & Zendle, 2021), this relationship remained significant. Kristiansen and Severin (2020) also found that in a sample of 12-16-year-olds, problem gambling severity increased as loot box engagement increased. Whilst it is possible that youth samples are engaging in illegal and unlicensed forms of gambling or more accessible forms of gambling are available (Calado et al, 2017; Macey & Hamari, 2019), this may also suggest that loot box purchasing acts as a gateway to further gambling, leading to higher severities of problem gambling. However, it is important to note that these studies are cross-sectional and as such, it could also be the case that those with pre-existing problems with gambling are more drawn to loot boxes. The findings of the present review therefore indicate that limited causational empirical research has been conducted into this relationship, and so any conclusions regarding the direction of this relationship are inferential.

Conversely, DeCamp (2020) found that the risk factors and predictors for youths involved in loot box engagement may differ from typical predictors for gambling. Gender remained the only similar risk factor, with males being more likely to participate in loot box purchasing and DLC purchasing than females. Across both the 8th grade and 11th grade samples, depression was found to have a significant association with DLC purchase. Wider research within the field of youth risk factors and problem gambling has suggested that those aged 13-19 years who suffer from mental health issues (e.g., depression), are more at risk of problem gambling

(Richard & Deverensky, 2017). However, to date, no significant associations between DLC purchasing and problem gambling have been found. It could be suggested that associations between DLC purchasing, and depression are more associated with gaming motivations related to coping or escapism as DLC purchasing often allows for the extension of gameplay (Kardefelt-Winther, 2014). As DeCamp did not assess risk factors associated with problematic gaming behaviours, it is unknown whether these are similar for loot box purchasing and DLC purchasing. The relationship between problem gambling and depression outlined by DeCamp could also be bi-directional. It is possible that those with pre-existing problems with gambling may develop issues with mental health or experience elevated levels of depression and anxiety as a result of negative consequences associated with problem gambling (Rizeanu, 2013; Hubert & Griffiths, 2018; Barrault et al., 2019), however this could still lead to an increase in DLC purchase through the need to escape and cope with these consequences.

In line with DeCamp's (2020) findings, Kristiansen and Severin (2020) found that younger loot box users were typically male. Research by Macey and Hamari (2019) indicated that esports-related gamblers (including the purchasing of loot boxes) were more likely to be underage males. It could be the case that these demographics are reflective of problem gambling demographics, as males are more likely to be problem gamblers when assessing youth problem gambling prevalence internationally (Calado & Griffiths, 2016) and this may be a further indication of the relationship between loot box purchasing and problem gambling. However, micro-transaction demographics appear to differ for different forms. As observed in the present review, older females are more likely to purchase pay-to-win micro-transactions than males (Lelonek-Kuelta et al., 2020; Steinmetz et al., 2021). This may be explained by wider gaming-related literature, as gender differences between game genre preference and motivations for play are established, with females typically enjoying puzzle or skill-based games, and males enjoying action and competitive games (Romrell, 2013). Therefore, it could

be the case that males are less likely to purchase pay-to-win micro-transactions because they play for competition and so perceptions surrounding the purchase of pay-to-win micro-transactions may be a deterrent and, as some loot box items enhance gameplay and give gameplay advantages, this may be appealing for those motivated by competition (Li et al., 2019). Given that males are typically found to play videogames for achievement (Carlisle et al., 2019), this aligns with the findings of the present review.

Research into the motivations for micro-transaction purchase is limited, with only one study from the 18 reviewed discussing motivations for loot box purchasing (Zendle et al., 2019). The most prevalent motivation for loot box purchase was for gameplay advantages, with the second being for the collection of items. Of the motivations identified, the least prevalent was purchasing loot boxes for profit. Whilst this may initially seem to differ from gambling motivations, suggesting a dissimilarity between loot box purchasing and gambling, wider literature has suggested that factors such as excitement, social reasons and gambling for boredom are also found to be reasons for gambling (Canale et al., 2015; Neighbors et al., 2002; Griffiths, 2007). Motivations relating to collecting items and competitions are also found in gaming-related literature, in the category of achievement (Yee, 2006a). However, further research into motivations for the purchase of a variety of micro-transactions may provide a more in-depth discussion necessary to identify similarities and dissimilarities and how these may contribute to problematic gaming and gambling behaviour.

The demographic differences identified may also show that the genres of games being played and their structure, as well as the micro-transaction types more accessible in these, should be assessed further. It may be the case that multiplayer online battle arena (MOBA) style games, such as *Dota 2*, have shorter rounds that may lead to more micro-transaction purchases. This could be due to the reward reinforcement schedule involved (Griffiths, 1999). If micro-transactions are offered to the player as rewards for winning after every 15-40-minute

round, this may shorten the time between reward processes taking place. With shorter or fewer post-reinforcement pauses occurring, players may be inclined to continue purchasing micro-transactions, like slot machine gambling (Griffiths, 1993). In line with this, the literature reviewed in the present chapter indicates that the frequency of micro-transaction purchasing is a key component in their impact on problem gambling severity and problem gaming behaviour (Steinemetz et al., 2021; Lelonek-Kuelta et al., 2020; von Meduna et al., 2020).

The present review identified two studies (Brady & Prentice, 2019; Larche et al., 2021) that assessed the physiological similarities between opening a loot box and participating in gambling games. Brady and Prentice (2019) reported small increases in galvanic skin response (GSR) whilst both playing a game of *FIFA* and opening loot boxes in the game, indicating a small increase in excitement levels. The study found no changes in participants' heart rates. However, the methodological limitations of this study may have contributed to the lack of arousal observed. By conducting the study on experienced *FIFA* players yet using the cheapest loot box available (containing the lowest rated players), it is possible that participant expectations limited their arousal levels. If participants were allowed to open the highest level of loot box (potentially containing the best-rated players), their arousal levels may have shown greater increases upon opening of the loot boxes. This was shown to be the case in Larche et al.'s (2021) study, which used a range of loot box ratings. Skin conductance response (SCR), which is also a measure of electrodermal activity like GSR, was found to significantly increase with loot boxes containing rarer rewards. Further to this, longer post-reinforcement pauses (PRPs) were found when loot boxes containing more rare items were opened. In the case of gambling, research has suggested that wins produce increased SCR responses, whereas losses do not, or they produce less of an SCR response (Lole et al., 2014; Stange et al., 2016). This could indicate that the opening of loot boxes with rarer items is physiologically like gambling and more specifically, winning in gambling games. Loot boxes with less rare items did not

produce as great a level of SCR. Self-reported rating for an urge to continue opening loot boxes in Larche et al.'s (2021) study showed that loot boxes that contained rarer items were rated higher than those that contained less rare items. These 'wins', as well as an urge to continue opening rarer loot boxes, could contribute to continued and problematic use and help explain the associations between loot box opening and problem gambling severity observed among studies in the present review.

Across the literature reviewed in the present chapter, there were disparities in conclusions regarding the associations between micro-transaction purchase and problematic gaming behaviour. Two studies specifically addressed problem gaming (King, Russell, et al, 2020; Lelonek-Kuelta et al., 2021). King, Russell, et al. (2020) found that the purchase of *Fortnite* micro-transactions (loot boxes and skins) were not associated with gaming disorder symptomology and instead were more closely related to social influence. Having a close peer that also purchased micro-transactions in *Fortnite* was a more influential factor than those relating to gaming disorder and impulsivity. This finding concurs with wider literature surrounding the purchase of virtual goods, with Wohn (2014) suggesting that those with more friends involved in a videogame tend to spend more money on virtual goods. In line with aforementioned motivations, it could be the case that competition between friends is a driving factor for micro-transaction purchase. This also brings about questions of external social influence on players and how this may impact micro-transaction purchase. To date, little research has been conducted into the influence of videogame streamers and content creators on their audiences. Although spectating esports, as well as participating in esports betting, lowered loot box consumption (Macey & Hamari, 2019; von Meduna et al., 2020), more casual videogame streamers and *YouTube* personalities are less restricted in the content they produce. Digital 'influencers' have been found to impact brand engagement, expected value, and intention to purchase (Jiménez-Castillo & Sánchez-Fernández, 2019). If this is the case, then it

could be suggested that videogame players who also engage with *YouTube* communities and online streaming platforms may engage in more micro-transaction purchases.

On the other hand, Lelonek-Kuelta et al. (2021) found that those who spent money on pay-to-win micro-transactions more frequently were more likely to exhibit problematic gaming behaviours and have higher levels of involvement in the games. Similarly, Li et al. (2019) reported a significant association between loot box purchasing and problematic video gaming. Those who purchased and engaged with loot boxes were more likely to meet the criteria for IGD. This relationship was explained further by King, Wong-Padoongpatt, et al. (2020) who suggested that obligation to engage in micro-transaction purchasing and monthly spending rates had the strongest associations with the criteria for IGD. These associations could be suggested to be underpinned, again, by the structural characteristics of some videogames, as well as motivations for play. For pay-to-win gamers, the speed of reward reinforcement may explain the associations to problematic gaming behaviour and for those who purchase loot boxes, collecting rare items may contribute to associative learning processes taking place during play (Griffiths & Nuyens, 2017).

2.4.1. Implications of the present review and regulatory recommendations

Firstly, it is clear from the above research that even though micro-transactions may have different functions or structures (i.e., P2W versus loot boxes), frequency of payment is an important factor when looking at the potential relationships between micro-transactions, problem gaming and problem gambling. When looking at the theory underpinning this, it could be suggested that more frequent events or quicker pay out frequencies increases the likelihood of problematic micro-transaction purchase behaviour and problem gambling symptoms (Griffiths, 1995; Harris & Griffiths, 2018; Harris et al., 2021). If this is the case, it is crucial that regulations regarding frequency of micro-transactions are considered. For example, limiting the amount of micro-transaction purchases available in videogames in a set amount of

time may reduce the frequency of event or pay out, allowing for larger pauses between reward reinforcement.

Further to this, the above research assesses a large range of ages, from youths to adults and spans various countries. Although in some countries, loot box regulations and policy have been implemented, there are still hesitations to declare loot boxes as forms of gambling. Given the accessibility of videogames, the samples assessed in current literature and the general consensus that loot boxes are linked to problem gambling, it is clear that loot boxes should be regulated in some form globally. Although the direction of the relationship between problem gambling and loot boxes is currently unknown, there is still a potential for harm to vulnerable populations regardless of the direction of this relationship. As videogames and subsequently the micro-transactions within them are accessible to younger audiences of players, the potential for early exposure to gambling-like mechanisms should be addressed. For example, classifying loot boxes as a form of gambling would allow for regulation based on each country's gambling related policy and minimise harm to those under the legal gambling age.

In terms of other forms of micro-transaction (i.e., skins, P2W and battle passes) and associations with problem gaming and gambling, further research is necessary to clarify these relationships before regulatory methods are discussed.

2.4.2. Future research

The present review paper demonstrates the limited research within the field of micro-transactions, problem gaming and problem gambling. Current literature does not go beyond establishing a correlational relationship between these and in the case of the relationship between engaging in micro-transactions and problem gaming, the arguments presented are not cohesive. Therefore, only inferential analyses into the relationship between videogame micro-transactions, problem gaming, and problem gambling can be discussed. However, there is a

clear established association between loot box purchasing and problem gambling, with most of the research presented indicating that those who purchase more loot boxes were more likely to score higher on problem gambling measures (this relationship could be, however, bi-directional). Given the diversity of samples included in the research, over a span of ages and in a variety of countries, this is perhaps the only consistent finding of the present review. As research within this field is in its infancy, there is also an apparent lack of methodological diversity in the research presented. As such, future studies should consider in-depth and methodologically diverse research, focusing on multiple micro-transaction types and the differences between these. Further analyses of micro-transaction relationship to problem gaming would also be beneficial. Finally, as previously suggested, more experimental, and longitudinal research is necessary, in order to establish causality (Griffiths, 2018; Griffiths, 2019a).

2.4.3. Limitations

Although the present review followed best practice guidelines (Siddaway et al., 2019), there are several limitations that should be considered. Firstly, the inclusion criteria for the present review excluded secondary and non-empirical research. In doing so, relevant literature discussing theoretical underpinnings and implications of the relationship between micro-transactions, problem gaming and problem gambling may have been excluded.

Further to this, research surrounding micro-transactions, problem gaming and problem gambling is in its relative infancy. This means that conclusions of the review are based on a limited body of research. Furthermore, the fast pace of the videogame industry means that new forms of micro-transactions not discussed in this review may be developed. Due to this, it may be necessary to update this review in the near future, to ensure that conclusions are relevant.

2.5. Conclusion

The research investigated in the present review suggests that a relationship between loot box purchasing and problem gambling is observed across a variety of samples with differing demographics. However, the purely correlational nature of this research means that only inferences regarding the cause or direction of this relationship can be made. Whilst there is evidence to suggest that other forms of micro-transaction purchasing may also have relationships with problem gambling, further research to establish the strength of this relationship is necessary. Associations between micro-transaction purchasing (including loot box buying) and problem gaming have also been established. However, conflicting evidence suggesting that there is a limited link between micro-transaction purchasing and problem gaming indicates the need for further study. Finally, recommendations for potential regulations and policy have been made as a result of the present review.

Chapter 3. Methodology

3. Chapter Overview

The main aim of the present thesis is to explore motivations for micro-transaction use and their relationships to problem gaming and gambling. The thesis comprises three empirical studies, each with individual research questions and aims (Table 3.1), culminating in the development and validation of the Motivation for Micro-transaction Use Scale (MMUS). The objective of the first empirical study is to apply qualitative methods to analyse videogame player experiences with in-game micro-transactions, and to identify the main themes, including underpinning motivations, relating to micro-transaction use. The objective of the second empirical study is to use structural equation modelling methods to analyse latent variables associated with motivations for gaming and gambling, problematic gaming and gambling behaviour, needs satisfaction, micro-transaction use and the respective relationships between these variables. The objective of the final empirical study is to develop and validate a micro-transaction-based scale, assessing key motivations for their purchase using established motivation theory as a basis for item development.

First, the present chapter provides key contextual information surrounding the development of research methodology and the core assumptions associated with research. It establishes the rationale for the paradigmatic approach of the present thesis to answer the posed research questions (see Table 3.1), as well as outline the research framework for the design of the thesis. The chapter then explores the methods of data collection and analysis used across the thesis. Finally, the present chapter outlines the key variables that will be examined throughout the thesis, and how these are being operationalised.

Table 3.1

Empirical Study Summaries

Study title	Research questions and aims	Methodology used
(1) Videogame player experiences with micro-transactions: An interpretative phenomenological analysis	(i) How do videogame players perceive different forms of micro-transactions? (ii) What motivates videogame players to engage with micro-transactions? (iii) How do videogame players relate micro-transaction use to problems with gambling and problematic gaming behaviour?	Qualitative
(2) The role of videogame micro-transactions in the relationship between motivations, problem gaming and problem gambling	(i) Examine the role of micro-transactions in the relationship between self-determined motivations for gaming and gambling and problematic behaviour (internet gaming disorder and problem gambling severity). (ii) Assess a range of hypotheses related to the proposed variables in the study.	Quantitative
(3) The development and validation of the Motivations for Micro-transaction Use Scale (MMUS)	(i) To develop and validate the novel Motivations for Micro-transaction Use Scale (MMUS) using underlying constructs developed from self-determination theory. (ii) To examine the reliability and validity of the scale, and underlying constructs, using a range of statistical analysis methods.	Mixed methods

3.1 Developing a Research Framework

When designing empirical research, the researcher must identify the most appropriate methods to best answer the research question, or research questions. However, without consideration of the historical and cultural context in which the research is being conducted, inconsistencies and challenges may emerge (Mauthner, 2020). Consequently, it is important that the researcher not only consider the technical methods of data collection, analysis, and the practicalities of research, but also the underpinning philosophical approaches and methodological choices involved.

A systematic approach to ensuring each of the key components of research is considered during the design process is following the 'research onion' framework, which outlines each of the 'layers' that make up a research methodology (Melnikovas, 2018; Saunders et al., 2016). These 'layers' are: (i) *philosophy* (i.e., ontological, epistemological, axiological and methodological positions), (ii) *approach* (i.e., testing theory, building theory or a combination of testing and building theory), (iii) *strategy* (i.e., how research questions are answered and how the methodology is executed), (iv) *methodological framework* (e.g., mono-method, mixed method, mixed-model), (v) *time horizon* (i.e., cross-sectional or longitudinal approaches) and, (vi) *techniques and procedures* (i.e., specific data collection and analysis choices).

3.1.1. The Philosophy of Research

According to Creswell (1994), there are four key philosophical assumptions involved in the research process. These concern: (i) the nature of reality (i.e., ontological assumption), (ii) how knowledge is gathered and what knowledge is obtained (i.e., epistemological assumption), (iii) the role of values and the aims of research (i.e., axiological assumption), and (iv) how the research is conducted (i.e., methodological assumption). Put together, each of the four

philosophical assumptions form the theoretical perspective of the research, referred to as the research paradigm (Shannon-Baker, 2016).

3.1.1.1. Ontology. Ontology is the branch of philosophy concerned with the nature of reality, how things are and how they work (Scotland, 2012). Ontology exists on a spectrum from naïve realism (i.e., the position that the world can be fully understood and there is a single reality) to relativism (i.e., the position that reality is a construct of the mind, and consequently there is no single reality). Where realists are concerned with understanding reality through the assumption that decision processes are universal and have patterns, relativists focus on the role of emotions, culture and social norms and the unpredictable nature of these (Peter, 1992). Typically, the realist perspective is actualised through quantitative (i.e., aiming to measure a phenomenon) design, whereas the relativist perspective is actualised through qualitative (i.e., aiming to understand the meaning of the phenomenon) design (Moroi, 2020).

Although appearing at opposite ends of the ontological continuum, Moon and Blackman (2014) argued that the realist and relativist perspectives can complement each other when considered inclusively, particularly through mixed-methods research design. In this sense, it could be suggested that by acknowledging the realist perspective of a possible single reality but considering the relativist perspective of multiple possible realities, research may be more effective in highlighting a key problem or phenomenon *and* understanding how to effectively and practically move towards change to address this, especially in the case where the subject of the research is multidimensional (Johnson & Christensen, 2019).

3.1.1.2. Epistemology. Epistemology is concerned with the theory of knowledge; formed of the considerations of what constitutes knowledge, how research is best conducted to lead to knowledge, the justification for the research conducted as a form of knowledge and the relationship between the researcher and the research subjects (Al-Ababneh, 2020). The

epistemological position of the researcher and the subsequent research conducted is often guided by preliminary ontological consideration (Rehman & Alharthi, 2016).

The epistemological position of objectivism reflects the assumption that a single truth can be established (i.e., the ontological position of realism) and consequently, the nature of knowledge and the relationship between the researcher and the subject will be objective and independent of social actors; the subject exists in a static state and can be directly measured (Yilmaz, 2013). Conversely, the epistemological position of subjectivism assumes that there are multiple realities (i.e., the ontological position of relativism), formed wholly and collectively by social actors in distinct structures and consequently, the researcher will integrate with the subjects to understand structural and collective realities (Gray, 2022). An alternative epistemological position, referred to as constructivism, rejects the epistemological assumptions that reality is either objective and single (i.e., objectivism), or that multiple realities are based solely on meaning given collectively by social actors (i.e., subjectivism). Instead, the constructionist position assumes that realities are formed by the interaction between the subject and the object, and that these realities are dependent on context and individual experiences; reality is a reflection of the experiences of social actors and their understanding of reality (Ültanır, 2012) but is further formed through how the researcher interacts with and understands the experiences of social actors (Shannon-Baker, 2023).

3.1.1.3. Axiology. Axiology is the branch of philosophy concerned with the role of personal beliefs, values and ethics in the inquisition of knowledge (Mbanaso et al., 2023). The axiological position of the researcher (and consequently, the research) is suggested to be formed through the combination of ontological and epistemological assumptions; the researcher must decide what is valuable and ethical, impacting the decisions and judgements made by the researcher during the research process (Killam, 2013).

In the case of researchers who take the positions of ontological realism and epistemological objectivism, research is suggested to be as unbiased and free of value as possible, with a focus on objective and measurable reliability and validity (Maarouf, 2019). With a goal of value-free research in mind, the researcher may consequently make methodological decisions to ensure an 'outsider' role is maintained (Sale et al., 2002; Yilmaz, 2013). Conversely, researchers who take the positions of ontological relativism and epistemological subjectivism or constructivism are suggested to recognise that research is often biased and based on the researcher's own understanding (Leavy, 2017). Consequently, the researcher may make methodological decisions leading to their personal beliefs and values integrating into, and being represented by, the outcomes of the research (Klakegg & Tvedt, 2024). Whereas value-free research aims to provide quantified measures of reliability and validity, value-laden research is largely based on the interpretation of the researcher, yet must still uphold scientific standards and as such, considers alternative forms of addressing bias (Maarouf, 2019). For example, including reflexive discussion or triangulating results throughout the research process (Hesse-Biber, 2010).

While it may appear that value-free and value-laden research are dichotomous and therefore, incompatible, it is suggested that social science research is, by nature, guided by values but that the level at which values are considered in research exists along a continuum (Biddle & Schafft, 2015). In other words, research questions that are initially formed are based on beliefs and values, however the researcher may subsequently choose to pursue value-free research, or value-laden research. To this end, it is suggested that mixed-methods research incorporating both value-free and value-laden positions is possible, and in some cases, crucial for the outcomes of the research (Mertens et al., 2010). However, it is argued that mixed methods research is often designed without consideration of axiological assumptions; conducting quantitative research with the purpose of validating qualitative findings or quantitatively

analysing qualitative data inherently violates the assumption that value-laden research is valid in its own right (Sale et al., 2002). Considering this, the present thesis aims to address the underpinning axiological assumptions associated with the design of the empirical studies and provide a strong theoretical framework for conducting mixed methods research.

3.1.1.4. Methodology. Methodology is the consideration of how research should be conducted and provides a rationale for decisions made, consistent with the ontological, epistemological and axiological position of the researcher and the desired outcomes of the research (Scotland, 2012). Consequently, research methodology informs the research process from start to finish, initially identifying and rationalising the choice of quantitative, qualitative or mixed methods approaches (Melnikovas, 2018).

Research design takes form through quantitative or qualitative methodology. A quantitative approach follows that there is a single reality, that this reality can be measured and validated numerically but can only be known imperfectly, whereas a qualitative approach follows that there is no single reality or truth, and instead, reality is created by interactions between social actors, and therefore needs to be further interpreted by the researcher (Tuli, 2010). Historically, there has been debate surrounding the incompatibility of quantitative and qualitative methodologies (Howe, 1992; Sharma et al., 2023) and the combining of quantitative and qualitative methods to form mixed method or multi-method research (Maxwell, 2010). Those who suggest that the two methodologies are philosophically incompatible and dichotomous are labelled as ‘purists’ (Cameron & Miller, 2007; Johnson & Onwuegbuzie, 2004), arguing that the two are not compatible on an paradigmatic level (Howe, 1988).

However, it is argued that research paradigms encompassing a range of ontological, epistemological, axiological and methodological positions emerged as a response to the ‘paradigm wars’ (Buchanan & Bryman, 2007). Therefore, methodologies can be integrated to

be complementary and to aid in providing a more holistic understanding of the phenomena being researched (Johnson & Onwuegbuzie, 2004), particularly when the phenomena is complex (Sharma et al., 2023).

3.2. The Research Framework of the Present Thesis

3.2.1. Philosophical Underpinning

The first layer of the Saunders et al. (2016) 'research onion' focuses on establishing the paradigmatic approach to the research. Specifically, the ontological, epistemological, axiological, and methodological position of the researcher and research. There are multiple paradigmatic approaches to research, each with their own underpinning philosophical assumptions (Mbanaso et al., 2023; Rahman, 2023). Approaches commonly discussed in research design are positivism, critical realism, interpretivism, postmodernism, transformative, and pragmatism (Creswell & Creswell, 2022; Kivunja & Kuyini, 2017; Mertens, 2007; Saunders et al., 2016; Wahyuni, 2012). The ontological, epistemological, and axiological assumptions for each of these approaches are outlined in Table 3.2.

It may be assumed that the present thesis is positioned in the pragmatic paradigm. That is, the idea that reality is continuously adapting and should be interpreted to best suit a situation (Kivunja & Kuyini, 2017). Rather than focusing on what is true, the pragmatic approach considers what works best and posits that using a single scientific method will not allow researchers to access full truth (Maarouf, 2019). However, Shan (2022) argued that the pragmatic approach has weak philosophical assumptions; the pragmatic paradigm suggests that combining methods is possible but does not provide a strong reasoning for doing so and instead, avoids consideration of the philosophical tensions involved in mixed-methods research. It is suggested that a meta-paradigmatic approach, wherein research is conducted across multiple paradigms, while respecting the purpose of each individual paradigms, holds stronger

philosophical foundations for research (Johnson, 2017). One such example of a meta-paradigm, and the approach taken in the present thesis, is dialectical pluralism (Johnson, 2012).

Dialectical pluralism is suggested to be a meta-paradigm based on the conversation and dialogue between seemingly contrasting paradigms, methods, and stakeholder and citizen perspectives (Tucker et al., 2020). The understanding and acknowledgement of the tensions across traditional forms of research paradigm is the underpinning philosophy of dialectical pluralism. This means that, rather than following the pragmatic approach of utilising mixed methods as a means to an end and consequently avoiding addressing the tension between methods, dialectical pluralism seeks to clearly establish the complementary nature of the quantitative and qualitative methods and provide a strong rationale for doing so (Shan, 2022).

Ontologically, dialectical pluralism assumes that there are multiple realities and that each is important, regardless of their differences; realities can combine and contrast fluidly to create open dialogue, understanding that multiple realities are possible and probable (Inayat & McCaffrey, 2024). Epistemologically, dialectical pluralism is dialogical; research is not undertaken with one single approach to knowledge creation but is based on synthesis and an integrated 'holistic' from multiple research approaches and choices (Johnson, 2012). That is, knowledge and what constitutes knowledge is primarily provisional or 'working' and 'thick' with value, but justified based on the dialogues held (Johnson, 2023). Consequently, axiologically, dialectical pluralism is value-laden and driven, focusing on learning from the 'other', with each study having its own values but with an ultimate goal of change or justice (Stefurak et al., 2016).

Finally, methodologically, dialectical pluralism promotes the consideration of which methodology should be used, rather than 'what works' (Shan, 2022). The methodology used in each study should be chosen procedurally and with the purpose of understanding and furthering

what is known to give stakeholders more freedom or choice, rather than with looking to provide solutions to a set of problems (Tucker et al., 2020). As such, dialectical pluralism supports the mixing of methodologies, considering both the convergence and divergence in methodological choices and crucially, the relevance to the research study (Johnson, 2017).

Furthermore, mixed methods dialectical pluralism allows for the improvement of policy research (i.e., research that aids in the development and implementation of policy), through the inclusion of macro- and micro-level data and perspectives to produce a workable and valuable outcome for all involved stakeholders (Johnson, 2012). In the case of the present thesis, including both qualitative and quantitative perspectives from academic research and subject experts as well as micro-transaction users is crucial for fully informed research directions and practical policy-related recommendations that result in the development of theory concerning micro-transaction use and problematic behaviour and the prevention of harm to micro-transaction users.

Consequently, the present thesis utilises mixed-methods research, considering throughout the perspectives of the researcher and research team, subject experts, and micro-transaction users to establish the direction of each research study and the collection of data, thereby informing research outcomes and subsequent recommendations. The methodology that will be utilised in each empirical study can be found in Table 3.1.

Table 3.2

The Philosophical Assumptions of Common Paradigms

Paradigm	Epistemology (*the nature of knowledge*)	Ontology (*the nature of reality*)	Axiology (*the role of values and the researcher*)	Methodology (*the research framework*)
Positivism	Observable and measurable Focused on causality and prediction Focused on generalisability	One 'true' reality Objective External from social actors	Value-free Researcher is independent to the data Objective researcher	Typically quantitative Typically deductive Focused on large sample sizes
Critical realism	Relative Observable but situated within historical and social context	Multiple realities – layers of independent reality and reality formed through social interaction Objective	Value-laden Researcher acknowledges bias of their own views, culture, and experiences Focused on relative objectivity and bias minimisation	Quantitative or qualitative Abductive (combines both inductive and deductive) Methods and data are based on the subject
Interpretivism	Subjective Focused on meanings, motivation, and experience Formed through narrative	Multiple realities Socially constructed reality Reality is an interpretation	Value-bound Integrated researcher Focused on researcher interpretation and reflexivity	Typically qualitative Typically inductive Smaller sample sizes In-depth investigation
Postmodernism	Knowledge is bound by dominant ideology and limited by human understanding Looks not just at what knowledge is, but what knowledge is not	Multiple realities Realities cannot truly be known	Value-constituted Acknowledges the power dynamic between research and the researcher Focused on questioning the bias of the researcher	Typically qualitative Deconstructive Focused on critical analysis of previous theory, debate, and data

Transformative	Subjective, rooted in complex cultural contexts Knowledge is bound by power	Multiple realities Socially constructed reality defined by social, political, cultural, economic, ethnic, racial, gender, age, and disability Reality is dependent on privilege	Value-driven The researcher as a deliberate driver of social justice and change Focused on the promotion of human rights through research outcomes	Qualitative or quantitative Typically inductive but may be based on a preliminary theoretical position Focused on action and participatory research methods
Pragmatism	Both observable and situational Focused on the practical applications of the research Problem-centred Knowledge is formed of what can be found and 'what works'	Reality is external but multiple Reality is dependent on the questions asked and the practicality of solutions	Value-bonded The research focus is driven by the researcher's own beliefs and experiences Both objective and subjective Research is not philosophically focused The researcher may adopt a reflexive approach	Mixed and/or multiple methods Inductive and/or deductive 'What works' approach Focused on a problem-solution relationship

Note. Synthesised from Creswell & Creswell (2022); Kivunja & Kuyini (2017); Mertens (2007); Saunders et al. (2016) and Wahyuni (2012)

3.2.2. Theoretical Approach

The second consideration of the 'research onion' is that of the approach to theory, consisting of the type reasoning used to design a research study (Saunders et al., 2016). That is, the way in which the researcher chooses to approach theory. Traditionally, theory is either developed, or tested, during the research process (Morse & Niehaus, 2009). In other words, if the research is deductive (i.e., focuses on testing and prediction) or inductive (i.e., exploratory and descriptive) in nature (Schoonenboom & Johnson, 2017).

Considering the nature of mixed-methods research, it is proposed that the researcher may adopt a hybrid approach; the research can be both deductive and inductive and can serve to both develop new and test previously established theory and contribute to body of knowledge of the phenomenon being researched, particularly if research surrounding the phenomenon is in its relative infancy (Mitchell, 2018). Whereas the deductive approach seeks to control background factors, and the inductive approach typically ignores background factors, the abductive approach focuses on the development of novel theory through exploration of the background factors involved in the phenomenon (Janiszewski & van Osselaer, 2022).

The meta-paradigmatic nature of the present thesis strengthens the rationale for the adoption of an abductive approach to theory. Consequently, the present thesis aims to develop new theory through the exploration of experiences (empirical Study 1), test and develop previous theory through the analysis of the relationships between observed variables (empirical Study 2) and develop a novel psychometric instrument (empirical Study 3).

3.2.3. Research Strategy and Methodological Framework

The next consideration suggested by Saunders et al. (2016) is that of the methodological framework and research strategy. Rather than adopting a single strategy and framework,

mixed-methods research utilises multiple strategies, which can be synthesised in different ways; this strategy can be clearly depicted in notation developed by Morse (1991), whereby qualitative and quantitative strategies are depicted using ‘qual’ or ‘quant’, which are capitalised when driving the approach (i.e., QUAL is qualitatively driven and QUANT is quantitatively driven).

However, Schoonenboom and Johnson (2017) propose further capabilities of the notation in the case where mixed-methods research is complex, equal-status (i.e., neither inductive nor deductive in nature), or research is conducted at different time points throughout the process (e.g., sequentially, concurrently, parallel). In this case, the Morse (1991) notation is adapted accordingly.

The present thesis adopts an iterative (or, sequential), multi-strategy approach, in alignment with the assumptions of dialectical pluralism (Johnson, 2023). As such, reflections and changes will be made after each study before starting the research cycle again. In other words, the present thesis follows the approach of not just ‘what works’ but which strategy and methodology would offer the most to the research outcome. As a result, the present thesis adopts a sequential and equal-status design; empirical studies will be conducted one after the other, all with equal status in the resulting thesis. Empirical Studies 1 and 2 will utilise single method approaches, and the final empirical study will utilise a concurrent mixed-method design. Therefore, the design of the present thesis can be depicted in the following format:

$$\text{QUAL} \rightarrow \text{QUAN} \rightarrow (\text{QUAN} + \text{QUAL})$$

When discussing equal status, mixed-methods research strategies, Schoonenboom & Johnson (2017) further highlight the need to consider the point (or points) of integration, whereby the research becomes mixed-methods. The present thesis will integrate primarily in

the philosophical decisions made during the research process. That is, the dialectical, iterative nature of the thesis. The thesis will culminate with the development and validation of the Motivation for Micro-transaction Use Scale (MMUS), with findings from empirical Studies 1 and 2 informing the item development stage, offering a second point of integration and the use of both quantitative and qualitative methods of data collection and analysis during the item development stage offering a third point of integration.

3.2.4. Time Horizon

The next research design consideration is the temporal nature of the research conducted; research can be cross-sectional (i.e., data is collected during a single time period) or longitudinal (i.e., data is collected over multiple periods of time) in nature (Saunders et al., 2016).

Empirical Studies 1 and 2 (see Table 3.1) will utilise cross-sectional data, which can be used to develop further hypotheses and areas of research or establish preliminary 'evidence' towards a body of literature (Wang & Cheng, 2020). Consequently, empirical Studies 1 and 2 seek to establish a preliminary understanding of micro-transaction use, by initially exploring videogame player perceptions of, and motivations for, the use of micro-transactions (Study 1) and then by developing theory surrounding the relationships between motivations, basic psychological needs, the use of micro-transactions and both problematic gaming and gambling behaviour (Study 2), with data for both empirical studies being collected at a single time point. Future research recommendations will then be provided for each chapter in their respective discussion sections.

It should be noted that data from two time points will be collected for empirical Study 3 (see Table 3.1), when developing and validating the Motivation for Micro-transaction Use Scale (MMUS). It is suggested that a crucial stage in scale validation, establishing test-retest

reliability, is often overlooked (Boateng et al., 2018). Consequently, the present thesis aims to contribute to high quality research practice by addressing the test-retest reliability of the developed scale.

3.2.5. Techniques and Procedures

Following philosophical and methodological considerations, the final decisions made before the research commences concerns the techniques and procedures used by the researcher to collect and analyse data (Mackenzie & Knipe, 2006; Saunders et al., 2016). As established, the present thesis utilises an equal status, mixed-methods approach. Consequently, both qualitative and quantitative data will be collected and analysed throughout the research process, respective to each of the studies conducted.

3.2.5.1. Qualitative Data: Collection and Analysis. Qualitative techniques and procedures seek to establish qualities, rather than quantities (Walliman, 2021). In other words, the data collected from participants is described using written or spoken words, is used to understand or interpret perceptions, experiences and emotions (Taylor et al., 2015) and is typically open-ended in nature (Creswell, 2015).

There are numerous methods that can be used to collect qualitative data. For example, observation, interviews, focus groups and narrative inquiry (Marshall et al., 2022). The present thesis aims to collect qualitative data in two forms. These are: (i) semi-structured interviews, and (ii) focus groups.

Semi-structured interviews are one-to-one interviews conducted using an interview guide, designed for the interviewer to add additional probing questions based on the participant's nuanced responses (Adeoye-Olatunde & Olenik, 2021). An interview guide is typically formed of three types of open-ended question: opening questions to help build rapport with the

participant (i.e., background and contextual questions), key questions about the participants' perceptions and experiences, and closing questions that are more general in nature to regain 'distance' from the participant (Hennink et al., 2020). Each interview produces a single transcript that is subsequently analysed. There are a variety of qualitative analytical techniques that can be used to analyse transcript data produced by semi-structured interviews (e.g., framework analysis, thematic analysis, interpretative phenomenological analysis, grounded theory), with the choice of analytical technique depending on the research questions posed, the aims of the research and the context of the data collected (Rapley, 2016).

Empirical Study 1 aims to utilise semi-structured interviews to explore videogame player experiences with micro-transactions. Data collected during empirical Study 1 will be analysed using Interpretative Phenomenological Analysis (IPA), which is recommended when exploring experiences, due to its phenomenological, double hermeneutic and idiographic nature (Smith et al., 2022). That is, understanding and interpreting the nuanced experiences of participants preliminarily on a case-by-case basis, then at a more general level. The IPA analysis process consists of numerous stages of coding singular transcripts, resulting in a table or list personal experiential themes (PET) for each participant, which are then further analysed to produce a table of group experiential themes (GET), which represent the experiences of the group (Smith & Nizza, 2021). GET are based not only on prevalence in the data, but also on the 'richness' of the themes across each transcript (Shinebourne, 2011a). Each stage of the IPA analytical process is documented in Table 3.3.

Table 3.3

The IPA Process

Stage	Analytical process
1	Read a singular transcript, making note of any interesting points, or comments
2	Read the transcript a second time, turning exploratory notes into emergent themes
3	Cluster emergent themes to create a list of superordinate themes and sub-ordinate themes
4	Generate a PET table from the clustered themes, highlighting the location of illustrative quotes in the transcript
5	Repeat stages 1-3 for the remaining transcripts
6	Cross-analyse PET tables for each transcript, clustering and altering themes, while noting any convergence and divergence across the group
7	Generate a GET table from the final list of clustered themes, including illustrative quotes and their respective locations in each participant transcript

Note. Synthesised from Rapley, (2016); Shinebourne, (2011a); Smith et al., (2022) and Smith and Nizza, (2021)

Focus groups are a form of multi-participant interview, based on the generation of data through participant discussion of their own experiences and understanding, as well as exchanges of participant opinion on the experiences and understanding of others (Kitzinger, 1995; Nassar-McMillan et al., 2010). While focus groups can be utilised to find consensus, it is suggested that the interactions between participants and the understanding of thought processes described by participants can provide valuable data (Barbour, 2018), particularly when developing items for a psychometric measure or scale and interviewing target users of the scale (Morgado et al., 2017). Focus groups are typically guided by a schedule or agenda, with the researcher acting as a conversation facilitator and moderator and produce a transcript of the discussion between participants (Wilkinson, 2015). Depending on the goal of the focus group, the data can be analysed in multiple ways, including thematic or content analysis (Cyr, 2019).

Content analysis is the analytical process through which the researcher makes inferences from the context of a body of text (Drisko & Maschi, 2016; Krippendorff, 2018). It is suggested by Kleinheksel et al. (2020) that content analysis can be used both to identify hidden meanings in bodies of text (i.e., latent content analysis) and as a surface level form of analysis, to identify information from text without the need for deeper contextual or interpretative understanding (i.e., manifest content analysis). In the case of manifest content analysis, the researcher explicitly describes what participants say without looking for a deeper meaning using coding that is meaningful to the data (Bengtsson, 2016).

Empirical Study 3 (see Table 3.1) aims to utilise data from two focus groups of micro-transaction users to assess an initial pool of items developed for the MMUS, with the aim of explicitly identify relevant or problematic items and the thought processes involved in participant understanding of the item pool. Consequently, manifest content analysis will be

used to analyse the focus group data, with the unit of meaning taking the form of the explicit item numbers or descriptions used in the initial MMUS item pool.

3.2.5.2. Quantitative Data: Collection and Analysis. Quantitative techniques and procedures seek to obtain data that can be measured and classified numerically and often utilise statistical analysis to form conclusions about what the data represents (Walliman, 2021). Quantitative data can be collected using surveys and questionnaires, or through directly measuring the biological processes of participants in experimental studies (Mcleod, 2023) and is typically close-ended in nature (Creswell, 2015).

Online surveys are typically used to collect large samples of data in an accessible, cost-effective and timely manner (Nardi, 2013). Consequently, online surveys will be utilised in empirical Studies 2 and 3, which will be accessible to participants on the platform *Qualtrics* using an online web link. Each survey will produce its own respective data set, which will be cleaned before the analysis process takes place.

Quantitative analysis methods depend on the research question or questions being studied and the form of data collected (Heumann et al., 2022). Empirical Study 2 aims to identify the relationship pathways between key variables associated with self-determined motivation, needs satisfaction and frustration, micro-transaction use and problem gaming and gambling behaviour. Consequently, structural equation modelling methods will be used.

Structural equation modelling (SEM) utilises multivariate analysis to describe relationships between indirectly measured variables (i.e., latent variables), allowing for the exploration of complex models and the testing of hypotheses concerning the relationships, or pathways between variables included in the model (Thakkar, 2020). There are two main forms of SEM: (i) partial least squares structural equation modelling (PLS-SEM) and, (ii) covariance-based structural equation modelling (CB-SEM), with each having its own respective pre-testing assumptions (Hair et al., 2021). Whereas CB-SEM is more typically used for theory

confirmation, PLS-SEM can be utilised for exploratory research and in cases where data is non-normally distributed (Hair, Matthews, et al., 2017). Further discussion of the SEM method utilised, and the rationale for this decision, can be found in the respective method section of empirical Study 2.

Empirical Study 3 aims to develop and validate the MMUS following best practice guidelines (Boateng et al., 2018). Consequently, a range of statistical analysis methods will be utilised to analyse quantitative data collected through the expert panel and the large-scale survey stages of the study. Further detail about the methods and procedures followed in empirical Study 3 can be found in the respective study chapter.

3.3. Quantitative Variables in the Present Thesis

Quantitative data will be collected for both empirical Studies 2 and 3 (see Table 3.1). The following section outlines each of the variables being analysed, the measures that will be used to operationalise these and the rationale for using each measure.

3.3.1. Assessing Micro-transaction Use

Empirical Studies 2 and 3 assess micro-transaction use. This will be measured using demographic-style questions, asking participants about the microtransaction type they use (i.e., loot boxes, battle passes, cosmetic items, expiration items or multiple types), the frequency of their micro-transaction use (i.e., daily, weekly, monthly, annually, or less frequently than annually), and their typical spend amount per transaction (i.e., a continuous numerical value in GBP).

3.3.2. Assessing Problem Gaming

Empirical Studies 2 and 3 assess problem gaming using the Internet Gaming Disorder Scale -Short Form (IGDS9-SF; Pontes & Griffiths, 2015). The IGDS9-SF is a nine-item scale

assessing internet gaming disorder. Scale items are rated across a five-point Likert scale (1 = never, 5 = very often) to assess each item (e.g., "Do you systematically fail when trying to control or cease your gaming activity?"). Item scores are summed, with total scores ranging from nine to 45 points. Higher total scores indicate a greater risk of internet gaming disorder. To be classified as a disordered gamer, scale users must score 36 or higher. The internal reliability of the scale was calculated by Pontes and Griffiths (2015) to be 0.87.

The most appropriate problem gaming measure was selected by consulting a current review of screening and assessment tools for gaming disorder, conducted by King, Chamberlain, et al. (2020). Both the IGDS9-SF and the Ten Item Internet Gaming Disorder Test (IGDT-10; Király et al., 2019) were suggested to cover both the DSM-V and ICD-11 criteria for gaming disorder. However, the IGDS9-SF was suggested by King, Chamberlain, et al. (2020) to have higher internal consistency values across 24 studies citing its use (Cronbach's alpha ranging from 0.81 – 0.96) than the IGDT-10 (Cronbach's alpha ranging from 0.62 – 0.87 across seven studies citing its use). Consequently, the IGDS9-SF scale was chosen for use in empirical Studies 2 and 3.

3.3.3. Assessing Problem Gambling

Empirical Studies 2 and 3 assess problem gambling behaviour using the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001). The PGSI is a nine-item scale. Scale items are rated across a four-point scale (0 = never, 3 = almost always) to assess each item (e.g., "Have you felt guilty about the way you gamble or what happens when you gamble?"). Item scores are summed, with scores ranging from zero to 27. Scale users are classified into three groups, based on their scores. These are: i) low-risk gamblers (scores of zero to three), ii) moderate-risk gamblers (scores between three and seven) and iii) problem gamblers (scores above eight). Low-risk gamblers are suggested to exhibit low levels of problematic behaviour, with limited

or no negative consequences. Moderate-risk gamblers are suggested to exhibit moderate levels of problematic behaviour and experience some negative consequences. Problem gamblers are suggested to gamble with negative consequences and potentially a loss of control. The internal reliability of the scale was calculated by Ferris and Wynne (2001) to be 0.84.

Other frequently used measures of problem gambling were assessed for appropriateness in empirical Studies 2 and 3. For example, the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987). The SOGS is a 20-item multiple-choice instrument (e.g., Have you ever claimed to be winning money gambling, but weren't really? In fact, you lost?) whereby scoring positively on one to four out of the 20 items classifies users as having "some problems with gambling" and positively scoring on five or more of the 20 items classifies users as a "probable pathological gambler". Although the SOGS is an appropriate screening tool to assess pathological gambling in clinical samples, it is suggested that the PGSI (Ferris & Wynne, 2001) is better able to assess sub-clinical levels of problem gambling and those 'at-risk' of developing problem gambling behaviours (Miller et al., 2013). Further, the PGSI is argued to provide a more continuous measure of problem gambling, as opposed to the dichotomous nature of the SOGS (Orford et al., 2010). Consequently, the PGSI was deemed as the most appropriate measure of problem gambling for the target samples of empirical Studies 2 and 3.

3.3.4. Assessing Motivation for Gaming

Empirical studies 2 and 3 assess motivation for gaming using the Gaming Motivation Scale (GAMS; Lafrenière et al., 2012). The GAMS is an 18-item scale. Scale items are rated across a seven-point Likert scale (ranging from 1 = do not agree at all, to 7 = very strongly agree). The GAMS assesses motivations utilising the self-determination motivation continuum (Ryan & Deci, 2000a), with each motivation or regulation type forming each of the six subscales. These are: (i) intrinsic motivation (e.g., "I play games for the feeling of efficacy I experience

when I play"), (ii) four sub-scales of extrinsic motivation, including integrated regulation (e.g., "I play because it is an extension of me"), identified regulation (e.g., "I play because it is a good way to develop important aspects of myself"), introjected regulation (i.e., I play because I feel that I must play regularly) and external regulation (e.g., "I play for the prestige of being a good player") and, (iii) amotivation (i.e., "Honestly, I don't know why I play"). Item scores are summed for each subscale, with scores ranging from seven to 21 per motivation or regulation type. The internal reliability for each subscale was calculated by Lafrenière et al. (2012) to range from 0.75 to 0.89.

Alternative measures of gaming motivation were considered for use in empirical Studies 2 and 3. For example, the Motives for Online Gaming Questionnaire (MOGQ; Demetrovics et al., 2011) and the Players Experience of Need Satisfaction (PENS) scale (Ryan et al., 2006). While commonly used to assess gaming motivation in academic literature, the MOGQ does not assess specific motivations related to self-determination theory (Bäcklund et al., 2022). Similarly, the PENS, although based on self-determination theory, focuses solely on the concept of intrinsic motivation, rather than the continuum of motivation proposed by Deci & Ryan (2015). Consequently, the GAMS (Lafrenière et al., 2012) was deemed as the most appropriate measure of gaming motivations, due to the underlying theoretical basis of the scale and its alignment with the research aims and questions of empirical Studies 2 and 3 (Table 3.1).

3.3.5. Assessing Motivation for Gambling

Empirical Studies 2 and 3 assess motivation for gambling using the Modified Gambling Motivation Scale (MGMS; Shinaprayoon et al., 2017). The MGMS is a 28-item scale. Scale items are rated across a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree) to assess six subscales, aligning with the self-determination theory motivation continuum (Ryan & Deci, 2000a). These are: (i) intellectual challenge (e.g., "I enjoy improving my knowledge

of the game"), (ii) excitement (e.g., "It is exciting to gamble"), (iii) socialisation (e.g., "It is the best way to relax"), (iv) monetary gain (e.g., "I play for money"), (v) social recognition (e.g., "It makes me feel important"), and (vi) amotivation (e.g., "I play for money, but I sometimes worry if I should continue playing"). The MGMS is scored by summing the scores for each subscale, then finding their average, with possible scores for each subscale ranging from zero to seven, and a maximum score of 42 for the whole scale. Higher scores for each subscale indicate a higher motivation to gambling for the specific type of motivation, and a higher total score indicates a higher level of motivation to gamble in general. The internal reliability for each subscale was calculated by Shinaprayoon et al. (2017) to range from 0.76 to 0.92.

Similar to the assessment of gaming motivation (Lafrenière et al., 2012), the present thesis utilises self-determination-based psychometric measures. The Gambling Motivation Scale (GMS; Chantal et al., 1994) was considered for use in the present thesis. However, as suggested by Shinaprayoon et al. (2017), the GMS may be less comprehensive due to the wording of items (i.e., *"For the efficacy that I get when I play my favourite game."*). Consequently, the MGMS was deemed as a more reliable and valid measure of gambling motivation than the GMS for the present thesis.

3.3.6. Measuring Needs Satisfaction and Needs Frustration

Empirical Study 2 assesses psychological needs satisfaction and frustration using the Basic Psychological Needs Satisfaction/Frustration Scale (BPNSFS; Chen et al., 2015). The BPNSFS is a 24-item scale assessing satisfaction and frustration with the three basic psychological needs of autonomy, competence, and relatedness. Each of the three basic psychological needs has eight items, four items assessing satisfaction and four items assessing frustration. Scale items are rated across a five-point Likert scale (1 = completely false, 5 = completely true) to assess each item (e.g., "I feel a sense of choice and freedom in the things I undertake"). Items scores

for each subscale is summed to produce a total score for autonomy, relatedness, and competence (for both needs satisfaction and needs frustration). There are multiple ways to score the BPNSFS, whereby composite scores can be used to assess needs satisfaction or frustration as whole concepts. The internal reliability for each subscale was calculated across four countries (US, China, Belgium, and Peru) by Chen et al. (2015), with alpha coefficients ranging from 0.64 to 0.89.

Numerous scales that measure needs frustration and satisfaction with the basic psychological needs of autonomy, competence and relatedness were considered for use in the present thesis. To assess autonomy, the Index of Autonomous Functioning (IAF; Weinstein et al., 2012) was considered. However, the IAF only measures satisfaction with the basic need for autonomy, rather than both satisfaction and frustration with the need for competence. To assess competence the Perceived Competence Scale (PCS; Williams & Deci, 1996) was considered. However, the PCS has currently only been used to assess learning competence (Williams & Deci, 1996) and competence with dealing with diabetes (Williams et al., 1998) and has not been adapted for use in measuring general life competence. Additionally, the PCS does not measure frustration with the need for competence. The Basic Psychological Needs Satisfaction Scale in General (BPNSS; (Deci & Ryan, 2000; Gagné, 2003) was also considered for use in the present thesis, as it captures satisfaction with the need for relatedness. However, and as found with the IAF and the PCS, the BPNSS does not measure frustration with basic psychological needs. Consequently, the BPNSFS (Chen et al., 2015) was deemed as the most relevant measure of both needs satisfaction and needs frustration for the present thesis.

3.3.7. Assessing Risky Use of Loot Boxes

As part of the scale development and validation process (empirical Study 3; Table 3.1), convergent validity tests will be conducted, to establish if the developed scale is related to other

scales measuring similar underlying concepts. Consequently, the Risky Loot Box Index (RLI; Brooks & Clark, 2019) will be used. The RLI is a five-item scale that examines 'risky' use of loot boxes. The scale is scored using a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree) to assess items (e.g., The thrill of opening loot boxes has encouraged me to buy more). Item scores are summed to produce a total score, ranging from five to 35. Higher scores indicate more risky loot box engagement. The internal reliability of the RLI was calculated by Drummond et al. (2020) to be 0.915.

To the researcher's knowledge, only two measures of problem or 'risky' loot box use are available. These are the RLI (Brooks & Clark, 2019) and the Problematic Use of Loot Boxes Questionnaire (PU-LB; González-Cabrera et al., 2022). While the PU-LB is suggested to be a reliable and valid measure of problematic loot box engagement, the RLI is argued to be suitable for cross-cultural measurement of problematic loot box engagement and appropriately reflects the distinction between gambling-related harm and problematic gambling (Xiao et al., 2024). Consequently, the RLI was considered to be the most appropriate measure of risky loot box use for use in the present thesis.

3.4. Summary of the Methodology Chapter

In summary, the present chapter defined and discussed key concepts related to research methodology, outlined the research framework followed throughout the present thesis and has provided the measurements that will be used to operationalise key quantitative variables analysed in the thesis. As the present thesis is formed through individual studies, each empirical study conducted has its own chapter, including relevant methodological and procedural discussion. Consequently, further information is provided in these chapters.

Chapter 4. Videogame Player Experiences with Micro-transactions: An Interpretative Phenomenological Analysis

4. Chapter Overview

Following the review of literature conducted in Chapter 2 of the present thesis, the need for further qualitative literature focusing on videogame player experiences with micro-transactions was identified. Consequently, the present chapter, and the first empirical study of the present thesis, aims to address this key research gap, by utilising in-depth qualitative analysis to explore videogame player perceptions and experiences with micro-transactions, highlighting motivational drivers associated with micro-transaction use, the consequences of engaging with micro-transactions and the potential similarities between micro-transactions and some forms of gambling. The chapter explains the key findings using extant gaming and gambling literature, as well as wider psychological theory.

4.1. Background

The videogame industry and its monetisation methods are ever-expanding, with in-game spending being projected to reach over $74 billion a year by 2025 (Clement, 2021). A popular form of in-game purchases are micro-transactions. Micro-transactions are commonly described as low-cost virtual items consisting of extra or bonus digital content. This digital content can include cosmetic items for avatars such as clothing or ‘skins’, expiration-based items that allow players to continue playing a game or speed up an in-game process, surprise items (typically known as ‘loot boxes’), and paid progression systems that require experience points (XP) to unlock items (often known as a battle pass).

Micro-transactions are suggested to exist in a converging space between videogame playing and gambling, due to the nature of their inclusion in many popular videogames, as well as the suggested structural similarities between some forms such as loot boxes to methods of

gambling such as slot machine use (Drummond & Sauer, 2018; King & Delfabbro, 2020). Videogames, and their respective forms of micro-transaction, are a widely accessible form of entertainment to players of all ages, and as such, concerns surrounding the potential impact of micro-transactions on problem gaming and gambling behaviours have become prevalent (Griffiths, 2018; Li et al., 2019).

4.1.1. Review of Literature

As discussed in Chapter 2 of the present thesis, much of the quantitative research surrounding micro-transactions has focused on specific micro-transaction forms and their relationship to disordered gaming and problem gambling (Raneri et al., 2022). Most notably, there is a suggested association between the use of loot boxes and problem gambling (Wardle & Zendle, 2021; Zendle & Cairns, 2018, 2019). Further to this, those more at risk of exhibiting problem gambling behaviours typically spend more on loot boxes than those not at risk, particularly when income levels increase (Garrett et al., 2022). While spending on loot boxes does not necessarily lead to problem gambling behaviours, it is suggested that frequency of purchase is associated with higher problem gambling levels (von Meduna et al., 2020).

Additionally, engagement with loot boxes is suggested to be associated with problem gaming behaviours. It is reported that those who are high-risk gamers are more likely to make an initial loot box purchase and that those who purchase loot boxes are more likely to partake in 'binging' when gaming (Li et al., 2019; Spicer, Nicklin, et al., 2022). However, this association is contested, with peer purchasing behaviours suggested to be more influential on loot box purchasing than disordered gaming (King, Russell, et al., 2020).

Beyond loot boxes, other forms of micro-transactions, such as skins and pay-to-win micro-transactions and their relationships to both problem gambling and problem gaming have been studied using quantitative methods. Although direct purchasing of avatar skins, as opposed to

through loot boxes, is suggested to be less problematic due to the lack of 'surprise' element involved, wider use of skins in unofficial gambling games among youths and adolescents are suggested to be associated with both problem gambling behaviours and disordered gaming behaviours (Hing et al., 2021). In the case of pay-to-win micro-transactions, which can include expiration-based forms, as well as advantageous weaponry or items, it is suggested that higher engagement levels with pay-to-win purchases (Steinmetz et al., 2021).

To date, Japan, China, the Netherlands, and Belgium have all implemented policy regarding the regulation of loot boxes as a result of the emerging quantitative research (Leahy, 2022), although these policies and regulations are not standardised and relate to the gambling law for each country. In the UK, reports published have suggested that, although links between loot boxes and problem gambling have been reported, the lack of ability to 'cash out' and obtain real-world money prevented loot box legislation from being implemented (Goddard, 2022). It is clear that there is still a lack of consensus regarding the risk of harm involved with the use of loot boxes and, even less so in the case of other forms of micro-transactions. It should also be noted that the previously discussed research highlights correlational relationships between micro-transactions, problem gambling, and disordered gaming and so the direction of the relationships (as well as the underpinning causality of the relationships) is not currently apparent.

Qualitative studies analysing micro-transactions have found a range of themes related to how videogame players experience micro-transactions, including motivations for their use, perceptions of their inclusion in games and links to gambling. However, these studies have various limitations that the present chapter aims to address. Research conducted by Cleghorn and Griffiths (2015) assessed the purchase behaviour of those who engaged with a broad range of virtual items using interpretative phenomenological analysis (IPA) methodology (Smith & Osborn, 2003). Several motivating factors were identified, including exclusivity, necessity,

social shopping and items being perceived as 'cool'. Additionally, themes reported surrounding social aspects involved in the purchase of virtual items, connection to avatars, as well as themes relating to impulse purchasing, purchasing for self-expression and feelings after purchases (feeling rewarded and self-torment). It was found that players expressed positive attitudes towards micro-transactions, through enabling friendship development and boosts of self-esteem related to self-efficacy and satisfaction. It was also suggested that participants felt attached to their in-game avatars and this motivated purchases.

Although Cleghorn and Griffiths (2015) addressed a research gap surrounding motivations for in-game purchasing and directly assessed lived experiences of participants and how individual meaning factored into their purchases, the rapidly changing climate of videogame monetisation methods, and the recent discourse surrounding associations between micro-transactions and problem gaming and gambling suggests the need for a more current analysis of videogame player experiences using IPA, allowing for the discussion of how changing monetisation methods may have and will continue to impact these experiences. For example, the study did not discuss potential similarities between virtual items and forms of gambling, and how players may perceive their micro-transaction use in relation to their gambling experiences.

More recent qualitative studies used thematic analysis methods, as opposed to IPA. Alha et al. (2018) conducted deductive thematic analysis among free-to-play (F2P) videogame players who use micro-transactions, using a pre-determined set of four themes: (i) perceptions of F2P games, (ii) experiencing F2P games, (iii) using real money in F2P games, and (iv) ethical issues in the F2P model. It was found that those who use micro-transactions generally had negative perceptions of the free-to-play model, with the concept of those who use micro-transactions as having unfair advantages in-game, although those who did purchase often discussed the benefits of time-saving and skipping content. Additionally, participants highlighted the ease of

using micro-transactions in relation to spontaneous purchases, and the 'addictiveness' of micro-transactions was seen as dependent on the players themselves, as opposed to the fault of game developers.

Alha et al. (2018) provided perspectives from a sub-group of players who engaged with micro-transactions. However, they did not specify the forms of micro-transactions used by participants, focusing on the F2P model as a whole. In this case, although experiences with micro-transactions were discussed, the focus of the study surrounded players' perceptions of and attitudes towards the micro-transactions and did not look in-depth at individual experiences, underpinning motivations for purchases or resulting emotional responses to these purchases.

Additionally, recent qualitative studies have use thematic analysis methods but focused specifically on loot boxes (Nicklin et al., 2021; Puiras et al., 2023). Nicklin et al. (2021) conducted a reflexive thematic analysis of participant accounts of motivations loot box engagement. Seven themes were found from this analysis. These were (i) opening experience, (ii) value of box contents, (iii) game-related elements, (iv) social influences, (v) emotive and impulsive influences, (vi) fear of missing out, and (vii) triggers and facilitators. It was found that stimulating aspects of loot box buying were mostly related to the excitement of the 'opening' of the loot box, as well as game developers adding novel items into the game. Additionally, the 'fear of missing out' was a driving motivation for loot box purchases, particularly when content was locked behind a paywall, or aided in the progression of the game. Most notably, the study linked motivations for purchase to the satisfaction of daily needs and needs satisfaction (Deci & Ryan, 2015).

Similarly, Puiras et al. (2023) conducted inductive content analysis to identify motives for refraining or engaging with loot boxes and gambling among a sample of Canadian university

students. These motives were then compared between loot box buying and gambling, to identify key similarities and differences. Similar themes between engaging with loot boxes and gambling were reported to be (i) enjoyment and (ii) the chance to win. Similar themes between refraining from loot box buying and gambling were reported to be (i) negative consequences, (ii) disinterest, (iii) finances, and (iv) accessibility. It was found that loot box buying was typically passive or to progress in the game, as opposed to gambling but that both loot box buyers and gamblers engaged due to feelings of excitement and the thrill of a surprise. It was also found that loot box buyers reported less concern about addiction and loss of money than gamblers, potentially due to the lack of knowledge surrounding negative financial impact from loot boxes. Alternatively, the double currency conversions used by some videogames (i.e., purchasing in-game items using virtual currency that is purchased using real-world money) may contribute to a disconnect between players and the real-world monetary impact (King & Delfabbro, 2019), leading to 'easier' purchases.

However, by focusing solely on loot boxes, both Nicklin et al. (2021) and Puiras et al. (2023) did not identify how other forms of micro-transaction play a role in videogame players' experiences and perceptions. For example, differences in emotions surrounding 'good' or 'bad' micro-transactions, as identified as part of the perceptions of F2P players by Alha et al. (2018). Additionally, loot box buyers may have different underpinning needs satisfaction requirements than those who use other forms of micro-transaction. Therefore, further in-depth and reflexive analysis is needed across a broad range of micro-transaction types.

Other recent qualitative studies surrounding micro-transactions have focused on singular forms of micro-transaction other than loot boxes. Petrovskaya and Zendle, (2020) carried out thematic analysis on content from a Dota 2 forum, focusing specifically on battle pass micro-transactions. The analysis of the content mainly explored perceptions and attitudes towards the battle pass micro-transaction. Three main themes were reported. These were the (i) spend-grind

trade-off, (ii) elitism, and (iii) positive engagement. It was found that negative perceptions of the battle pass surrounded the difficulty and the time investment involved in gaining the required XP to level up and gain a reward. For some players, the ability to buy levels resulted in feelings of elitism. That is, playing to progress was not accessible to those who could not afford it and resulting in a feeling of pressure to engage with the battle pass. For others, purchasing the battle pass resulted in a feeling of connectedness with fellow players, particularly those who enjoyed guild-based play.

It should be noted that the qualitative analysis conducted by Petrovskaya and Zendle (2020) formed part of a mixed-methods study, which also focused on quantitative analysis of battle pass engagement. As a result, the qualitative analysis, although providing novel findings, did not analyse individual battle pass users and so did not draw conclusions from individuals own lived experience, instead utilising online content. Further exploration of battle pass users and their motivations for purchase, as opposed to just their attitudes and perceptions, is necessary. This would also allow for participants' discussion of sense-making and meaning and how their experience may differ to other micro-transaction forms. For example, the battle pass mechanism differs to the loot box micro-transaction and more time investment is required to gain rewards, rather than monetary investment. Therefore, a more thorough investigation of the types of investment involved with multiple micro-transaction types and potential differing motivations for purchase is necessary.

4.1.2. The Present Chapter

The present chapter addresses the gap in research in multiple ways. Firstly, as the majority of current qualitative research conducted surrounding micro-transactions has utilised thematic analysis methods (Alha et al., 2018; Nicklin et al., 2021; Petrovskaya & Zendle, 2020; Puiras et al., 2023), it is crucial that individual videogame player experiences are considered, including how those who use micro-transactions make sense of and understand their

engagement in relation to their both videogames and wider gaming and gambling context. Additionally, convergences and divergences in these experiences across a group of micro-transaction users should be considered. Subsequently, models associated with motivations for in-game purchases can be developed, allowing for an in-depth exploration of factors involved with the use of micro-transactions and the relationships between these.

Furthermore, understanding the perceptions, needs and motivations of individuals is considered to be key for identifying any preventative or harm-reducing measures for addictive behaviours (Kennedy & Gregoire, 2009). Through understanding what motivates potentially problematic micro-transaction use as well as understanding the underlying cognitive processes involved in using micro-transactions, videogame companies and governing bodies can utilise preventative and corrective approaches in order to protect at-risk individuals.

Finally, the present chapter aims to discuss multiple types of micro-transaction. Previous qualitative literature has focused either solely on loot boxes (Nicklin et al., 2021; Puiras et al., 2023) or battle passes (Petrovskaya & Zendle, 2020). Other qualitative literature has focused on general 'virtual items' (Cleghorn & Griffiths, 2015) or unspecified F2P micro-transactions (Alha et al., 2018).

Therefore, the present chapter aims to address this gap and contribute to the limited body of qualitative literature surrounding the lived experiences of videogame players who engage with micro-transactions. The present chapter utilises IPA to analyse individual and nuanced participant accounts of their experiences with multiple forms of micro-transaction, before identifying convergences and divergences among the participants. The present chapter posed the following three research questions (RQs): How do videogame players perceive different forms of micro-transactions? (RQ1); What motivates videogame players to engage with micro-

transactions? (RQ2); and (iii) How do videogame players relate micro-transaction use to problems with gambling and problematic gaming behaviour? (RQ3)

4.2. Method

4.2.1. Design

The present qualitative study utilised an interpretative phenomenological analysis (IPA; Smith et al., 2022; Smith & Osborn, 2003) approach in order to explore the lived experience of videogame players who use in-game micro-transactions. Semi-structured interviews were conducted. These were then transcribed and analysed to produce a series of themes relating to experiences with micro-transactions. A rationale for the use of IPA and the research procedure are detailed in the following sections.

4.2.2. The Use of IPA in the Present Chapter

IPA is most commonly described as a double hermeneutic process, through which the interviewer or researcher makes sense of a participants' sense-making of a phenomenon they experience (Smith & Osborn, 2003). IPA has three main theoretical underpinnings that should be considered throughout the research process to ensure a high quality of analysis (Eatough & Smith, 2017; Shinebourne, 2011b). The first is that the process is hermeneutic, or in other words, is interpretive in nature through sense-making of individuals experiences. The second is that the research remains closely rooted to the phenomenology and the lived experiences of individuals. Finally, the process is idiographic. This means that each participants' experience is analysed on a case-by-case basis, so that the nuances of individual experiences are considered. The researcher may then choose to present a single case study or can analyse the emerging themes identified in the group as a whole. For the purpose of the present chapter, the group experiential themes are presented, so as to discuss the convergence and divergence in experiences among a group of videogame players who purchase in-game items.

4.2.3. Participants

A total of 11 participants were recruited through social media platform *Twitter* (*n* = 3), Nottingham Trent University *Microsoft Teams* spaces (*n* = 5), and through *Super Smash Bros.* community Discord servers (*n* = 2) and *Dota 2* community Discord servers (*n* = 1). In the case of the Discord server recruitment method, potential participants were informed of the research and were told to contact the researcher if they met the eligibility criteria and were interested in taking part. All remaining participants (*n* = 8), both on *Twitter* and on *Microsoft Teams* were informed of the research and the eligibility criteria and were provided with a link to contact the researcher if they were interested in participating. The eligibility criteria stated that participants should: (i) be aged 18 years and over, (ii) play videogames, and (iii) have previously purchased in-game content, including any form of downloadable content (DLC). For the purpose of the present chapter, DLC is defined as the umbrella term for any downloadable content associated with a game. This includes smaller cost micro-transactions, as well as larger cost expansions and game add-ins. Participants were made aware that the present chapter sought to discuss smaller cost purchases made within games themselves (i.e., micro-transactions), as opposed to larger cost forms of DLC (i.e., expansions and additionally story content) purchased externally to the game.

Participants were aged between 18 and 25 years. There were two female participants, two non-binary participants, and seven male participants. All participants were residents of the United Kingdom. As such, monetary expenditure is discussed in Great British Pounds (GBP; £).

Before taking part in the interview, participants completed a pre-interview survey. Participants were asked their age and gender and also answered questions about their gaming behaviours. These asked about participants' self-identified gaming experience level (beginner, intermediate or advanced) as well as their preferred genre and platforms and how many hours

a week they played videogames. Following these questions, participants completed the nine-item Internet Gaming Disorder Scale–Short Form (IGD-SF9) (Pontes & Griffiths, 2015). None of the participants met the threshold for internet gaming disorder. Finally, participants were asked about their gambling engagement within the previous 12 months. If participants engaged with any forms of gambling, they were also asked to complete the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001). One of the participants met the threshold for problem gambling. Participants who did not engage in any form of gambling were not asked to complete the final gambling portion of the pre-interview questionnaire. See Table 4.1 for a summary of participant characteristics and instrument scores.

4.2.4. Interview Schedule

The initial interview schedule (Appendix A) was developed by the researcher, derived from the researcher's own interactions and experiences with micro-transactions, as well as current literature. The supervisory team then provided constructive input throughout the development of the interview schedule. Following semi-structured interview procedures outlined by Hennink et al. (2020), the interviews began with more general questions that explored the role of videogames and micro-transactions in participants' lives. These questions served to build a rapport between the interviewer and the participants. The general questions were then followed by more specific questions concerning the goals of the current research (i.e., participants' engagement with and behaviours surrounding micro-transactions, their reasons for using micro-transactions, their gaming behaviours and their experiences with gambling).

4.2.5. Data Collection

Semi-structured interviews were conducted from January to March of 2022. Each participant was interviewed once by the researcher online, using either *Microsoft Teams* or *Zoom*. Participants chose their preferred platform. Interviews lasted between 30 and 45

minutes. Participants were offered no reward for participation. Interviews were transcribed verbatim and participants were given pseudonyms after transcription.

4.2.6. Data Analysis

The analysis process for the present chapter was informed by best practice literature (Nizza et al., 2021). Interpretative phenomenological analysis (IPA) typically follows the process of multiple readings of a single transcript at a time, while note taking in the margins, each time allowing the researcher to become more involved with the participants' experiences and perceptions (Smith & Fieldsend, 2021). Each transcript was thoroughly read multiple times, with no notes being taken to ensure that the researcher was familiar with the data. After familiarity with the data was achieved, the researcher read the transcript again and made notes about notable comments made by the participant or words used by the participant. These took the form of descriptive and linguistic coding. After this, the researcher read through once more, turning the notes made into phrases that capture the essence of the participants' experience, as well as the researcher's initial reaction to this. These formed the conceptual coding and subsequent emerging themes. Following the development of emerging themes, the researcher then listed these in sequential order. During the IPA process, individual researchers may take novel approaches to grouping and condensing the emerging themes. For the present chapter, the researcher printed the sequential list of themes onto physical pages and then colour coded related and similar themes until a set series of personal experiential themes (PETs) were formed. These included superordinate themes individually or with sub-themes. The researcher then identified the most relevant and rich quotes from the transcription to illustrate these themes.

Finally, the researcher then identified group experiential themes (GETs), highlighting any convergence or divergence throughout. The researcher also made a note of relevant and illustrative quotes from each participant in relation to each superordinate or sub-ordinate GET

identified. The GETs were then shared with the supervisory team for triangulation. The final series of group themes is analysed and discussed in the present chapter.

Table 4.1

Sample Demographics, Characteristics, IGD-SF9[1] and PGSI[2] scores

Pseudonym	Age	Gender	Videogame playing level	Hours of game play per week	Preferred videogame genre(s)	Preferred videogame platform(s)	IGD-SF9	Type of gambling in the last 12 months	PGSI
Eleanor	19	F	Intermediate	15	Roleplaying Games (RPGs)	PC, Mobile, Console	20	National Lottery; Private betting	0
Jordan	26	Nb	Advanced	20	RPGs, Platformers, Puzzle, Visual Novels	PC, Console	19	Private betting	0
Tim	22	M	Intermediate	6	First Person Shooters (FPS)	Mobile, Console	21	National Lottery; Another lottery	0
Alex	20	Nb	Advanced	20	RPG, Dungeon-Crawler, Strategy, Massively Multiplayer Online Roleplaying Games (MMORPGS), FPS, Platformer, Action/Adventure	PC	18	None	x
James	25	M	Intermediate	8-10	FPS, Indie, Puzzle, Action	PC	9	None	x
Daniel	23	M	Advanced	30	Adventure, Action, RPG, Puzzle, FPS	PC, Mobile, Console	14	Betting pools	0
Nina	21	F	Advanced	15	Shooters, Battle Royale, Multiplayer	PC, Mobile, Console	21	None	x
Harry	18	M	Advanced	42	FPS, Roguelike, MMORPG, Rhythm Games, Virtual Reality (VR), Soulslike	PC, Mobile	22	None	x
Charlie	21	M	Intermediate	25	Multiplayer Online Battle Arena (MOBA), RPG	Mobile, Console	20	National Lottery; Betting pools	14
Nathan	19	M	Advanced	16	Grand Strategy, RPG, Simulation	PC, Mobile, Console	29	None	x
Michael	27	M	Advanced	8	RPG/Football Sims	PC, Console	15	Slot machines; Private betting	0

[1] Internet Gaming Disorder Scale – Short Form (Pontes & Griffiths, 2015)
[2] Problem Gambling Severity Index (Ferris & Wynne, 2001)

4.2.7. Reflexive Statement

Guidance surrounding best practices for qualitative research indicates that the nature of IPA requires reflexivity from involved researchers (Clancy, 2013). Throughout the research process, researcher bias was considered and noted to ensure that any personal experience with micro-transactions or beliefs did not influence analysis of participants' own experiences. Prior to data collection, the researcher recognised potential bias due to involvement in multiple videogame communities, research experience, and awareness of media discourse surrounding micro-transaction engagement. This means that the research and media discourse surrounding potential issues developed from micro-transaction engagement were not considered unless participants themselves discussed these in relation to their own experiences. Moreover, three of the 11 participants were recruited through the researcher's own videogame community links, meaning similar perceptions and beliefs to the researcher may have been observed. To this end, participants were asked open-ended and neutral questions, encouraging discussion of their own perceptions, beliefs and experiences, with no reference to the researcher's own. The researcher also ensured that neutral responses were given to participants during interviews, as to not convey any opinion or to influence further responses. Finally, any reflexive thoughts were noted during the analysis stage and considered before the group experiential themes were developed.

4.2.8. Quality Assessment

Multiple assurances were taken to guarantee a high standard and quality of research. Alase (2017) highlights the importance of authenticating data when undertaking IPA research, so as to not compromise the understanding of participants' lived experiences. As such, the researcher utilised triangulation and auditing methods to ensure that the analysis upheld the underpinning philosophical theoretical perspectives of IPA. That is, to ensure that the researcher's analysis was interpretative and not wholly descriptive, was idiographic in nature, and remained close to

the participants' account of their experience. Moreover, the integrity of the research was upheld through the inclusion of a participant eligibility criteria. This was to ensure that a group of videogame players who had engaged with micro-transactions were chosen to take part in the study based on their lived experiences and ability to answer the research questions posed.

4.2.9. Ethics

The research was approved by the research team's University Ethics Committee. To obtain favourable ethical approval, multiple safeguarding and privacy policies were considered. Firstly, participants were given an information sheet outlining the purpose of the study, as well as what the study entailed and information about protecting anonymity. Participants were then asked to sign consent forms agreeing to taking part and for the use of the subsequent data. Secondly, participants were given post-participation debriefs, including relevant links to guidance and advice surrounding the topics discussed, should they need assistance after the study. Finally, participant names were pseudonymised to protect their confidentiality.

4.3. Analytical Findings

Between three and five superordinate themes were found in each transcript. As the present chapter explored experiences across a group, these were analysed further to identify similarities or differences in experience. Six superordinate themes were identified during the analysis of the participant interviews (Table 4.2). The remaining fives themes were evident in most of the transcripts, but not all. Two of the themes identified (*Motivations for use* and *Comparing micro-transaction use and gambling*) also had linked subordinate themes. Each superordinate theme is illustrated with linking text from participant transcripts and in cases where sub-themes were present, the sub-theme is illustrated instead.

Table 4.2

Group Experiential Themes

Super-ordinate themes	*Sub-themes*
Self-control vs. impulsivity	
Motivations for use	a. Rewarding developers b. Limited time offers c. Peer influence and social status
Obligation to play after purchases	
Guilt and regret	
Feeling tricked or cheated	
Comparing micro-transaction use and gambling	a. Similar feelings of excitement and euphoria b. Similarities between loot boxes and gambling

4.3.1. Superordinate Theme 1: Self-control vs. Impulsivity

This theme illustrated the similarities and differences in the ways videogame players purchase and use micro-transactions. All participants discussed their experiences with controlling their micro-transaction use or making impulsive purchases. The interview did not explicitly ask about spending behaviour and instead asked participants about their engagement with micro-transactions. In some cases, participants related their engagement to setting spending amounts, or instead discussed their experiences with making impulsive decisions. The participant accounts of their experiences were divided almost equally between those who controlled their purchases and those who typically purchased impulsively. For each participant there were varied degrees of control involved in their purchases. For example, Harry explained how he controlled his engagement with micro-transactions through setting himself spending limits:

> *"I guess...like, I've been on and off for like, several years, like, I don't actively force...like, I set myself like a budget, I suppose, like, this is, this is one and then you're done for the rest of the month. And then, and then I basically live by that. But apart from that, I've not really been like...I've not really felt the encouragement to go into micro-transactions that much"*

Harry appeared to find following a budget easy when engaging with micro-transactions. His lack of consistency when using micro-transactions enabled him to take a step back and objectively view his purchases. He later mentioned his reasons for controlling his spending:

> *"Most of the games I play tend to have the aesthetic micro-transactions, so the ones that don't give you any like sort of advantage. So, it's more just like...I feel like it's just more of a principle for me where I try not to spend...too much. So, I could spend it on other stuff, like, a new mouse or a new keyboard"*

Harry's control over his spending stemmed from the limited impact cosmetic micro-transactions have on the game. For Harry, value is placed on the ability to build skill and competency in the game he is playing. He self-identified as a competitive player and so his priority is not on the appearance of his avatar, but on his level in the game and achieving goals. His ability to maintain his control with micro-transactions was also shown through his rationalisation and planning of his spending on physical game enhancing equipment. This also showed a level of caution when purchasing virtual items, versus tangible goods. Harry's experience indicated his lack of need for micro-transactions, due to being motivated by building skill and learning how to master the game and so he was able to control his spending.

Michael also discussed his budgeting when spending and his need to control his spending, due to the ease at which purchases can be made:

> *"And, and ah well, you know, sure, why not, I'll spend the extra couple of quid. Because I'm topping up my Google account anyway, get a few more Pokéballs because then I can catch even more of them, and then you do fall into that cyclical...well, while I'm here, I may as well expand my storage and my backpack and that kind of thing, but I just have like a really set limit of like, well, I'm not gonna blow like thirty quid on this, you know, fiver, ten like at absolute most"*

Michael discussed his experiences with the free-to-play mobile game *Pokémon GO*, in which expiration-based micro-transactions are offered in the form of *Pokéballs*, which are used to 'catch' *Pokémon*. If a specific number of *Pokéballs* are used a day, the player cannot catch any more P*okémon*, potentially missing out on 'rare' finds. By purchasing more, the player is able to play the game for a longer period of time, without having to wait for their stock to refresh. Unlike Harry, Michael showed a clear struggle not to spend more money than he initially intended to. This appeared to be exasperated by the speed at which micro-transactions can be purchased and having easily accessible funds. For Michael, the longer he wanted and needed to play the game, the more likely his impulsive purchases were. However, Michael's anxiety about wasting or 'blowing' more money was clear in how resolute he was regarding his personal budget and his 'absolute' limits. For Michael, a balance was needed; ten pounds (£10) or below was considered to be a small enough amount of money to pay in order to potentially catch a rare *Pokémon*, but not too much that he felt guilty about his purchase and so he was able to control his spending through finding this balance.

Tim similarly mentioned his planning in regard to micro-transaction use, stating that he actively planned when to engage, but suggested that he often felt like his gaming would be enhanced by purchasing, and so impulsively engaged with in-game purchases:

> *"Because I look back at some of the kind of micro-transactions I've made throughout the course of the game. And then you think it maybe allowed me to get to the end of the game, or participate more in the game for like a week. But after the week, they kind of...it's very micro in the sense that it's um...the impact of it has kind of run its course and ran out. So it's a kind of thing where generally, I think over the course of my gameplay, I've kind of veered slightly more cautiously away from them"*

Tim's experience indicated that he did not feel able to complete a game without micro-transaction use, suggesting that they 'allowed' him to finish the game. It appears that in moments, he would impulsively purchase when he felt stuck or he had no choice but to purchase but that in hindsight, he did not need to engage in a micro-transaction. His change in opinion and engagement with micro-transactions over time was related to an increase in his gaming skill. This indicates that it may be more casual videogame players that are typical micro-transaction users, when they feel as though they are not skilled enough to complete the game and wish to enhance the gameplay further. The need to purchase to enhance gameplay was also true for Nina. Her main forms of engagement with micro-transactions were through cosmetic items and battle passes.

> *"So, with battle pass, I immediately like for the games that I play, I immediately get the battle pass. I also play Fortnite, so I get like there's this membership, thing along with the battle pass I get that. If there's a new skin I like I get it, if there's some sort of*

DLC then, I won't immediately get it because DLCs are a little bit more expensive, but if it's something I'm like, oh that would be really good or I should get it and it'll help me and if it looks like it's worth the cost, I'll do that"

Nina showed no hesitation towards micro-transaction use, and she was immediate with her decision to purchase in-game items, illustrated by her repetitive use of the word 'immediately'. Regardless of the skin or the quality of the battle pass, she showed a tendency to impulsively purchase. She played a variety of games and used micro-transactions in all of these. However, she did take time to plan more expensive transactions. Her mentioning of some purchases 'helping' her in the game shows that she felt her gaming experience was dependent on micro-transaction use, whether through feeling included in social event through purchasing skins, or through increasing XP and gaining rewards from battle passes. In both instances, it is clear that Nina's impulsive purchases give her a feeling of progression and skill afterwards.

4.3.2. Superordinate Theme 2: Motivations for Use

This superordinate theme focused on participants' motivations for using micro-transactions. Three key motivations were established during the group experiential theme analysis. These were *rewarding the developers*; *limited time offers* and *peer influence and social* status. The sub-theme *rewarding the developers* surrounds participants' willingness to use micro-transactions in games made by developers they respected. The *limited time offers* sub-theme discusses both expiration-based and rare or collectible forms of micro-transaction and how these are attractive to some players. Finally, the *peer influence and social status* sub-theme focuses on the influence of players' peer groups when using micro-transactions, as well as how status is reflected in their in-game purchases.

4.3.2.1. Sub-theme 1: Rewarding Developers. This sub-theme encompassed how rewarding developers for their involvement in games is a driving motivation for some videogame players. It may be assumed that when individuals pay a base price for a game, purchasing extra content for the game would feel redundant. However, for some participants, micro-transaction use was a method of supporting games and creators and enabling the continued creation of the game. This particularly seemed to be the case for free-to-play games. Nathan's investment in videogames went beyond playing for entertainment. He explained how he engaged with forums and media discussing the games he was currently playing in-depth. This then factored into his decision for micro-transaction use in games:

> *"I think I might be more likely to buy a micro-transaction, if it's for a game and developer that I respect, if that makes sense. If, the game itself, at base level, is really fun and enjoyable, and I've got a lot of hours out of it and I know that the developers are good people, then I might be tempted to...buy something further within the game just to support the developers"*

By investing more time into researching games and their creators, Nathan built his knowledge about the practices of game companies. To this end, he was more motivated to purchase when he felt a level of connectedness to a developer, or if he found the game developers likeable. The morality of game developers is something that has been discussed in popular media and in gaming communities, particularly surrounding micro-transactions, with the ethics of gaming companies coming being scrutinised due to the monetisation methods they use (King & Delfabbro, 2018). Therefore, Nathan appeared to be more drawn to make purchases when he felt their implementation of micro-transactions was more moral. Nathan's inclusion of his enjoyment level and time investment in the game was also notable, because

these factors together were also mentioned by other participants. Similar to findings by Eliassen (2022), this was especially expressed in the case of free-to-play games. For example, Daniel mentioned this is how he expressed his support:

> *"And yeah, just basically just because the hours I put in, it's almost like, it does also kind of support the game. So, if I'm playing it a lot, it's like, ah I'll spend a bit more on that just to be cool. And you know, they can keep...keep running the game. So, I mean, a lot of the micro-transactions are like the sort of free to play games"*

Similarly, Jordan mentioned the idea that making in-game purchases aided developers, particularly for independent companies:

> *"You know, it's the idea that you know I've got this whole game to play and then I've got more content on top of that and with like if it's like an indie game from a smaller developer I feel quite good because it feels like I'm supporting them a bit more"*

Jordan's emotional response of 'feeling quite good' after supporting the developer is a concept that has been discussed before in the micro-transaction literature, with supporting the developers and feeling charitable towards developers as a key motivating factor for some videogame players (Marder et al., 2019). In the cases of Jordan and Nathan, their involvement of gaming went beyond that of a casual player, and they both engaged with other game-based media and communities. In fact, of those participants whose experiences included engaging with other forms of media outside the respective games they played, most mentioned the game development companies and felt the need to support their work. It then could be the case that a feeling of belonging and community is what drives the feeling of being charitable towards

game development companies, especially for those heavily involved in gaming and for those who identify with particular gaming communities.

4.3.2.2. Subtheme 2: Limited Time Offers. This sub-theme referred to how limited time offers, or good value micro-transactions is a motivating factor for some videogame players in micro-transaction engagement. In-game events have become increasingly common in videogames that use online or real-time features, to provide players with perceived valuable or discounted virtual items. For some, limited time micro-transactions are appealing due to the rarity of the reward offered, and for others, limited time offers are seen as more valuable than regular micro-transactions offered in games. For Eleanor, how micro-transactions are presented within videogames heavily impacted her motivations to purchase:

> *"Yeah, so I'd say...I'd feel more inclined when something was kind of limited edition. I feel like, with...videogame marketing, I feel like if they market something as being limited, in time and special, it does kind of make me consider it a bit more"*

For Eleanor, the ability to feel unique or 'special' among a group of players through the purchase of in-game items was appealing. In this instance, Eleanor's act of micro-transaction use was based on the feeling of belonging to a small, elite group of players who own and can use the item. This may especially be the case for cosmetic-based micro-transactions, because they can be used as a symbol of investment in the videogame. For Eleanor, the value of the item increased if it was special, whether through monetary value or emotional value. In this case, the motivating factor of limited-edition offers indicated Eleanor's need for social acceptance and the positive feeling she got from feeling part of a group. Alex described a

similar experience with a micro-transaction. However, this refers to their purchasing of loot boxes, rather than purchasing skins outright:

> *"Yeah, so I think...I've been more inclined to buy like, loot boxes, for example, in Overwatch during events when they have uh skins that you can only get during that event to get out of loot boxes, for example"*

In Alex's case, even though they may not obtain the skin they desire from loot boxes, the fact that the limited-time skin is a possible reward was a driving motivation in their purchases. In this sense, Alex experienced less aversion to potential loss from loot boxes due to the perceived reward value they might gain. Loss aversion refers to the concept that those who play videogames and engage in micro-transactions would rather spend money than to risk not owning or potentially owning the item (Schmidt & Zank, 2005). In the case of Alex's experiences, the need to own the limited-edition skin outweighed the cost of the money they had spent on opening loot boxes. This has been previously noted in research concerning loot boxes, with arousal levels increasing when more rare items are won (Larche et al., 2021). Therefore, it is reasonable to suggest that Alex felt a sense of accomplishment when a rare reward was finally won from the loot box.

4.3.2.3. Sub-theme 3: Peer Influence and Social Status. This sub-theme illustrated how, for some, peer influence and boosting social status can be a key motivation for micro-transaction use. This sub-theme also illustrated how this may not always be the case, and that for some players, micro-transaction purchases are more of a personal choice. For videogame players influenced by peers, micro-transaction use is an indication of social status through respectability, as well as an opportunity to feel connected to their gaming communities. For

others, it is a more autonomous choice to engage with micro-transactions, based on their view of themselves and their feelings towards their in-game characters. Nina described experiencing positive social benefits from purchasing in-game items, especially regarding feeling respected by her community:

> *"And I want to get involved and be part of it as well and...you know how, uh, in games when you see someone with a really old badge from when they were like they just started off and oh my God, that's an old person and you have automatically have a respect for them. So, things like that, like it, it builds a collection"*

For Nina, community was an important part of her videogame playing and was mentioned continuously throughout her interview. Collecting items appears to be Nina's way of building her in-game status and allowing her to be an individual in a community of like-minded individuals. In this way, Nina needed to feel competent and respected by other players and felt showcasing her purchased items was the best way to do this, particularly in games she felt invested in. She initially mentioned two games that she played for at least two hours every day. These were *Valorant* and *Dauntless*. Both games are free-to-play but offer cosmetic-based micro-transactions. In free-to-play games, it could be the case that at a base level, Nina did not feel that she could personalise and customise her avatars or characters to the level she needed to express herself properly, and so the cosmetic items offered appealed to her. Moreover, Nina purchased items like skins to gift to her friends in-game:

> *"Um, to kind of be part of the community, like if my friends like a skin and they have the skin, or if they don't have a skin and they like it, and I want to get it and give it to them"*

Another of Nina's experiences centred around buying skins for other individuals, specifically because reciprocal gift-giving factored into her motivations for micro-transaction use. By gifting friends her skins, she boosted or maintained her friendships with her community members and also increased the likelihood that she would be gifted in return. This in turn boosted her reputation and projected a positive image of herself to those she played games with. For Nina, this served to be beneficial in games like *Valorant* because teamwork can be a big part of gameplay. Daniel, on the other hand, explained his change from purchasing due to his friends to only purchasing because he enjoyed the micro-transaction:

> *"Um, personally, I don't...maybe, maybe when I was younger, I maybe did it a bit more like to be like...oh, hey, look, I've got this cool item in this game or something. But nowadays, it's probably less like...for me to buy something, I'd have to think it's like, oh, that's something cool that I'd want to get. Like, I wouldn't get something just because like, you know, my friend or someone else says, oh, that's really cool. Like, sort of, like, it has to be more like a...yeah, I do want that, I'd get that"*

The change in behaviour Daniel described appears to centre around his ideas of friendship and popularity. He explained that as he became more autonomous and as his maturity levels increased, he decided that the value of the items he purchased should be more personal. In this sense, it may be the case that Daniel's risk-taking behaviours (in this case compulsive or less inhibited spending) decreased as he gained a more solid sense of self and identity. It appeared as though Daniel's need for autonomy outweighed his need for a sense of belonging among as his peers as he aged. Similarly, Charlie purchases were more individual and focused more on

his attachment to his in-game character, as opposed to how other players viewed him and his in-game avatar:

> *"But then when I play, you know, mobile games, yeah, I do realise...it...sometimes with the skins, it makes...it looks cooler. And like, you know, you've got the feeling, you're attached to it. It's like, you know, you have a pet dog, you want to make your pet dog, you know, the most beautiful, the most handsome dog ever. That's why you buy him or her like clothes, good chains, or anything"*

Although looking 'cool' played a role in Charlie's purchasing, his experiences indicate his need for autonomy, presented through a unique in-game avatar and the resulting pride he feels when purchasing for his avatar. Likening his character to a 'pet dog', he showed his connectedness to his in-game self and how he was represented online. For many videogame players, videogame avatars can represent the 'ideal self' and can alter how players view themselves. Certainly, it seems that Charlie felt positively about buying skins in a videogame, possibly due to the boost of confidence he got from feeling as though his avatar represents his uniqueness among his peers.

4.3.3. Superordinate Theme 3: Obligation to Play After Purchases

This theme concerned the feeling of obligation that videogame players feel after micro-transaction use. For some participants, this concerned feeling like they needed to get good monetary value from the micro-transaction, and for others it was the feeling of needing to complete criteria to gain the most rewards from the micro-transaction. In both cases, most participants felt like they were playing the game more than they had originally intended to. It should be noted that all participants who discussed feeling obligated to play the game more

after purchases referred to the battle pass-style micro-transaction and their experiences with this. James explained how he typically avoided battle pass-style micro-transactions, due to how time consuming completing the tasks for the rewards could be:

> *"So I think it does kind of it does kind of operate in a similar sort of way where, and like I said, this is usually why it's like a one-time purchase because it kind of like makes you feel like you ought to be playing quite a lot of the game and maybe like if I'm already kind of in the mood to like...if I'm, if I'm enjoying something and maybe I do like the, like when I did buy the Apex Legends Battle Pass I did maybe, I think I was...I was still, when I was still quite new to the game and I was quite enjoying it. Like I knew that I'd probably spend like, you know, a few hours every night just playing it with friends and stuff. But yeah, after a certain point it just kind of get to that similar feeling of oh I ought to play a bit more. Because I've you know, I've already spent the money on the Battle Pass and if I don't unlock everything then like have I wasted my money because I haven't like got everything out of it as I could"*

In this extract, James mentioned that he was still learning to play the game when he purchased the battle pass and felt like he would get more enjoyment and skill from the game by purchasing. In his experience, he had not initially invested a lot of time playing *Apex Legends*, but he planned to invest more time into the game through purchasing the battle pass. However, it was clear that by purchasing the battle pass, James felt the need to complete all the tasks to get the best monetary value, even if he was not gaining any enjoyment from playing. The shift from enjoyment to obligation occurred over time and James could be described as feeling a sense of 'sunk cost' when playing (Arkes & Blumer, 1985). That is, experiencing a negative feeling when not getting as much out of the game as possible, but feeling as though

he had already invested too much to stop playing. However, it seems that James' experience was not new to him, as he mentioned the 'familiar' feeling of needing to play more after time. However, for James, the feeling of obligation was natural to experience when playing a game for a long time, making it easier for him to decide when to stop playing. While Nina's experience was similar to James in that she felt like she must complete all the battle pass tasks to obtain the most value from it, unlike James, she did not stop playing the game, even if she no longer enjoyed it:

> *"I feel really bad like, I will grind like, the Valorant Battle Pass ended yesterday and I was still like, only halfway through it, and so me and my boyfriend, we both got together and just kind of grinded the last few hours and then I had to go to meetings. So, he finished up a few more levels and we got to almost the end, we still had five levels, and there was this knife at the end of that level that was really good and exclusive and you don't get that again. So, we had to kind of...pay to level that, pay with like virtual currency to level to that level, so we could get that knife"*

In this extract, Nina discussed her negative feelings when she did not believe that she would complete the battle pass in time, often calling upon her partner or friends to aid her if she had other responsibilities. Her motivation to obtain a rare and exclusive reward surpassed her need for enjoyment, so much so that she was willing to pay to complete the levels needed. It appeared as though Nina would feel greatly unsatisfied if she did not complete the battle pass, holding a belief that she must finish each goal and gain each reward or there would be negative consequences. However, Daniel's experience was very different to that of James and Nina. For Daniel, his purchasing of a battle pass came after he had already invested a lot of time in the game:

> *"So, it's like, oh I, I play it or I might play a bit more regularly, just to make sure I do level that up. But...again, usually, those games that I would buy it in are usually games that I play regularly anyway, so it probably...it does encourage me to keep going back to that game. But yeah, it's normally because I'm playing that game a lot anyway, I wouldn't sort of get a new game and just after playing it for like a very short period, buy it"*

In this extract, Daniel described how his purchase of a battle pass typically came when he knew he would be spending a lot of time engaging in a particular game. Unlike James, Daniel typically focused on playing one or two games at a time, allowing himself to fully invest time, energy and potentially money into the games. Daniel did not appear to experience any negative consequences from purchasing the battle pass and did not feel like it was a necessity to purchase and 'level up'. For Daniel, it was a supplementary way to earn benefits in a game he already built XP in and did not feel like it was a responsibility. In this sense, Daniel felt like it was an easy way to earn rewards, especially when he had built his skills and competence in the game already.

4.3.4. Superordinate Theme 4: Guilt and Regret

This theme concerned the feelings of guilt and regret that participants reported feeling after using micro-transactions. For some, this was an immediate but small amount of guilt after their purchase, which was often accompanied by a feeling of excitement. For others, there was a longer-term impact and feeling of regret. Michael's experience with regret was expressed immediately after he made a purchase, although it was paired with the joy he felt about obtaining more items to aid his game:

> *"Whereas like, oh I've just bought like four hundred Pokéballs that I'm going to waste trying to catch Rattatas. Like, you know, there's definitely like, you have to process that. So, thirty seconds, I would, I'd say it's probably either, it's fifty-fifty of like, yes, I've got these items, I'm going to use this and also like, I've just spent money I didn't have to spend"*

In this extract, Michael expressed the emotional processing that occurred after using a micro-transaction. He discussed the immediate seconds after he purchased a game-enhancing micro-transaction. In this case, he was able to continue playing the game by purchasing an expiration-based micro-transaction, and so it was clear that he felt a level of excitement, especially when he enjoyed the game he was playing. Earlier in the interview, Michael mentioned the idea that he often regretted buying non-physical goods, because he did not technically own the 'non-tangible' items. However, his contradicting feelings were apparent, as he later mentioned a lack of longer-term consideration of his purchases, stating that *"And then once it's done, it's done, you know…"*

In this case, the feeling of regret was minimal, and only immediately after his purchase. It also appeared that this low-level of regret occurred because Michael had previously self-determined his own budget and only spent smaller amounts on the game. Moreover, it is apparent that Michael was accepting of his purchases and by budgeting, was able to control the level of regret he felt through his rationalisation of his purchases and his likening of micro-transaction use to expending money on a hobby. For Daniel, a lower level of regret was also experienced after micro-transactions purchases:

"I don't know, I don't feel...too bad about it, 'cus I never do it - I'm never spending massive amounts, so...and especially now that I've got a job, so I've got a bit more money, it's like, I don't mind spending those, those bits here and there. So yeah, I don't feel, I never have like, negative feelings or regret stuff when I do it. I just...especially since if, it's normally a game I like so it's not going to be like, oh, well, I don't play that now. Or like, things like that. So…"

Daniel's assurance in his purchases was based on the small amount of money he spent at a time, illustrated by his use of 'bits here and there'. By purchasing smaller amounts, at a lower frequency, he was able to feel comfortable in the choices he made when using micro-transactions. Additionally, Daniel's occupation helped him to change his view on his spending, because he was more secure in his finances, and so felt less negatively about his expenditure on games, especially if it was a game he enjoyed and had invested a lot of time in already. Eleanor's occupation also impacted her perception of her spending, although unlike Daniel's experience, Eleanor's was not so positive:

"Definitely, I feel like...when I used to purchase micro-transactions, I feel, I'd feel quite good in the moment. I feel like yeah, you know, skip the quest. It's been a, it's been made a bit easier for me but then I'd check my bank account, and I'd be like, why have I spent a few quid on this when I'm a student and I shouldn't be spending money on…a videogame"

In this extract, Eleanor explained her thought processes during a micro-transaction spend, in the immediate moments afterwards and then at a later date. Unlike Michael and Daniel, Eleanor's feelings of guilt and regret impacted her later than the initial moments after her

purchase. In fact, she described her rumination about the amount she had spent, illustrated by her repetition about her spending. It was clear that Eleanor did not view videogames as a worthwhile way to spend her limited student income, as seen by her contemplation and pause before saying 'videogame'. She specifically mentioned her student status in her negative thoughts and showed her perception of what was 'acceptable' for a student to spend money on. It may be the case that for Eleanor, her guilt came from her view that students should be frugal and should save money for 'sensible' purchases.

4.3.5. Superordinate Theme 5: Feeling Tricked or Cheated

This theme concerned the feelings of being tricked or cheated by micro-transactions and how micro-transactions are included in games by videogame companies. For some participants, this related to the micro-transactions themselves and the feelings of fairness for those who alter gameplay. For others it was the feeling invoked after purchasing and the length of time the reward feeling lasted for. Nathan's feeling of being cheated had multiple levels, based on his expectations from the game he was playing itself, as well as his perception of specific micro-transactions:

> *"I think if I can give a concrete example, there was a game that came out a couple years ago called Shadows of War, um, which is a really fun game. Except for a while, they've since patched out, there was a marketplace where you could buy characters and…use real life money to gain an in-game currency and that completely took the emotion away from me. It's sort of, a...not barrier, it's like a...almost a cheat code for the progression system in the game and it completely takes out any sort of…immersion you have cause it's- you're in this huge fantasy world"*

For Nathan, videogames were an investment of time and money and so should provide a positive experience, with immersion being an important factor in his enjoyment. Based on his expectations from the games he played, it appeared that Nathan used gaming as a form of escapism and had a positive experience with a feeling of 'flow'. This was evidenced later in his interview, where he referred to gaming as his 'crutch' for dealing with negative emotions. It is clear that his negative thoughts surrounding micro-transactions stemmed from his inability to escape reality and the consequences of his negative emotions when being prompted to purchase an in-game item with real-life currency. Due to this, he felt cheated out of an opportunity to 'switch off' from his life and reality.

Nathan was also motivated by skill development and his need for competence. Consequently, Nathan felt as though using micro-transactions offered some players skill advantages in the game, based on the amount they paid, illustrated by his use of the phrase 'cheat code for the progression system'. Nathan used the words 'cheat code' to symbolise how easy he perceived it was to progress in the game when not obtaining mastery without monetary input, whereas completing the game without micro-transactions took more time and effort. In this sense, Nathan felt cheated by micro-transactions and the lack of skill they represented to him. Harry's experience was similar to Nathan's, seemingly due to their perceptions of the purpose of videogames:

> *"So how the weapon skins work was that they also modified the weapon stats, but when they nerf the weapon, they didn't nerf um this weapon skin in particular. So it was still running around and being the complete menace it was before the nerf. And, and that's the sort of, like, micro-transaction that I dislike, because they just gave everyone*

a competitive advantage and basically force everyone to, to align themselves with a certain um, a certain loader. Otherwise, you'd be behind everyone"

Much like Nathan, Harry was motivated by gaining skills and mastery. His negative experience with game-altering micro-transactions reflects his goals for competence in any game he is playing. By giving some players a competitive advantage, he felt as though the micro-transactions took away his ability to control the level of fairness, and therefore his enjoyment within the game. This is illustrated by his use of the word 'force', showing how he felt cheated out of in-game autonomy due to the inclusion of micro-transaction in the games he played and the pressure he felt to purchase. His use of the word 'menace' further illustrated his experiences with game-altering micro-transactions, showing how he felt cheated out of a relaxing gaming session, instead having to play differently to accommodate the effects of the weapon skin and the chaos this reflected in gameplay. Alex and Eleanor also expressed their feelings of frustration with their experiences with micro-transactions, although their reasoning for this feeling differed to both Nathan and Harry:

"And I think that kind of model is very predatory. Towards people who you know...have, like more personalities susceptible to that kind of thing" (Alex)

"So, I definitely... I guess, say I did, I have fallen victim to micro-transactions" (Eleanor)

In these extracts, both Alex and Eleanor expressed their feelings of being tricked by videogame companies and the monetisation methods used in modern games. Their use of the words 'predatory' and 'victim' indicate the lack of agency they felt when interacting with

micro-transactions. For both participants, what should be an enjoyable and relaxing past-time had instead left them with a feeling of helplessness. In this sense, it appeared they both felt pressured by the games they played to pay, in order to get the same enjoyment as other players. Eleanor's repetitive use of 'I' illustrates her feeling of ownership over her decisions to purchase micro-transactions, even though she felt victimised by the action. However, Alex referred to others who were susceptible, rather than feeling personally susceptible, even though they had engaged with micro-transactions previously. For Alex, continued engagement with and a vulnerability to micro-transactions was related to compulsive behaviours and an 'addictive personality'.

4.3.6. Superordinate Theme 6: Comparing Micro-transaction Use and Gambling

Superordinate theme six focused on participants' sense-making of micro-transaction use in relation to gambling. Two sub-themes were identified during analysis of group experiential themes. These were *similar feelings of excitement and euphoria* and *similarities between loot boxes and gambling*. The sub-theme *similar feelings of excitement and euphoria* discusses the mood boost and anticipation involved in micro-transaction use and how participants directly compared this to forms of gambling. The sub-theme *similarities between loot boxes and gambling* focuses on participants' experiences with loot box micro-transactions, and how surprise-based micro-transactions compared directly to forms of gambling.

4.3.6.1. Sub-theme 1: Similar Feelings of Excitement and Euphoria. This sub-theme explored participants' experiences with micro-transactions and how they felt their engagement mirrored the emotional and psychological impact of gambling. It should be noted that all participants who had self-reported taking part in some form of gambling in the past 12 months mentioned the similarities in feelings and emotions between micro-transaction use and

gambling, although this may be due to the ability to recall their experiences in greater detail than those who had not taken part in any form of gambling in the past 12 months. In addition to this, participants who had gambled completed the PGSI (Ferris & Wynne, 2001) before their interviews. It should be noted that of the participants' extracts presented in this sub-theme, Eleanor did not meet the criteria to be considered a problem gambler, whereas Charlie did. Charlie's experiences with micro-transactions were grounded in the rewards he received from opening loot box-style items:

> *"So,if you say like, what's the joy from you know, doing that micro-transaction? It's gambling. It's the same joy. Like you go to a casino and you win something. Or like, you know, with the card games, you buy packs. And like, you open it...Oh, I get good cards or bad cards...It's the same feeling"*

In this extract, Charlie directly compared micro-transaction use to gambling, as well as purchasing real-life card booster packs, illustrated in his resolute phrasing of *"It's gambling."* Charlie felt a similar sense of excitement in the anticipation period before finding out if he received 'good' or 'bad' loot. For some loot box buyers, arousal levels increase in the moments before a reward items are revealed (Brady & Prentice, 2019), so it made sense that Charlie may have felt this way and that this experience was memorable to him. His feelings after the loot was revealed also imitated that of gambling, through the two potential outcomes – a win or a loss. This was illustrated in the way that Charlie recounted his experience because it mirrored the experience of gambling, through a pause before he says *"...I get good cards or bad cards",* as though he was reliving the 'rush' he felt after an anticipatory period. However, Charlie's experience was not necessarily always positive:

"And then, you know, like, with micro-transactions, we are buying you know, a dose of joy. And the dose of...that dose of joy doesn't last long. Just lasts, you know, for quite a short amount of time"

The language that Charlie used in this extract indicated how he related the purchase of micro-transactions to medication, illustrated through his repetitive use of the word 'dose'. For Charlie, a micro-transaction was a temporary remedy to his negative mood, and so for a short time, it fulfilled any needs he may have. The word 'dose' also highlights how temporary the feeling actually was for him and the lifecycle that micro-transactions have. In this case, in order to feel the euphoria for a longer period of time, Charlie experienced a need to continue and increase the frequency of his micro-transaction use, regardless of if he experiences a 'win' or a 'loss'. In this case, it indicated a similarity between those who engage in gambling and loot box purchasing, as those who gamble often continue even when experiencing a loss, in attempt to chase a loss, or based on the assumption that a win will imminently follow a loss (Griffiths, 1990). Similar to Charlie, Eleanor felt a sense of euphoria after using micro-transaction. However, unlike Charlie, Eleanor's urges to purchase micro-transactions were sporadic, and infrequent rather than consistent:

"Maybe I'll occasionally get a scratch-card or two but it's not something I do, quite regularly because I feel like... it does kind of in the grand scheme of things it does kind of evoke the same emotions as micro-transactions you know, you get this original like boost and excitement but in the long term I feel like it's more damaging"

In this extract, Eleanor outlined the emotional process of using micro-transaction. She described her feeling of immediate gratification and reward, regardless of the outcome, relating

it to her experiences with purchasing scratch-cards. Similar to Charlie's gambling experience, Eleanor felt a sense of arousal during the anticipatory period of micro-transaction use. It should be noted that Eleanor typically did not engage with loot boxes, but rather expiration-based micro-transactions and yet still experienced a feeling of excitement in the moments before purchasing. In this case, Eleanor appeared to feel an instant reward through her ability to skip a level, or to be able to continue playing the game, illustrated by her use of the word 'boost', which mimics the feeling of a 'high' that those who gamble experience (Griffiths, 1996). However, unlike Charlie, Eleanor indicated that she perceived gambling to be more damaging than using micro-transaction, potentially due to the type of micro-transaction she purchased. That is, she does not experience a 'win' or 'loss', only an exchange of currency for an immediate win. This highlights a potential difference in the feeling and reward processes involved in both gambling and non-surprise-based micro-transactions.

4.3.6.2. Sub-theme 2: Similarities Between Loot Boxes and Gambling. This sub-theme concerned how participants perceived similarities between specific forms of micro-transactions and gambling mechanisms. For most participants, it was loot boxes and the element of surprise and its similarities to gambling that were mentioned over any other micro-transaction mechanism. It is important to note that the associations between loot boxes and gambling have been reported on heavily in popular media and by governing bodies globally (Close et al., 2021; Spicer, Nicklin, et al., 2022), so this may have shaped the perceptions and experiences of participants. Nevertheless, most participants had, at some point, engaged with and purchased loot boxes and had an understanding of multiple forms of gambling, even if they had not engaged with any method of gambling before. For James, the similarity between micro-transactions and gambling was distinctly related to the underpinning surprise-based element involved:

"But like if you're buying like a loot box where you don't know what's actually inside it, you are kind of just buying something which you don't necessarily know is gonna...is going to have anything that you actually want in it. So, and again, that's despite me having bought like, like a handful of loot boxes, just to kind of just to sort of try...try my luck...yeah, I never really...I'd consider that kind of thing...gambling"

In this extract, James recounted his experiences with infrequent loot box purchasing, relating the sense of luck and random reward mechanism to gambling, illustrated through his use of the phrase 'try my luck'. Charlie similarly discussed his experience with surprise-based-micro-transactions, but further mentioned the concept of a 'jackpot' through having an 'ideal' or goal character or item:

"But when you know, when I first roll it, and then I didn't get what I want, then I, you know, buy another currency, roll it again, if I get one, that'd be good. But not...if not, you know, just roll again. Especially, you know, if you if you really want the item, or the characters in, you know, in that event, or something like that"

In this extract, Charlie's continuous use of the word 'roll' here could be symbolic of the rolling of dice in gambling games, due to the outcome being unknown and the surprise element involved. The use of the word 'roll' could also be Charlie relating loot boxes to some forms of gambling. Loot boxes are suggested to mimic or simulate slot machine gambling through similar graphics, colours, and sounds (Drummond & Sauer, 2018) and so in this case, Charlie was relating his experience with loot boxes through their similar structure to slot machine gambling. Additionally, Charlie's method of purchasing loot boxes in a cyclic nature until a

desired outcome was achieved is similar to that with gambling, particularly where players are informed of a larger jackpot (Griffiths & Wood, 2001). It also appears to be the case that for Charlie, a near-miss is a motivation to keep 'rolling'. In relation to gambling, near-miss events encourage increased involvement through re-enforcement that a win is imminent (Parke & Griffiths, 2004). This is illustrated through Charlie's phrasing of *"if not…just roll again"*. Michael's perception was similar to that of James and Charlie. However, in his own experience, there was a distinct difference between loot box mechanisms and gambling:

> *"So, to flip the coin, Yu-Gi-Oh Legacy of the Dualist. You buy booster packs in game, but it's only for in game currency that you gain from playing the game. So, it has that element of like, ooh, I don't know what I'm gonna get. But it's purely based on in game currency that you're earn in the game...you cannot buy it, you cannot spend real money on it, that, completely fine"*

In this extract, Michael explains his understanding of the surprise element of loot boxes, or packs, in specific games. Previously in his interview, he likened the potential of obtaining 'rare' items to gambling, by way of the potential high reward and the 'stakes' involved in both micro-transaction use and gambling games. However, unlike other participants, Michael highlighted the distinction between paid-for loot boxes and those bought using earned in-game currency. For Michael, there was a level of morality involved based on financial risk. This is illustrated when he used the phrase 'completely fine' when discussing earned loot boxes. In this sense, Michael's association between micro-transactions and gambling is the monetary aspect involved, regardless of the element of surprise.

4.4. Discussion

The present chapter explored videogame players' experiences with micro-transactions and in doing so answered the three RQs posed: (i) How do videogame players experience different forms of micro-transactions? (RQ1); (ii) What motivates videogame players to engage with micro-transactions? (RQ2); and (iii) How do videogame players relate micro-transaction use to problems with gambling and problematic gaming behaviour? (RQ3).

The six themes identified from participant accounts were (i) *self-control vs. impulsivity,* (ii) *motivations for use (rewarding the developer, limited time offers* and *peer and social influence),* (iii) *obligation to play after purchase,* (iv) *guilt and regret,* (v) *feeling tricked or cheated* and (vi) *comparing micro-transaction use to gambling (similar feelings of euphoria and excitement* and *similarities between loot boxes and gambling)*. Similarities in the present chapter's developed themes and the themes found in previous literature can be observed. For example, themes such as impulsivity, rewarding the developer, limited time offers, and peer and social influence and similarities between loot boxes and gambling have commonly been found throughout qualitative studies relating to micro-transactions (Alha et al., 2018; Cleghorn & Griffiths, 2015; Nicklin et al., 2021; Petrovskaya & Zendle, 2020; Puiras et al., 2023). However, by utilising IPA methodology and by discussing a broad scope of micro-transactions, the present chapter identified several novel themes not yet identified in the extant literature. For example, obligation to play after purchase, guilt and regret, and feeling tricked or cheated. Therefore, the following section elaborates on and analyses theory surrounding previously found themes, as well as discussing the potential psychological underpinning of those not previously identified in literature.

4.4.1. Frustration with Needs and Links to Motivations and Self-control

When assessing participants' experiences with micro-transactions, the underpinning motivations and needs of each participant should be considered. Self-determination theory (Deci & Ryan, 2015) posits that individuals' motivations exist between three interconnected forms. These are (i) autonomous motivations (i.e., for their own interest and personal growth) which are often intrinsic in nature, (ii) controlled motivations (i.e., for external reward and the desire for approval from others or themselves) which are often extrinsic in nature, and (iii) amotivation (i.e., a lack of motivation) where individuals feel as though they do not possess the ability to control outcomes (Mills et al., 2021). Self-determination theory also suggests that three basic psychological needs should be fulfilled in order for individuals to function successfully and to foster healthy well-being. These are autonomy (i.e., the feeling of being in control of one's own behaviour and the ability to take direct action), competence (i.e., the feeling of developing skills needed to undertake tasks and to gain mastery), and relatedness (i.e., the feeling of connection to others and a sense of belonging) (Ryan & Deci, 2017). When these three needs are fulfilled, individuals are more likely to be successfully motivated autonomously, rather than through controlled motivations (Deci & Ryan, 2015).

In the case of micro-transaction engagement, it could be that a need for external reward indicates frustration with the three basic psychological needs and that different types of micro-transaction may appeal to each differing need. For example, as suggested in Chapter 2 of the present thesis, battle pass type micro-transactions offer videogame players the opportunity to earn rewards by earning experience points (XP) in the game. These XP points can then be used to unlock rewards. As the player progresses up each level or 'tier' of a battle pass, the number of XP points needed to unlock the next reward increases, as does the 'rarity' of the reward. In this case, a player who feels like they are not in control of their own choices in real-life or their personal goals, may be more likely to engage with a battle pass micro-transaction, as it could

potentially fulfil their need for autonomy. Moreover, the ability to 'level up' the battle pass may appeal to those with a need for competence, allowing for the completion of the battle pass to instil a sense of mastery of the game and skill-building. This is reflected in the present chapter, particularly when looking at accounts of experience with specific micro-transaction types. For example, Tim's experience centred around pay-to-win-based micro-transactions that aided in his completion of the game and his feelings of being a low-skilled player. When he felt as though he had developed his gaming skill, he no longer felt rewarded by pay-to-win micro-transactions. This could be due to the fulfilment of his need for competence through self-determined growth and development in the game.

Motivations for both gaming and gambling have been identified in previous research (Lee et al., 2007; Yee, 2006a), with each individual motivation linked to either extrinsic or intrinsic forms of motivation (Chantal et al., 1995). Moreover, an underlying link to each of the basic psychological needs can be observed in relation to the design of videogames and player motivations (Ryan et al., 2006). For example, online multiplayer games may be particularly appealing to those who are motivated by teamwork and social interaction and players may experience fulfilment of the need for relatedness, through an increased sense of community and belonging. Similarly, gambling involvement and type are suggested to be related to specific motivations, potentially due to the underlying needs involved (Chantal et al., 1995; Mathieu et al., 2020). As micro-transactions are suggested to encompass the convergence between gaming and gambling (King & Delfabbro, 2020), it would be reasonable to suggest that motivations for micro-transaction use also highlight the convergence between the two, including the underpinning fulfilment of autonomy, competence and relatedness involved. The motivations for micro-transaction use found in the present chapter illustrate this convergence and can be explained using self-determination theory as a basis. It could be suggested that this needs-motivation connection can be observed when looking at gamers motivated to purchase micro-

transactions in order to reward the developer of the game. This is illustrated by Jordan, whose experience with using micro-transactions centred around the sense of support and community they felt when purchasing. In other words, Jordan may be experiencing needs frustration based on relatedness, thereby increasing their motivation to reward the developer and resulting in the fulfilment of his relatedness need.

Finally, when looking at participant experiences in the present chapter, participants experienced a varying ability to control their micro-transaction use. For example, Michael's experience centred around his need for competence, reflected in the type of micro-transaction he purchased and his need to continue playing the game to build his skill. Michael often found it easy to spend more money than he originally intended on micro-transactions, leading to greater financial loss as a result of his need to continue playing. In wider gaming research, it is suggested that frustration with needs can also impact the relationship between self-control and problem gaming behaviours in that an individual being frustrated with their basic psychological needs can alter individuals' ability to control their behaviours (Mills et al., 2021). In a gaming context, this can lead to maladaptive gaming behaviours, due to the fulfilment of basic needs overriding the need to inhibit gaming time and investment. In the case of micro-transactions, it could be that greater needs frustration, leading to an inability to regulate behaviour, may result in maladaptive use of micro-transactions, through compulsive buying.

4.4.2. Speed Of Purchase and Links to Impulsivity and the Impact of Purchase Frequency

For some participants, the ease at which micro-transactions could be purchased was a large factor in spending more money than originally intended. In a lot of cases, participants play videogames in online spaces or on consoles, where the norm is to save card and bank details to the system, for ease of purchasing games. The integration of stores and marketplaces into these online spaces allows for faster spending and less disruption to gameplay. Speed of play has

been suggested to be a key factor in the excitement and enjoyment of gambling games and can encourage longer game play time and greater monetary expenditure, particularly for those with a propensity for problem gambling behaviours (Harris & Griffiths, 2018). While there is already an established association between problem gambling and loot box buyers (Zendle & Cairns, 2018, 2019), it is reasonable to suggest that a similar reward mechanism is occurring, regardless of the micro-transaction type. That is, the ease and speed of purchase leads to faster feelings of gratification and reward. With less time for individuals to think and make informed decisions about their purchases, it is clear to see how instant rewards may lead to more money spending than intended, which is the case for multiple participants in the present chapter. This may particularly be the case for surprise-based micro-transactions such as loot boxes, given the gambling-like nature of these and the added arousing elements of potentially rare rewards (Brady & Prentice, 2019).

Additionally, speed of purchase, as well as the speed of the 'effect' of the micro-transaction played a large role in participants perceptions surrounding the similarities between gambling mechanisms and micro-transactions. Namely, Charlie's experience with repeated loot box purchases. His experience centred around his patterns of purchase and the ability to continuously purchase, which he attributed to the short lifespan of the micro-transaction. Charlie also associated loot box buying with gambling through the similar feelings of reward after using a micro-transaction, and his need to increasingly purchase, in order to feel a sense of euphoria and obtain the 'jackpot' skin or item. In gambling literature, it is suggested that the development of tolerance and chasing behaviour increases the chances of experiencing other problem gambling symptoms (Sleczka & Romild, 2021). It should be noted that Charlie met the PGSI criteria (Ferris & Wynne, 2001) for problem gambling. It is therefore reasonable to suggest that his experience with loot box buying mirrors that of forms of gambling, through

the structural characteristics of event frequency and opportunities to purchase repeatedly, and as such, experiences similar feelings to those who gamble excessively (Griffiths, 1999).

4.4.3. Dysfunctional Cognitive Beliefs and Links to Maladaptive Behaviours

For some participants, the feeling of obligation was a prominent factor in their experiences of using micro-transactions. For example, James felt a need to continue playing the game after purchasing a battle pass, leading to a turning point where he no longer felt playing the game was fun. In this case, he felt an obligation to play in order to obtain the most value from his purchase. Nina also experienced this feeling and continued to play even after she stopped having fun playing the game. Yee (2006b) discussed how for some videogame players, increased engagement can lead to the game feeling like work. That is, it loses its enjoyment value due to the time expenditure needed to be successful. It could be suggested that this mirrors the experiences of both Nina and James. Beyond the feeling of success from the game, it could also be suggested that the sense of obligation comes from the participants' own rule-making in relation to how they play the games, and their own cognitive beliefs. In this case, participants have a distorted perception about the value of the battle pass rewards, and in turn create their own rigid set of rules regarding how they play in order to feel fulfilled from the battle pass (Marino & Spada, 2017). Although no participants in the present chapter were classified as having internet gaming disorder, it has been suggested that the cognitive dysfunction associated with rewards in game can potentially lead to higher risk of maladaptive behaviours and internet gaming disorder (Li et al., 2020).

Moreover, some participants felt an emotional connection to their in-game avatar and went so far as to purchase cosmetic-based micro-transactions as a method of self-expression. For example, Charlie felt a sense of attachment to his avatar, likening it to a 'pet dog'. This could

be suggested to indicate a level of avatar attachment. In other words, Charlie believed that his in-game avatar was an extension of himself (King & Delfabbro, 2014). This behaviour is suggested to be a form of dysfunctional cognitive belief that could potentially lead to maladaptive gaming behaviours through obsession with in-game characters and the feeling of achievement as though it is real-world achievement (King & Delfabbro, 2016). Therefore, having the potential to lead to risky micro-transaction use, or over-expenditure in videogames (Billieux et al., 2020; Szolin et al., 2022a, 2022b).

4.4.4. Morality and Links to Self-Conscious Emotions and Social Identity

The concept of morality was discussed by participants in relation to 'good' and 'bad' forms of micro-transactions, as well as 'acceptable' methods of engaging with micro-transactions. In the present chapter, morality was heavily associated with participants' perceptions of community ethics and moral code. When looking at the feelings of being cheated by micro-transactions, both Harry and Nathan expressed emotions of contempt towards micro-transactions that gave competitive advantages. Typically, individuals experience feelings of contempt, disgust and anger towards acts they perceive to be a violation of one or more of three types of ethics (Tracy et al., 2007). These are based on community (i.e., based on social convention), autonomy or divinity (i.e., religious-based values). In the case of both Harry and Nathan, their contempt stemmed from the disadvantages faced by those who chose not to purchase micro-transactions, particularly in the games they engaged with.

In other words, they felt as though the micro-transactions that give competitive advantage violated the ethics of both their communities, as members of a group of players who refrain from purchasing, as well as their autonomy, because they felt as though greater pressure was placed upon them to purchase. A feeling that micro-transactions are unfair has been identified in recent literature, particularly in relation to pay-to-win forms of micro-transactions

(Petrovskaya & Zendle, 2021). The contempt experienced from the feelings of unfairness or unethical inclusion of micro-transactions can then lead to an 'othering' and a lower social status being placed on those who chose to purchase, through the feeling of identity among the groups of players who refrain from purchasing (Evers et al., 2015).

In fact, social identity appeared to be a driving factor involved in purchases for participants, through a greater feeling of belonging among peers but also through wanting to feel unique and distinct from peers. For example, Nina's experiences were grounded in her gifting and receiving skins from her peers in-game. She expressed her willingness to purchase when items were a limited edition and when peers and social influence were involved, especially if her friends displayed or wanted a particular rare skin for their avatars. This can be explained by looking at the sense of virtual community involved in multiplayer games. That is, videogame players typically purchase more when experiencing a sense of belonging from their online spaces (Hsieh & Tseng, 2018). With Nina, the giving-receiving nature of her purchasing reflects the sense of community she feels.

Additionally, participants were more motivated to purchase when limited time offers were available. This has been readily discussed in relation to micro-transactions and virtual items, with social identity forming the basis of this motivation. That is, players wish to feel unique and distinct from their peers in virtual spaces and purchasing limited edition and unique items helps them achieve this (Cai et al., 2019; Cleghorn & Griffiths, 2015; King, Russell, et al., 2020). This is reflected in the present chapter by Eleanor, who indicated that feeling special was a key factor in her intention to purchase micro-transactions and that rare items boosted her feeling of being unique in a group of those who purchase.

Finally, participants also discussed forms of self-conscious emotions (other than contempt), such as guilt in relation to the longer-term impact of using micro-transactions. Michael and

Daniel expressed minimal feelings of guilt after their purchases, whereas Eleanor expressed a longer-term feeling of guilt. When looking at related literature, it is suggested that women typically feel more guilt and shame towards their gambling behaviours than men do and those who are more guilt-prone in relation to their gambling were more autonomously motivated. This then allows for greater success when quitting gambling (Kushnir et al., 2016). This could also be reflected in Eleanor's infrequent micro-transaction use, as her overwhelming feelings of guilt afterwards may dissuade her to make a repeated purchase. While the present chapter cannot generalise due to the scale of sample size and the purpose of the study, these are both interesting factors, highlighting potential divergences between those who engage with micro-transactions and their underlying motivations.

4.5. Limitations and Areas for Future Study

4.5.1. Limitations of the Present Chapter

The limitation of the present chapter lies mainly within the inherent methodological approach of interpretative phenomenological analysis (IPA). It could be that the interpretative nature of IPA is problematic in the sense that it is subjective (Tuffour, 2017). That is, the present chapter is an account of the researchers' interpretations of experience, rather than an actual account of lived experiences. However, by ensuring that reflexivity was considered throughout the analytical process, the researcher's own preconceptions about the negative impact of micro-transactions were discussed. Even so, it could be the case that even with the consideration of the researcher's preconceptions, that this impacted the analytical process. Furthermore, the validity of IPA is often brought into question (Brocki & Wearden, 2006) due to its subjective nature. As such, triangulation methods were used to ensure that all researchers involved in the present chapter agreed with the analytical approach and personal experiential themes presented by participants. All researchers involved also assessed the final group experiential themes

presented in the present chapter. Additionally, given that IPA is grounded in lived experience, it is crucial that accurate representation be given to the emerging themes found through the analysis of participant transcripts. To ensure that an accurate interpretation of participant experience occurred, representation was not solely based on prevalence in transcripts, rather selected quotes used in the present chapter were chosen due to their ability to articulate the theme presented, as well as provide nuanced views and accounts of experiences with micro-transactions. Nevertheless, it could be the case that participants' experience was not as well represented as possible.

Additionally, the full socio-economic significance of participants' experiences was not taken into consideration during the initial recruitment process. In other words, participant demographics did not extend beyond age and gender. This was due to the nature of the present chapter and how participants related their experiences to their own socio-economic status. To this end, the researcher allowed for participants to discuss their own interpretations of how their occupation or cultural background may impact their experiences, and as such, the researcher did not discuss the relevance of this unless it was discussed by participants themselves. Due to this, it could be the case that important contextual and theoretical underpinnings were not discussed. However, the analyses presented in the present chapter attempted to represent participants' own accounts as best as possible.

Finally, it should be noted that there are limitations in the sample of participants themselves. While the sample of the present chapter consisted of all adults, it may be the case that motivations for the purchase of and experiences surrounding micro-transactions may differ among younger populations. This is particularly the case with populations who are not as financially independent as adult populations of videogame players. Additionally, participants self-selected when taking part and were made aware of the nature of the study. As such, the

possibility of self-selection bias should be considered. That is, participants may have chosen to take part as a result of their micro-transaction engagement and the perceptions surrounding this.

4.5.2. Research Implications

The present chapter has identified several novel themes associated with the experiences of videogame players who engage with micro-transactions. As such, there are a number of psychological impacts and implications. Firstly, further associations with gambling have been identified, with particular links to speed of purchase and play. This has a number of implications for policy regarding event frequency in videogames and the availability of micro-transactions. In this sense, governing bodies should consider the role speed of purchase has on the development of problematic behaviours and the ability to reduce harm. Secondly, the role of cognitive beliefs and the potential for these to lead to maladaptive behaviours in regard to expenditure and investment in micro-transactions was identified, particularly in the case of battle pass micro-transactions and a sense of obligation, as well as beliefs regarding social status and contempt. It is therefore recommended that healthcare providers utilise cognitive behavioural therapy methods when addressing cognitive beliefs relating to problematic use of micro-transactions. Finally, it is suggested in the present chapter that a frustration with needs plays a vital role in micro-transaction engagement. To this end, when looking at harm minimisation tools, support with a focus on psychological well-being should be provided to those who engage with problematic use of micro-transactions.

4.5.3. Areas for Future Research

The present chapter aimed to fill a research gap by producing novel themes related to videogame player experiences with micro-transactions, taking into account multiple micro-transactions forms and the perceptions, experiences, and emotions involved with the use of

these and has used self-determination theory (Deci & Ryan, 2015) to explain the prevalence of these themes. Therefore, future research should explore the relationships between needs satisfaction and micro-transaction engagement.

Causal research with more representative sample sizes should be conducted to identify directions and strengths of relationships of the potential contributing factors in micro-transaction use. Longitudinal research would also be beneficial in exploring how videogame player experiences with micro-transaction may change over time, particularly when looking at changes in motivations and needs fulfilment and divergences between youth and adult experiences.

Finally, it should be noted that only one participant in the present chapter was identified as a problem gambler. Although this did enable the present chapter to discuss micro-transactions and their relationship to problem gambling, further qualitative research utilising a larger sample of problem gamblers should be conducted. This would allow for a more robust analysis of the experiences of problem gamblers who use micro-transactions and a greater understanding of any differences in experiences with micro-transactions between those who are problem gamblers and those who are not.

4.6. Conclusion

The present chapter addressed the gap in qualitative research surrounding videogame player experiences with multiple forms of micro-transaction. The present chapter also contributed novel findings to the body of literature by utilising IPA methods to identify six themes involved in videogame player experiences with micro-transactions. These were (i) *self-control vs. impulsivity,* (ii) *motivations for use,* (iii) *obligation to play after purchase,* (iv) *guilt and regret,* (v) *feeling tricked or cheated* and (vi) *comparing micro-transaction use to gambling.* For the participants in the present chapter, experiences with micro-transaction use were explained

using self-determination theory. In particular, by participant needs for autonomy, relatedness, and competence. It was found that micro-transaction use can bring about conflicting feelings. Some videogame players may take positive benefits from their micro-transaction engagement, such as feelings of community and belonging or a connectedness to their peers and game developers. Others may experience negative consequences, such as feeling guilty or feeling an obligation to continue playing the game after purchases. Perceptions of micro-transactions varied across participants, but some felt as though their inclusion in games is unfair, which may lead to less engagement with specific videogames. Findings from the present chapter may be useful for videogame developers wanting to understand their player base and their perceptions to and experiences with in-game monetisation methods. These findings will also aid in the development and validation of motivational measures for micro-transaction use, as well as policy, regulations and harm-minimisation tools relating to in-game micro-transactions.

Chapter 5. The Role of Videogame Micro-Transactions in the Relationship Between Self-Determined Motivations and Problem Gaming and Gambling Behaviour

5. Chapter Overview

A key finding of the first empirical study of the present thesis (Chapter 4) was that micro-transaction use may be related to self-determination theory (Deci & Ryan, 2015). Consequently, the second empirical study of the present thesis, the present chapter, aims to assess the complex relationship between motivation, needs satisfaction and frustration, micro-transaction engagement and both problem gaming and gambling behaviour utilising structural equation modelling methods.

5.1. Background

In recent years, there has been concern for micro-transaction users in relation to problematic gambling and gaming behaviours. This has particularly concerned young people and the ease of access to micro-transactions in videogames. A recent report published by the Gambling Commission (Gambling Commission, 2022) highlighted that 39% of 11-16-year-olds (n = 2299) were aware of, and had used, in-game items including skins and loot boxes. This presents concern due to associations between loot box use and problem gambling (Griffiths, 2018; Wardle & Zendle, 2021; Zendle et al., 2019; Zendle & Cairns, 2018) and the prevalence of gambling among youth populations (Calado et al., 2017; Turner et al., 2018; Zendle et al., 2019). Although broadly discussed, there is a dearth of literature regarding motivations for engaging in micro-transaction use. To understand the best approach for harm prevention or intervention measures, underpinning motivations for micro-transaction use must be considered because motivation is a crucial aspect of behavioural change (Flannery, 2017). Therefore, the present chapter aimed to provide a base for the development of motivational theory surrounding

the use of micro-transactions and provide recommendations for both healthcare providers and videogame companies, when assessing the use of micro-transactions in videogames.

Micro-transactions remain one of the largest monetisation forms in videogames, with a projected global market growth from $67.94 billion to $76.66 billion in 2023 (The Business Research Company, 2023). As reported in Chapter 1 of the present thesis, micro-transactions can be described as a form of in-game monetisation, usually consisting of low-cost virtual items or purchases that add extra content to a videogame. Monetisation methods in videogames are ever-changing, with micro-transactions covering a wide range of content, from cosmetic items that change how an avatar looks and weapons that increase player skill to mechanisms such as loot boxes and battle passes, which allow for extra gameplay experiences. In the case of loot boxes, players typically obtain or purchase 'keys' to unlock boxes or crates that contain random cosmetic items, weapons, or boosts, of varying 'rarity' or prestige. Battle passes operate as seasonal items that allow players to unlock cosmetic items after obtaining increasing amounts of experience points (XPs).

As reported in Chapter 2 of the present thesis, there is a consensus in the literature surrounding micro-transaction use and problem gambling behaviours, however, links between micro-transaction use and problem gaming behaviours are less discussed (Raneri et al., 2022). For example, research by King, Russell, et al. (2020) suggested that youth spending on micro-transactions was not associated with problem gaming, and instead was based on peer purchasing behaviour. However, recent literature has suggested that gaming disorder symptoms among adolescent populations increase with the use of micro-transactions, including the purchase of loot boxes (Hing et al., 2023). Moreover, Lelonek-Kuleta et al. (2021) reported an association between pay-to-win micro-transactions and problem gaming, although it should be noted that their research focused on adult populations and so may not relate to youth populations.

Research concerning adult populations of micro-transaction users has focused on loot boxes and battle passes. Most notably, it has been suggested that loot boxes have commonalities with forms of gambling likes slot machines (Griffiths, 2018). Where slot machines use real-world currency, loot boxes are opened directly with in-game currency or using keys purchased with in-game currency (Uddin, 2021) and have similar reward schedules (Drummond & Sauer, 2018; Griffiths, 2018; von Meduna et al., 2020). Moreover, loot boxes share similar visual and audio cues to slot machines, potentially used to invoke feelings of excitement and to build anticipation before a prize is revealed (Whittaker, 2019). Research has suggested that increased levels of arousal (identified through increased skin conductance response), feelings of reward, and urge to continue using loot boxes is impacted by rarity of rewards obtained (Larche et al., 2021). This could be argued to be similar to the impact of gambling, where 'wins' are shown to increase skin conductance response levels (Wilkes et al., 2010).

Research into the psychological impact of the battle pass mechanism has primarily focused on the prevalence of battle passes in games and on player perceptions of the battle pass. A mixed methods study by Petrovskaya and Zendle (2020) found that the inclusion of a battle pass mechanism in the game *Dota 2* did not significantly impact player engagement but that player spending on battle passes steadily increased. It is suggested that spending on battle passes has increased due to the ability to 'level up' the battle pass using experience points (XPs) or by purchasing levels. Consequently, player engagement with the game may not be impacted by the battle pass, but spending on battle passes may have increased due to the ability to unlock levels quickly and easily through purchasing, rather than players actively earning XPs to gain rewards. This was further discussed in Petrovskaya and Zendle's (2020) research, which also addressed *Dota* 2 player perceptions of the battle pass. It was found that attitudes towards battle passes were mainly negative, with discussion centring around the *spend-grind trade off* and *elitism*. Players discussed the need to spend money unlocking the levels, due to unachievable

XP goals. This then led to feelings of elitism in-game, whereby players who were unable to unlock items through paying discussed feeling left out and 'closed off' from the 'elite' community members.

Similar negative attitudes to micro-transaction use were discussed in Chapter 4 of the present thesis, following assessment of videogame player motivations for micro-transaction use. Main themes included feelings of guilt when using micro-transactions, being 'tricked' by micro-transactions, and having a sense of obligation to play a game for longer if micro-transactions were used. Participants also described the similarities between gambling and loot box use, as well as the euphoric and rewarding feelings of engaging in a micro-transaction, leading to the potential need to purchase micro-transactions more frequently.

Frequency of micro-transaction use and potential links to problematic gaming and gambling behaviour have been discussed in literature, although there is currently a lack of consensus regarding the role frequency of micro-transaction use may play in the development of problematic behaviour. Chapter 2 of the present thesis highlighted frequency of micro-transaction use as a potentially important factor in the development of problematic behaviour, particularly concerning reward event frequency and allowing for pauses between reward reinforcements. In the wider literature, higher frequencies of gambling events are suggested to increase levels of arousal, enjoyment and potentially contribute to impulsive behaviour through impaired motor response inhibition (Harris et al., 2021; Harris & Griffiths, 2018).

Similarly, the structural characteristics of videogames are suggested to operate using highly engaging reward systems through fast loading times (i.e., high frequencies of events), the earning of XPs, levelling up, or obtaining rewards and loot from competing videogame quests or storylines, which increases enjoyment of and engagement with gaming, leading to potentially problematic behaviour (King et al., 2011).

It has also been suggested that increased spending on micro-transactions can lead to problematic behaviour. There is consensus that there is an association between expenditure on micro-transactions (more specifically, buying loot boxes) and problem gambling behaviour, with suggestions that as expenditure on loot boxes increases, so does problem gambling severity (Drummond et al., 2020; Zendle et al., 2019). It is argued that this is due to the structural similarities between loot boxes and gambling forms such as slot machines (Raneri et al., 2022). However, there is limited research evidencing a link between expenditure on micro-transactions and problematic gaming behaviour. Research by Drummond et al. (2020) suggested that those exhibiting symptoms of *both* gaming disorder and problem gambling were more likely to spender higher amounts of money on loot boxes than those with symptoms aligning with either gaming disorder *or* problem gambling. This could indicate a more complex interaction between problematic gaming and gambling and the role that micro-transaction use has on this relationship. However, further research is necessary to explore the interaction between gaming, gambling, and micro-transaction use.

Although research surrounding micro-transaction use is becoming more prominent, the relationships between self-determined motivations, elements of micro-transaction use (i.e., spend amounts, frequency of use and micro-transaction type) and problem gaming and gambling have not yet been explored in-depth.

5.2. Theoretical Framework and Hypotheses

5.2.1. Self-determination Theory (SDT)

SDT is a macro-theory concerned with the concept of human development and 'active' growth through intrinsic motivation (i.e., the tendency to seek out challenges and learning opportunities) (Deci & Ryan, 2015). SDT comprises five mini-theories of motivation and

personality: causality orientations theory, goal contents theory, cognitive evaluation theory, basic psychological needs theory, and organismic integration theory (Ryan & Deci, 2000a).

SDT posits that motivations can be autonomous or controlled (Deci & Ryan, 2008). These motivations lie on a spectrum from amotivation (i.e., a lack of control) and extrinsic (i.e., dependent on external pressures and reward) to intrinsic (i.e., for an individual's enjoyment or to build skill). That is, motivations can be more self-determined or autonomous (intrinsic) in nature, or less self-determined and controlled in nature (extrinsic and amotivation).

Basic Psychological Needs Theory (BPNT) posits that humans need to satisfy three basic psychological needs to flourish. These are autonomy (i.e., the need to feel that one has chosen their own behaviour), relatedness (i.e., the need to form relationships and connections) and competence (i.e., the need for mastery and success). Individuals oriented towards controlled (more closely aligned to extrinsic motivations and amotivation) motivations have been associated with maladaptive behaviours that limit flourishing, as well as frustration with basic psychological needs, whereas those oriented towards autonomous motivations (more closely aligned to intrinsic motivations) are suggested to be more likely to satisfy their basic psychological needs and thrive (Oostdam et al., 2019). The present chapter applied BPNT to the use of micro-transactions and their relationship to motivations for gaming and gambling, problem gambling and problem gaming.

5.2.2. Self-Determination Theory, Gaming Motivation, and Problem Gaming Behaviours

Ryan et al. (2006) discussed the *"motivational pull"* of videogames using SDT. Their research suggested that videogame players look to satisfy their basic psychological need for autonomy, relatedness, and competence through videogame play. Findings suggested that autonomy, relatedness, and competence independently predicted future gameplay and videogame enjoyment. Moreover, those who experienced more autonomy and competence

satisfaction during gameplay were shown to feel more positive benefits from gameplay, suggesting that it may be the role of frustration with basic psychological needs that results in problematic gaming and gambling behaviour (Vuorinen et al., 2022), irrespective of time spent playing a game, if the underlying motivations are more controlled in nature. In fact, it has been suggested that a frustration with daily needs is an explanation for the association between introjected regulation (a form of extrinsic motivation) and amotivated gaming with problem videogame playing, whereby a frustration with autonomy partially mediates the relationship (Mills, Milyavskaya, Heath, et al., 2018).

Moreover, it is suggested that there is a reciprocal relationship between internet gaming disorder (IGD) and need satisfaction, such that those with IGD symptoms were more likely to have lower levels of needs satisfaction over time, which in turn leads to maintenance of IGD symptoms and worsening mental and physical health (Weinstein et al., 2017). This is supported by Scerri et al.'s (2018) research, which suggested that a higher needs-fulfilment deficit (lower satisfaction with the three basic psychological needs for autonomy, relatedness and competence) was associated with IGD behaviours, with this relationship being mediated by self-esteem levels and depression. Therefore, it could be the case that those with higher needs-fulfilment deficit utilise gaming to increase their real-world needs satisfaction, through obtaining in-game XPs, socialising, and potentially purchasing items. The process of needs fulfilment and reward with progression or items may then undermine those motivated intrinsically, or further reward those motivated extrinsically (Ryan & Deci, 2000c), leading to increased engagement and involvement in the videogame and causing the development or maintenance of IGD symptoms.

5.2.3. Self-Determination Theory, Gambling Motivation, and Problem Gambling

SDT has also been discussed in relation to problematic gambling behaviour. It has been suggested that those who gamble through highly self-determined motivations were more likely

to continue gambling (i.e., intrinsic motivations for gambling were associated with involvement and continuation of gambling) than those who were motivated by external reward (Chantal et al., 1995). Moreover, it has been found that skill-based gambling (i.e., betting on horseraces) was more associated with self-determined motivations, whereas luck-based gambling (i.e., slot machines) was more associated with less self-determined motivations.

Conversely, other studies have found that autonomous motivation for gambling was negatively associated with problematic behaviour, whereas those who gambled through controlled motivations (i.e., extrinsic and amotivation) were more likely to gamble more frequently, spend more money on gambling, and exhibit more severe problematic behaviour (Neighbors & Larimer, 2004). This is further evidenced by Rodriguez et al. (2015) who found that autonomous motivation was negatively associated with gambling problems, where those who were autonomously motivated did not gamble to chase losses or for escapism. On the other hand, their research found that controlled motivations were typically associated with higher levels of problem gambling.

Considering the role of needs frustration, it has been proposed that external pressures (i.e., more extrinsically positioned motivations) and a lack of control (i.e., amotivation) are related to greater frustration with basic needs, which can then lead to greater psychological distress and problematic gambling behaviour (Mills et al., 2021). In this case, needs frustration may have a mediating role. However, it has also been suggested that needs frustration may moderate or predict increased severity of gambling problems when the initial motivation to gamble is for extrinsic reward, specifically monetary gain (Hagfors et al., 2023). It should also be noted that Hagfors et al.'s (2023) research was longitudinal in nature, as opposed to Mills et al.'s (2021) research, which was cross-sectional (and therefore correlational) in nature. Consequently, longitudinal research may provide a more complete picture of the role of needs frustration.

However, further research to confirm the stability of the role of needs frustration may be beneficial for understanding the complex relationships involved.

5.2.4. Self-Determination Theory and Micro-Transaction Use

To establish and develop theory surrounding micro-transaction use, research has assessed motivations for micro-transaction use. Typically, with a focus on loot boxes (Nicklin et al., 2021; Zendle et al., 2019) or more recently, with battle passes (Petrovskaya & Zendle, 2020). Chapter 4 of the present thesis reported motivations for the use of multiple forms of micro-transactions, including expiration based (i.e., extra lives or time), loot boxes, single purchase (i.e., skins or cosmetic items), battle passes, and in-game currency. The most prominent motivations for purchase were rewarding developers, limited time offers, peer influence, and social status. Both Chapter 4 of the present thesis and Nicklin et al. (2021) associated motivations for the use of micro-transactions with self-determination theory (Ryan & Deci, 2000a).

Research regarding SDT and micro-transaction use is in its infancy. However, it has been suggested that in-game spending is driven by a frustration with the basic psychological needs, with relatedness (i.e., the need for a sense of belonging, community, and friendship) and competence (i.e., feelings of mastery or achievement) as underpinning motivations for micro-transaction use (Lemmens & Weergang, 2023).

5.3. The Present Chapter (Aims and Hypotheses)

Based on the aforementioned literature and the research gaps identified, the present chapter had one main research objective, which was to examine the role of micro-transactions in the relationship between self-determined motivations for gaming and gambling and problematic behaviour (internet gaming disorder and problem gambling severity). It also had a number of hypotheses. In relation to the direct effects of micro-transactions, it was hypothesized that: (i)

both extrinsic motivation and amotivation would predict higher frequency of micro-transaction use (H_{1a}), (ii) both extrinsic motivation and amotivation would predict higher spend per micro-transaction (H_{1b}), (iii) intrinsic motivation would negatively predict frequency of micro-transaction use (H_{2a}), and (iv) intrinsic motivation would negatively predict spend per micro-transaction (H_{2b}).

In relation to the indirect effects of micro-transactions, it was hypothesized that: (i) both extrinsic motivation and amotivation would positively predict frequency of micro-transaction use, which predicts higher severity of problem behaviour (H_{3a}), (ii) both extrinsic motivation and amotivation positively would predict spend per transaction, which predicts higher severity of problem behaviour (H_{3b}), (iii) intrinsic motivation would negatively predict frequency of micro-transaction use, which predicts lower severity of problem behaviour (H_{4a}), (iv) intrinsic motivation would negatively predict spend per transaction, which predicts lower severity of problem behaviour (H_{4b}), (v) both extrinsic motivation and amotivation positively predict higher levels of needs frustration, which further predicts higher frequency of micro-transaction use, which is then positively associated with problem behaviour (H_{5a}), (vi) both extrinsic motivation and amotivation positively predict higher levels of needs frustration, which further predicts higher spend per transaction, which is then positively associated with problem behaviour (H_{5b}), (vii) intrinsic motivation would positively predict higher levels of needs satisfaction, which further predicts lower frequency of micro-transaction use, which is then negatively associated with problem behaviour (H_{6a}), and (viii) intrinsic motivation would positively predict higher levels of needs satisfaction, which further predicts lower spend per transaction, which is then negatively associated with problem behaviour (H_{6b}).

In relation to the moderation effects, it was hypothesized that: (i) the type of micro-transaction used would strengthen the relationship between frustration or satisfaction with needs and frequency of micro-transaction use (H_{7a}), (ii) the type of micro-transaction used

would strengthen the relationship between frustration or satisfaction with needs and spend per transaction (H_{7b}), (iii) the type of micro-transaction used would strengthen the relationship between micro-transaction frequency and spend and the severity of problem behaviour (H_{8a}) and (iv) the type of micro-transaction used would strengthen the relationship between micro-transaction frequency and spend and the severity of problem behaviour (H_{8b}).

5.4. Method and Materials

5.4.1. Design and Participants

Data were collected from January 2023 to March 2023 using an online survey hosted on the *Qualtrics* platform. Participants were recruited using social media platforms *Twitter* (now *X*) and *Reddit*. Students from Nottingham Trent University were also invited to take part using a *Microsoft Teams* link.

Participants were eligible to take part if they (i) were aged 18 years old and over, (ii) currently played or have previously played videogames and (iii) currently used or have previously used micro-transactions. The eligibility criteria needed to be met for participants to take part in the study. Participants were informed that they could only take part and be entered into a prize draw for compensation if they were living in the UK. However, participants outside of the UK who wished to take part could do so voluntarily without being entered into the prize draw. The study was approved by Nottingham Trent University's School Research Ethics Committee in December 2022.

Power analysis suggested that a sample size of 308 would provide adequate power to estimate the proposed model, with an anticipated medium effect size of 0.3 and a statistical power level of 0.8 (Soper, 2023). A total of 646 participants were initially recruited to take part in the survey. Of the 646 responses received, 18 were removed due to being perceived as non-serious responses (e.g., participants reporting their age as '99 years') and 258 were removed

due to being flagged as 'bot' responses. Bot responses were detected using *Qualtrics'* built-in bot detection software, which uses reCAPTCHA technology to calculate a score between 0 and 1 for each participant, where scores below 0.5 indicate that the response is a non-valid bot response. In the present chapter, responses flagged with a score below 0.5 were removed from the sample. This left a final sample of 370 participants. The sample was predominantly male (n = 274, 74.1%) and the sample was aged between 18 and 65 years (M_{age} = 28.24 years, SD = 7.88). Further demographic information can be found in Table 5.1.

5.4.2. Measures

The online survey administered to participants comprised basic demographic questions, demographic-style videogame and gambling engagement questions, psychometric measures (assessing motivation, problem gaming, and problem gambling), and demographic-style micro-transaction use questions. All psychometric measures used in the present chapter had been previously developed and psychometrically validated.

5.4.2.1. Demographic Information. Participants were asked basic demographic information, such as their age, gender, employment status, and annual income.

5.4.2.2. Videogame and gaming engagement. Participants were asked to answer demographic-style questions about their videogame use, including their preferred gaming platform (i.e., PC, console or mobile device) and how many hours a week they typically spent playing videogames. Participants who responded that they had taken part in any form of gambling in the previous 12 months were asked to select which from 16 different forms (found in Table 5.1). If participants selected 'none', they were not asked any gambling-related questions.

5.4.2.3. The Gaming Motivation Scale (GAMS). The GAMS (Lafrenière et al., 2012) is an 18-item scale assessing motivations for gaming. Scale items are rated using a seven-point

Likert scale (ranging from 1 = *Do not agree at all*, to 7 = *Very strongly agree*) to assess *intrinsic motivation* (e.g., *"I play games for the feeling of efficacy I experience when I play"*), four sub-scales of extrinsic motivation, including *integrated regulation* (e.g., *"I play because it is an extension of me"*), *identified regulation* (e.g., *"I play because it is a good way to develop important aspects of myself"*), *introjected regulation* (i.e., I play because I feel that I must play regularly) and *external regulation* (e.g., *"I play for the prestige of being a good player"*) and *amotivation* (i.e., *"Honestly, I don't know why I play"*). The GAMS is scored by summing the total score for each motivation subscale, with a maximum possible score of 21 per motivation type. Cronbach's alpha for each subscale was calculated by Lafreniere et al. (2012) to range from 0.75 to 0.89. In the present chapter, Cronbach's alpha for each subscale ranged from 0.71 to 0.90, except for intrinsic motivation which had a Cronbach's alpha of 0.48. Consequently, during the first stage of model assessment, the intrinsic motivation subscale was removed from further testing.

5.4.2.4. The Modified Gambling Motivations Scale (MGMS). The MGMS (Shinaprayoon et al., 2017) is a 28-item scale assessing motivations for gambling. Scale items are rated using a seven-point Likert scale (1 = *Strongly disagree,* 7 = *Strongly agree*) to assess intellectual challenge (e.g., *"I enjoy improving my knowledge of the game"*), *excitement* (e.g., *"It is exciting to gamble"*), socialisation (e.g., *"It is the best way to relax"*), *monetary gain* (e.g., *"I play for money"*), social recognition (e.g., *"It makes me feel important"*) and amotivation (e.g., *"I play for money, but I sometimes worry if I should continue playing"*). The MGMS is scored by summing the scores for each subscale, then finding their average, with possible scores for each subscale ranging from zero to seven, and a total maximum score of 42. Higher scores for each subscale indicate a higher motivation to gambling for that particular motivation type, and a higher total score indicates a higher level of motivation to gamble in general. Cronbach's alpha for each subscale was calculated by Shinaprayoon et al. (2017) to

range from 0.76 to 0.92. In the present chapter, Cronbach's alpha for each subscale ranged from 0.95 to 0.98.

5.4.2.5. The Internet Gaming Disorder Scale – Short Form (IGDS-SF9). The IGDS-SF9 (Pontes & Griffiths, 2015) is a nine-item scale assessing internet gaming disorder. Scale items are rated using a five-point Likert scale (1 = *Never*, 5 = *Very Often*) to assess each item (e.g., *"Do you feel preoccupied with your gaming behavior?"*). Scores for each item are summed, allowing for scores ranging from nine to 45 points, with higher scores indicating a greater risk of IGD. Those who obtain a score of 36 and over are suggested to be classified as a disordered gamer. Cronbach's alpha was calculated by Pontes and Griffiths (Pontes & Griffiths, 2015) to be 0.87. In the present chapter, Cronbach's alpha was calculated to be 0.86.

5.4.2.6. The Problem Gambling Severity Index (PGSI). The PGSI (Ferris & Wynne, 2001) is a nine-item scale assessing problem gambling. Scale items are rated using a four-point scale (0 = *Never*, 3 = *Almost always*) to assess each item (e.g., *"Have you bet more than you could really afford to lose?"*). Item scores are summed, ranging from a minimum total score of 0 and a maximum total score of 27. Those who score eight or more are suggested to be problem gamblers. Those who score between three and seven are suggested to be moderate risk gamblers (i.e., exhibiting moderate levels of problematic behaviour and experiencing some negative consequences). Those who score one or two on the scale are suggested to be low-risk gamblers (i.e., exhibiting low levels of problematic behaviour, with limited or no negative consequences). Cronbach's alpha was calculated by Ferris and Wynne (Ferris & Wynne, 2001) to be 0.84. In the present chapter, Cronbach's alpha was calculated to be 0.95.

5.4.2.7. Basic Psychological Needs Satisfaction/Frustration Scale (BPNSFS). The BPNSFS (Chen et al., 2015) is a 24-item scale assessing satisfaction and frustration with the basic psychological needs of autonomy, competence, and relatedness. Each of the three basic

psychological needs has eight items, four that assess satisfaction and four that assess frustration. Scale items are rated using a five-point Likert scale (1 = *Completely false*, 5 = *Completely true*) to assess each item (e.g., *"I feel a sense of choice and freedom in the things I undertake"*). The score for item from each subscale is summed to produce a total score for autonomy, relatedness, and competence (for both needs satisfaction and needs frustration). Scoring for the BPNSFS can be utilised in different ways, whereby composite scores can be used to assess needs satisfaction or frustration as whole concepts. The present chapter used composite scores for each subscale, to create one needs satisfaction construct, and one needs frustration construct. The internal reliability for each subscale was calculated across four countries (US, China, Belgium, and Peru) by Chen at al. (2015), with Cronbach's alpha ranging from 0.64 to 0.89. In the present chapter, Cronbach's alpha for the needs frustration subscale was 0.90 and Cronbach's alpha for the needs satisfaction subscale was 0.89.

5.4.2.8. Micro-transaction Use. Micro-transaction use was assessed using three separate demographic-style questions. These were: (i) micro-transaction type typically used (i.e., loot boxes, battle passes, cosmetic items, expiration items or multiple types), (ii) typical frequency of micro-transaction use (i.e., daily, weekly, monthly, annually, or less frequently than annually), and (iii) typical amount of money spent per transaction (i.e., a continuous numerical value in GBP [£]).

Table 5.1

Participant Demographic Information

Descriptive	Category	Frequency	Percentage
Gender			
	Male	274	74.1%
	Female	71	19.2%
	Non-binary/third gender	20	5.4%
	Prefer not to say	5	1.4%
Age (in years)			
	25-34	167	45.1%
	18-24	139	37.6%
	35-44	48	13.0%
	45-54	12	3.2%
	55-64	3	0.8%
	65 and older	1	0.3%
Employment status			
	Employed - full time	193	52.2%
	Student	83	22.4%
	Employed - part time	38	10.3%
	Unemployed - looking for work	24	6.5%

Descriptive	Category	Frequency	Percentage
	Unemployed - not looking for work	11	3.0%
	Other	7	1.9%
	Prefer not to say	9	2.4%
	Retired	5	1.4%
Preferred platform			
	PC only	158	42.7%
	Console only	59	15.9%
	PC and console	48	13.0%
	PC and mobile	47	12.7%
	PC, console, and mobile	24	6.5%
	Mobile only	18	4.9%
	Console and Mobile	16	4.3%
Time spent gaming per week			
	Less than 1 hour	1	0.3%
	1-5 hours	50	13.5%
	6-10 hours	77	20.8%
	11-15 hours	89	24.1%
	16-20 hours	63	17.0%
	More than 20 hours	88	23.8%
	Unsure	2	0.5%

Descriptive	Category	Frequency	Percentage
Preferred micro-transaction type			
	Skins or other single purchase cosmetic items	119	32.2%
	Multiple micro-transactions	93	25.1%
	Battle passes	89	24.1%
	Loot boxes	44	11.9%
	Expiration-based (e.g., extra lives or level skips)	25	6.8%
Frequency of micro-transaction purchase(s)			
	Daily	3	0.8%
	Weekly	24	6.5%
	Monthly	125	33.8%
	Annually	107	28.9%
	Less frequently than annually	111	30.0%
Typical micro-transaction spend per transaction			
	£0	13	3.5%
	< £1	12	3.2%
	£1 - 4.99	82	22.2%
	£5 - 9.99	119	32.2%
	£10 - 19.99	95	25.7%
	£20 - £39.99	34	9.2%

Descriptive	Category	Frequency	Percentage
	£40 - 59.99	10	2.7%
	£60 - 100	4	1.1%
	> £100	1	0.3%
Gambling type in past 12 months			
	None of the above	192	33.7%
	National lottery draw	106	18.6%
	Online betting	42	7.4%
	Another lottery	38	6.7%
	Slot machines	30	5.3%
	Horse races	29	5.1%
	Online gambling	25	4.4%
	Bingo	24	4.2%
	Other betting with a bookmaker	19	3.3%
	Private betting	19	3.3%
	Betting pools	18	3.2%
	Casino	17	3.0%
	Spread betting	4	0.7%
	Dog races	3	0.5%
	Fixed odds betting tables	2	0.4%
	Betting exchange	1	0.2%

5.4.3. Statistical Analysis

The present chapter utilised R and SmartPLS 4.0 (Ringle et al., 2022) for data handling, descriptive statistics, and model analysis. SmartPLS software was used for Partial Least Squares – Structural Equation Modelling (PLS-SEM). Before commencing with analysis of the data, several key factors were considered regarding the appropriate form of SEM to undertake.

First, PLS-SEM is a model validation method that combines principal components analysis and ordinary least squares regression and is traditionally used in cases of theory development, when there is limited literature available and previous model testing has not occurred (Hair et al., 2019). Additionally, PLS-SEM is similar to running a series of multiple regression analyses, however, these are run simultaneously and relationships between variables can be more complex (Mehmetoglu, 2012). Further, PLS-SEM is suggested to be robust against smaller sample sizes and models with complex structures (i.e., serial mediation and moderation interactions) and higher numbers of variables (Dash & Paul, 2021). Finally, PLS-SEM is suggested to be more appropriate for the analysis of non-normally distributed data, which can often occur in social science research (Bono et al., 2017). Consequently, the present chapter utilised PLS-SEM methods to analyse the proposed model due to the complexity of the model structure.

To ensure that PLS-SEM was an appropriate method of model testing, an initial analysis was carried out using R packages *lavaan* (Rosseel, 2012) and *MVN* (Korkmaz et al., 2014) to identify if the cleaned data were normally distributed. Results from the Mardia's multivariate skewness and kurtosis tests ($p < 0.001$) indicated that the data were not normally distributed. Shapiro-Wilk's univariate test further indicated that the variables were not normally distributed. It is suggested that that Shapiro-Wilk's univariate test is sensitive to sample sizes > 300 and consequently, absolute skewness and kurtosis (excess) values should also be analysed for non-normality, whereby skewness values should be ≤ 2 and kurtosis (excess)

values should be ≤ 4 (Mishra et al., 2019). Descriptive statistics for each variable, including absolute skewness and kurtosis (excess) values can be found in Table 5.2. Subsequently, PLS-SEM was deemed as an appropriate method for model evaluation.

PLS-SEM typically consists of two stages of model analysis (Hair, Hult, et al., 2017). The first stage of analysis focuses on testing the measurement model (i.e., assessing that items assessing latent constructs were reliable and valid at testing the underlying concept of the variable). The second stage of analysis focuses on testing the structural model (i.e., assessing the constructs and their relationship pathways). Both measurement model and structural model analysis were conducted using SmartPLS 4.0 (Ringle et al., 2022).

5.5. Results

5.5.1. Measurement Model Testing

First, item loadings were assessed. Typically, it is suggested that items have loading values larger than 0.708 (Hair et al., 2019). However, Hulland (1999) suggested that item loadings of > 0.4 are acceptable, particularly in the case of social science research. It is suggested that items loading below 0.3 are removed (Field, 2013).

Internal consistency and reliability were tested using Cronbach's alpha and McDonald's omega. Cronbach's alpha and McDonald's omega values are suggested to be acceptable above 0.7 (McNeish, 2018). Composite reliability values are also suggested to be acceptable above 0.7 (Hair et al., 2014). Convergent validity was assessed using average variance extracted (AVE), whereby values should be > 0.5 (indicating that over 50% of the indicator variance can be explained by the latent variable). However, it is suggested that AVE is a more conservative measurement of validity, and consequently should not be used to assess convergent validity alone. Instead, composite reliability scores can also be used to establish convergent validity (Fornell & Larcker, 1981) . In the case where AVE values are < 0.5, it is suggested by Hair,

Hult, et al. (2017) that constructs with an AVE value of > 0.4 and a composite reliability of > 0.6 are acceptable, but any items with loadings of < 0.3 should be removed. Subsequently, one item from the problematic gaming variable was removed ("*Do you play in order to temporarily escape or relieve a negative mood (e.g., helplessness, guilt, anxiety)?*"). Once removed, AVE and composite reliability increased to acceptable levels.

The intrinsic gaming motivation variable was found to not be reliable ($\alpha = 0.48$, $\omega = 0.51$). Low reliability may occur when a factor has a small number of items, items do not accurately assess the underlying construct, or items assess a complex construct (Tavakol & Dennick, 2011). In the case of the intrinsic subscale of the GAMS (Lafrenière et al., 2012), it is possible that participants were not clear on the wording of the items, leading to responses that did not accurately capture the underlying concept of intrinsic gaming motivation. For example, Item 3 ("For the feeling of efficacy I experience when I play") uses vague wording (i.e., the definition of efficacy may not be fully understood by participants), as was suggested by Shinaprayoon et al. (2017).

Item deletion was not considered due to the factor consisting of only three items, which is suggested to be the minimum number of items for a stable factor (Raubenheimer, 2004). Furthermore, it is suggested that factors are only retained when they contain more than three items and can be meaningfully interpreted (Worthington & Whittaker, 2006). Wider gaming research using the intrinsic motivation subscale of the GAMS (Lafrenière et al., 2012) has also encountered issues with the reliability of the subscale, resulting in its exclusion (Mills, Milyavskaya, Heath, et al., 2018). Consequently, the intrinsic gaming motivation variable was excluded from the model. Final Cronbach's alpha, McDonald's omega, compositive reliability and AVE values can be found in Table 5.3.

When assessing discriminant validity of the variables, it is suggested that items should be below the heterotrait-monotrait ratio of correlations of < 0.90 when variables are conceptually similar (Henseler et al., 2015). The HTMT values can be found in Table 5.4. In the case that some constructs are identified as too similar, item cross-loadings should be assessed during the analysis process. In the case where item cross-loadings exceed 0.90 or items present assessed another construct with less than 0.10 difference between the cross-loading construct and the parent construct, it is suggested that items should be removed (Ximénez et al., 2022).

Consequently, three items were removed from the intrinsic gambling motivation variable due to high cross loading (i.e., "*I feel competent when I gamble*", "*Gambling allows me to test my control*" and "*It gives me a feeling of control*"). A further two items were also removed from the extrinsic gambling motivation variable (i.e., "*I play for money*" and "*I feel important when I win*"). Once these were removed, variables were equal to or below the suggested 0.90 threshold. For any variables with a HTMT ratio equalling 0.90, any cross-loading between items had a difference of more than 0.10 between the cross-loading variable and the parent variable and consequently, were deemed acceptable. When assessing why items may cross-load, it may be beneficial to consider the theoretical underpinnings of the variables in the present chapter. That is, self-determined motivations. These are suggested to lie on a spectrum from completely extrinsic to completely intrinsic, with some forms of motivations linked to both extrinsic and intrinsic (i.e., the integrated regulation style of motivation). Consequently, it may be the case that items cross-load when they are theoretically linked, as was the case with present chapter. However, to avoid issues with discriminant validity, items were removed in the present chapter. Once the convergent reliability and validity and discriminant validity levels were acceptable, the next stage of the PLS-SEM analysis were conducted.

Table 5.2

Means, Standard Deviations, Skewness, and Kurtosis (excess) Values

Variable	Mean	SD	Skewness	Kurtosis (excess)
Gaming: Amotivation	8.16	4.81	0.69	-0.55
Gaming: External Regulation	13.05	4.23	-0.4	-0.67
Gaming: Identified Regulation	13.43	3.6	-0.26	0
Gaming: Integrated Regulation	12.75	4.1	-0.32	-0.45
Gaming: Introjected Regulation	8.35	4.32	0.68	-0.39
Gambling: Amotivation	1.28	1.78	1.37	0.9
Gambling: Extrinsic Motivation	1.15	1.37	0.81	-0.41
Gambling: Intrinsic Motivation	1.24	1.6	1.05	-0.09
IGD	18.73	6.25	0.99	1.12
Needs Frustration	31.5	9.43	0.12	-0.7
Needs Satisfaction	44.35	7.68	-0.58	-0.22
PGSI	1.33	3.44	3.62	15.21

Note. IGD = Internet Gaming Disorder, PGSI = Problem Gambling Severity Index.

Table 5.3

Cronbach's Alpha, Composite Reliability, and AVE Values

Variable	Cronbach's alpha	McDonald's Omega	Composite reliability	Average variance extracted (AVE)
Gaming: Amotivation	0.90	0.90	0.90	0.83
Gaming: External Regulation	0.71	0.71	0.70	0.63
Gaming: Identified Regulation	0.71	0.73	0.70	0.63
Gaming: Integrated Regulation	0.80	0.81	0.80	0.71
Gaming: Introjected Regulation	0.83	0.83	0.80	0.74
Gambling: Amotivation	0.95	0.95	1.00	0.88
Gambling: Extrinsic Motivation	0.97	0.96	1.00	0.77
Gambling: Intrinsic Motivation	0.98	0.98	1.00	0.83
IGD	0.86	0.86	0.90	0.51
Needs Frustration	0.90	0.90	0.90	0.47
Needs Satisfaction	0.89	0.88	0.90	0.44
PGSI	0.95	0.94	0.90	0.70

Note. IGD = Internet Gaming Disorder, PGSI = Problem Gambling Severity Index.

Table 5.4

HTMT Ratio Values

Variable	Freq	G.Amo	G.Exter	G.Iden	G.Integ	G.Intro	Gb.Amo	Gb.Extrinsic	Gb.Intrinsic	IGD	MMT	NF	NS	PGSI
Freq														
G.Amo	0.145													
G.Exter	0.302	0.247												
G.Iden	0.079	0.174	0.246											
G.Integ	0.115	0.113	0.250	0.863										
G.Intro	0.304	0.494	0.454	0.352	0.503									
Gb.Amo	0.196	0.221	0.221	0.036	0.138	0.178								
Gb.Extrinsic	0.263	0.258	0.221	0.075	0.163	0.316	0.880							
Gb.Intrinsic	0.188	0.154	0.217	0.044	0.130	0.184	0.837	0.906						
IGD	0.315	0.553	0.328	0.152	0.320	0.679	0.203	0.279	0.181					
MMT	0.072	0.015	0.036	0.042	0.113	0.077	0.080	0.034	0.013	0.041				
NF	0.115	0.396	0.186	0.141	0.174	0.446	0.140	0.127	0.086	0.536	0.058			
NS	0.093	0.277	0.133	0.165	0.106	0.301	0.082	0.066	0.060	0.424	0.068	0.757		
PGSI	0.329	0.391	0.157	0.061	0.122	0.379	0.590	0.671	0.499	0.462	0.031	0.226	0.191	
Spend	0.122	0.120	0.092	0.047	0.047	0.083	0.078	0.093	0.117	0.146	0.023	0.090	0.104	0.034

Note. HTMT = Heterotrait-Monotrait, Freq = Frequency, G.Amo = gaming amotivation, G. Exter = gaming external regulation, G.Iden = gaming identified regulation, G.Integ = gaming integrated regulation, G.Intro = gaming introjected regulation, Gb.Amo = gambling amotivation, Gb.Extrinsic = extrinsic gambling motivation, Gb.Intrinsic = intrinsic gambling motivation, IGD = internet gaming disorder, MMT = micro-transaction type, NF = needs frustration, NS = needs satisfaction, PGSI = Problem Gambling Severity Index, Spend = micro-transaction spend.

5.5.2. Structural Model Testing

According to Hair et al. (2014), best practice for SEM requires testing the structural model for common method bias by assessing if there is multicollinearity between independent variables. This is carried out by assessing the variance inflation factor (VIF) of endogenous variables. Suggested values for VIF are below 5 or below 10 (James et al., 2013). However, there is little consensus regarding adequate values, and this varies by discipline. In the case of the present chapter, the structure of the motivation-related variables tested (i.e., existing along a spectrum with some conceptual correlation, rather than being explicitly distinct constructs) may explain VIF values higher than 5. That is, correlation between two or more independent variables is expected. However, all VIF values were under 10, indicating minimal issues with collinearity (Table 5.5).

Model predictive power and in-sample explanatory power are then assessed using R^2 and Q^2 values. R^2 values must be above 0.10 for variance of the endogenous construct to be explained (Falk & Miller, 1992). The adjusted R^2 values indicate that the variance for all endogenous variables, other than spend ($R = 0.010$), were an adequate value (Table 5.6).

It is suggested that Q^2 values are indicative of predictive power of the endogenous constructs and the model as a whole (Henseler et al., 2009). Q^2 values above 0 typically indicate good predictive power of the constructs. It should be noted that the Q^2 value for the spend construct was below 0 and consequently, was not useful for in-sample prediction. However, all other values were adequate (Table 5.6).

Finally, pathway analysis was performed using two-tailed bootstrapping (with 5000 resamples) with a confidence interval of 95%. The following section outlines the results of the pathway analysis and subsequently, the hypothesis testing stage of analysis.

5.5.3. Hypothesis Testing

This section outlines the key findings from the hypothesis testing process. Several significant relationships were found, although no serial mediation or moderation interactions were observed at a significant level. Instead, direct, and simple mediation effects were found to be statistically significant.

5.5.3.1. Statistically Significant Findings. Of the hypotheses tested, two were partially supported. These related to the relationship between motivations for gaming and gambling, frequency of micro-transaction use, and gambling behaviour.

The first partially supported hypothesis (H_1) was that both extrinsic motivation and amotivation would predict higher frequency of micro-transaction use. In the present chapter, this was the case for externally regulated extrinsic gaming motivation ($\beta = 0.2$, $p < 0.01$), introjected regulation gaming motivation ($\beta = 0.147$, $p = 0.046$), and extrinsic gambling motivation ($\beta = 0.311$, $p = 0.007$). The remaining forms of extrinsic gaming motivation (i.e., identified regulation and integrated regulation), as well as amotivation did not significantly predict higher frequencies of micro-transaction use.

The second partially supported hypothesis (H_{5a}) was that frequency of micro-transaction use would mediate the relationship between both extrinsic motivation and amotivation for gaming and gambling and problematic gaming and gambling behaviour. In the present chapter, frequency of micro-transaction use partially mediated the relationship between extrinsic motivations for gambling and problem gambling severity ($\beta = 0.05$, $p = 0.032$).

Finally, a further significant finding emerged that was not initially hypothesised. That is, the relationship between extrinsic gaming motivations and problem gambling. It was found that frequency of micro-transaction use fully mediated the relationship between external gaming motivations and problem gambling severity ($\beta = 0.032$, $p = 0.01$).

5.5.3.2. Statistically Non-Significant Findings. None of the hypotheses related to micro-transaction expenditure were found to be significant during the pathway analysis stage of the present chapter. Moreover, no serial mediation pathways were found to be significant (i.e., needs frustration and satisfaction did not play a role in the relationship between self-determined motivations, frequency of micro-transaction use, and problematic gaming and gambling behaviour).

Similarly, the use of multiple forms of micro-transaction was not found to have a statistically significant moderating effect on needs frustration and satisfaction, frequency of micro-transaction use, and micro-transaction expenditure pathways. Table 5.7 contains further information about all pathways analysed and their statistical significance. It should be noted that the intrinsic gaming motivation variable was excluded during the data analysis stage, and consequently, pathways relating to intrinsic gaming motivation are not presented and discussed.

Table 5.5

VIF values for each Endogenous variable

Variable	Freq VIF	IGD VIF	NF VIF	NS VIF	PGSI VIF	Spend VIF
Freq		1.20			1.20	
G.Amo	1.56	1.56	1.45	1.45	1.56	1.54
G.Exter	1.22	1.27	1.21	1.21	1.27	1.22
G.Iden	1.88	1.88	1.79	1.79	1.88	1.88
G.Integ	2.05	2.05	2.04	2.04	2.05	2.05
G.Intrinsic	1.26	1.27	1.21	1.21	1.27	1.26
G.Intro	1.98	2.01	1.85	1.85	2.01	1.98
Gb.Amo	3.87	3.87	3.79	3.79	3.87	3.87
Gb.Extrinsic	6.60	6.72	6.55	6.55	6.72	6.60
Gb.Intrinsic	5.06	5.08	5.02	5.02	5.08	5.05
NF	2.31	2.31			2.31	2.31
NS	2.17	2.17			2.17	2.17
Spend	1.04	1.06			1.06	

Note. VIF = variance inflation factor, Freq = frequency, G.Amo = gaming amotivation, G. Exter = gaming external regulation, G.Iden = gaming identified regulation, G.Integ = gaming integrated regulation, G.Intro = gaming introjected regulation, Gb.Amo = gambling amotivation, Gb.Extrinsic = extrinsic gambling motivation, Gb.Intrinsic = intrinsic gambling motivation, IGD = internet gaming disorder, MMT = micro-transaction type, NF = needs frustration, NS = needs satisfaction, PGSI = Problem Gambling Severity Index, Spend = micro-transaction spend.

Table 5.6

Adjusted R^2 and Q^2 Values for each Endogenous Variable

Variable	Adjusted R^2	Q^2
Frequency	0.136	0.084
IGD	0.475	0.373
Needs Frustration	0.195	0.160
Needs Satisfaction	0.144	0.105
PGSI	0.524	0.455
Spend	0.010	-0.043

Note. IGD = Internet Gaming Disorder, PGSI = Problem Gambling Severity Index.

Table 5.7

Pathways Analysis and Hypothesis Testing

Hypothesis	Pathway(s)	Std Beta (β)	SD	*t*-value	*p*-value	BC LL	BC UL	Hypothesis Statement
Direct Effects								
H_{1a}								**Partially Supported**
	Gb.Extrinsic -> Freq	0.311	0.116	2.686	0.007	0.081	0.539	Supported
	G.Exter -> Freq	0.2	0.054	3.676	< 0.001	0.089	0.3	Supported
	G.Intro -> Freq	0.147	0.074	1.999	0.046	0.007	0.297	Supported
	G.Integ -> Freq	-0.001	0.066	0.019	0.985	-0.131	0.126	Not supported
	G.Iden -> Freq	-0.017	0.07	0.245	0.806	-0.164	0.11	Not supported
	Gb.Amo -> Freq	-0.037	0.09	0.416	0.678	-0.212	0.141	Not supported
	G.Amo -> Freq	-0.037	0.062	0.593	0.553	-0.156	0.084	Not supported
H_{1b}								**Not Supported**
	G.Amo -> Spend	0.117	0.078	1.487	0.137	-0.027	0.275	Not supported
	G.Integ -> Spend	0.091	0.078	1.171	0.242	-0.068	0.233	Not supported
	Gb.Amo -> Spend	0.037	0.089	0.416	0.677	-0.13	0.224	Not supported
	G.Exter -> Spend	0.016	0.076	0.207	0.836	-0.15	0.144	Not supported
	G.Intro -> Spend	0.015	0.083	0.177	0.859	-0.15	0.172	Not supported
	G.Iden -> Spend	-0.028	0.082	0.338	0.735	-0.199	0.125	Not supported
	Gb.Extrinsic -> Spend	-0.093	0.083	1.128	0.259	-0.261	0.062	Not supported
H_{2a}								**Not Supported**
	Gb.Intrinsic -> Freq	-0.115	0.104	1.107	0.268	-0.316	0.093	Not supported
H_{2b}								**Not Supported**
	Gb.Intrinsic -> Spend	-0.095	0.075	1.26	0.208	-0.237	0.063	Not supported
Indirect Effects								

Hypothesis	Pathway(s)	Std Beta (β)	SD	*t*-value	*p*-value	BC LL	BC UL	Hypothesis Statement
H_{3a}								**Partially Supported**
	Gb.Extrinsic -> Freq -> PGSI	0.05	0.023	2.148	0.032	0.013	0.105	Supported
	G.Exter -> Freq -> IGD	0.022	0.012	1.945	0.052	0.005	0.052	Not supported
	G.Intro -> Freq -> IGD	0.017	0.011	1.492	0.136	0.001	0.049	Not supported
	G.Integ -> Freq -> IGD	0	0.008	0.018	0.985	-0.017	0.015	Not supported
	G.Iden -> Freq -> IGD	-0.002	0.008	0.235	0.814	-0.023	0.011	Not supported
	G.Amo -> Freq -> IGD	-0.004	0.007	0.555	0.579	-0.023	0.008	Not supported
	Gb.Amo -> Freq -> PGSI	-0.006	0.015	0.406	0.685	-0.038	0.022	Not supported
H_{3b}								**Not Supported**
	G.Amo -> Spend -> IGD	0.006	0.008	0.723	0.47	-0.001	0.035	Not supported
	G.Integ -> Spend -> IGD	0.005	0.007	0.659	0.51	-0.002	0.031	Not supported
	G.Intro -> Spend -> IGD	0.001	0.006	0.136	0.892	-0.007	0.012	Not supported
	G.Exter -> Spend -> IGD	0.001	0.005	0.156	0.876	-0.006	0.016	Not supported
	Gb.Extrinsic -> Spend -> PGSI	0	0.003	0.154	0.877	-0.004	0.01	Not supported
	Gb.Amo -> Spend -> PGSI	0	0.003	0.072	0.942	-0.008	0.003	Not supported
	G.Iden -> Spend -> IGD	-0.001	0.006	0.244	0.807	-0.023	0.005	Not supported
H_{4a}								**Not Supported**
	Gb.Intrinsic -> Freq -> PGSI	-0.019	0.018	1.054	0.292	-0.059	0.011	Not supported
H_{4b}								**Not Supported**
	Gb.Intrinsic -> Spend -> PGSI	0	0.003	0.143	0.886	-0.004	0.011	Not supported
H_{5a}								**Not Supported**
	Gb.Amo -> NF -> Freq -> PGSI	0.002	0.004	0.549	0.583	-0.003	0.011	Not supported
	G.Amo -> NF -> Freq -> IGD	0.002	0.003	0.551	0.581	-0.002	0.01	Not supported
	G.Intro -> NF -> Freq -> IGD	0.002	0.003	0.57	0.569	-0.003	0.011	Not supported
	G.Integ -> NF -> Freq -> IGD	0	0.001	0.135	0.892	-0.001	0.004	Not supported
	G.Exter -> NF -> Freq -> IGD	0	0.001	0.309	0.757	-0.004	0	Not supported

Hypothesis	Pathway(s)	Std Beta (β)	SD	*t*-value	*p*-value	BC LL	BC UL	Hypothesis Statement
	G.Iden -> NF -> Freq -> IGD	0	0.001	0.317	0.751	0	0.005	Not supported
	Gb.Extrinsic -> NF -> Freq -> PGSI	-0.002	0.003	0.498	0.618	-0.013	0.002	Not supported
H_{5b}								**Not Supported**
	Gb.Extrinsic -> NF -> Spend -> PGSI	0	0	0.038	0.97	-0.001	0.002	Not supported
	G.Integ -> NF -> Spend -> IGD	0	0	0.042	0.966	0	0.002	Not supported
	Gb.Amo -> NF -> Spend -> PGSI	0	0	0.043	0.966	-0.001	0.001	Not supported
	G.Amo -> NF -> Spend -> IGD	0	0.001	0.047	0.963	-0.001	0.001	Not supported
	G.Exter -> NF -> Spend -> IGD	0	0	0.099	0.922	-0.002	0	Not supported
	G.Iden -> NF -> Spend -> IGD	0	0	0.112	0.911	0	0.002	Not supported
	G.Intro -> NF -> Spend -> IGD	0	0.002	0.181	0.856	-0.001	0.006	Not supported
H_{6a}								**Not Supported**
	Gb.Intrinsic -> NS -> Freq -> PGSI	0.001	0.003	0.256	0.798	-0.003	0.01	Not supported
H_{6b}								**Not Supported**
	Gb.Intrinsic -> NS -> Spend -> PGSI	0	0.001	0.028	0.978	-0.001	0.002	Not supported
Moderation								
H_{7a}								**Not Supported**
	MMT x NS -> Freq	-0.017	0.173	0.099	0.921	-0.349	0.32	Not supported
	MMT x NF -> Freq	-0.049	0.168	0.291	0.771	-0.374	0.292	Not supported
H_{7b}								**Not Supported**
	MMT x NS -> Spend	-0.031	0.129	0.243	0.808	-0.282	0.221	Not supported

Hypothesis	Pathway(s)	Std Beta (β)	SD	*t*-value	*p*-value	BC LL	BC UL	Hypothesis Statement
	MMT x NF -> Spend	0.064	0.138	0.46	0.645	-0.196	0.349	Not supported
H_{8a}								**Not Supported**
	MMT x Freq -> IGD	0.024	0.11	0.217	0.828	-0.189	0.238	Not supported
	MMT x Freq -> PGSI	-0.124	0.077	1.618	0.106	-0.262	0.042	Not supported
H_{8b}								**Not Supported**
	MMT x Spend -> PGSI	0.125	0.165	0.757	0.449	-0.045	0.587	Not supported
	MMT x Spend -> IGD	-0.029	0.125	0.235	0.814	-0.194	0.254	Not supported
Not hypothesised								
	G.Exter -> Freq -> PGSI	0.032	0.013	2.577	0.01	0.013	0.063	-

Note. Freq = frequency, G.Amo = gaming amotivation, G. Exter = gaming external regulation, G.Iden = gaming identified regulation, G.Integ = gaming integrated regulation, G.Intro = gaming introjected regulation, Gb.Amo = gambling amotivation, Gb.Extrinsic = extrinsic gambling motivation, Gb.Intrinsic = intrinsic gambling motivation, IGD = internet gaming disorder, MMT = micro-transaction type, NF = needs frustration, NS = needs satisfaction, PGSI = Problem Gambling Severity Index, Spend = micro-transaction spend.

5.6. Discussion

The present chapter aimed to assess micro-transaction variables suggested to be involved in the relationship between self-determined motivations for gaming and gambling, and problematic gaming and gambling behaviours. Multiple key findings emerged from the present chapter, particularly in relation to frequency of micro-transaction use. Consequently, the following section discusses the theoretical underpinnings of the significant findings of the chapter. Due to the complexity of the model, the following discussion mirrors the results section of the present chapter. Firstly, an overview of key significant and non-significant findings is given. Potential explanations and implications of these findings are then discussed.

5.6.1. Overview of Key Significant and Non-Significant Findings

The pathways analysis and hypothesis testing stages of the present chapter highlighted three main significant findings. The first was that those motivated to play games through external and introjected regulation were more likely to engage in micro-transaction use at higher frequencies. This was also the case for those who were extrinsically motivated to gamble. The second significant finding was that frequency of micro-transaction use partially mediated the relationship between extrinsic gambling motivations and problem gambling severity. That is, frequency of micro-transaction use accounted for some (but not all) of the relationship between extrinsic gambling motivation and problem gambling severity. The final significant finding was not initially hypothesised but emerged from the pathways analysis stage of the present chapter. It was found that frequency of micro-transaction use mediated the relationship between externally regulated gaming motivations and problem gambling severity (i.e., frequency of micro-transaction use explained the relationship between externally regulated gaming motivations and problem gambling).

Although initially hypothesised, the role of micro-transaction expenditure was not found to be significant in the present chapter. Similarly, both needs frustration and satisfaction did not play significant roles in the relationships between self-determined motivations, frequency of micro-transaction use, and problematic behaviour. Finally, the use of multiple micro-transaction types was found to have no statistically significant effect on relationships between needs frustration and satisfaction, frequency of micro-transaction use, expenditure on micro-transactions, and problematic gaming and gambling behaviour.

5.6.2. Significant Findings: The Relationship Between Self-Determined Motivations, Frequency of Micro-Transaction Use and Problem Behaviours

When looking at the association between extrinsic motivation and frequency of micro-transaction use, those motivated to play videogames through external regulation may be more likely to engage in micro-transaction use more frequently due to the need for external reward. In videogames, external reward may come from gaining levels or items, or gaming 'prestige'. In this case, purchasing items and obtaining a virtual item or unlocking a level with money rather than through playing the videogame may allow the player to feel a sense of reward, without having to 'grind' or play the game for longer periods of time for rewards. Consequently, micro-transactions are a quicker way of achieving in-game rewards. Similarly, in the wider gambling literature, external reward is associated with the motivation to gamble for monetary gain, or to become 'rich', with those who gamble for financial reasons being more likely to gamble at higher frequencies (Tabri et al., 2022).

Additionally, introjected regulation-based gaming motivations focus upon self-esteem and ego (Uzun & Aydemir, 2020). For example, individuals feeling the need to play videogames regularly to feel good about themselves. In the present chapter, micro-transactions may enable players to earn in-game prestige and status through the rarity of rewards obtained through loot boxes or skin purchases. Introjected regulation is also suggested to be associated with

obligation to perform an activity, or the feeling of needing to take part in an activity, irrespective of whether the individual wishes to (Guay, 2022). Therefore, it may be the case that participants feel like they should engage in micro-transaction use. A potential explanation for this could be that social pressure impacts micro-transaction use habits by way of peer engagement and players' needs to 'fit it' with peers. In fact, King, Russell, et al. (2020) found that those who experienced issues with self-worth were more likely to play videogames for longer and be influenced by peer purchasing behaviour. Moreover, internal punishments, such as feelings of guilt and anxiety are also suggested to be key factors in introjected regulation (Hurst et al., 2017). In Chapter 4 of the present thesis, feelings of obligation, guilt, and shame were found to be key themes related to the use of micro-transactions.

It should be noted that the present chapter utilised gaming and gambling motivation measures, rather than motivations for micro-transaction use. At the time of writing, no such validated measure exists, and therefore, gaming and gambling measures were used, due to the nature of micro-transactions being a convergence between gaming and gambling (King & Delfabbro, 2020). It could be the case that because micro-transactions are embedded into videogames, this lends to similar motivations for micro-transaction use and gaming and gambling motivations. Suggested similarities between some gambling forms and micro-transactions may also indicate similar motivational drivers. Conversely, micro-transaction use may be its own phenomenon, but that the theoretical underpinning of SDT allows for similar motivational drivers. Further research would be beneficial to assess if those who engage in micro-transaction use have the same motivational profile as their gaming and gambling motivations.

Frequency of micro-transaction use also partially mediated the relationship between extrinsic motivations for gambling and problem gambling severity. In other words, those who were motivated by external gambling rewards (i.e., monetary gain) were more likely to

experience problems with gambling, and this relationship was partially explained by higher frequency of micro-transaction use. It could be that the similarities between micro-transactions such as loot boxes and forms of gambling mirror the relationship between gambling 'speed of play' and problematic gambling behaviour. That is, the ability to rapidly engage in micro-transaction use and experience reward processes could potentially mimic highly arousing slot machine rewards schedules, whereby rewards are possible every few seconds (Griffiths & Wood, 2001). In fact, the speed of gambling play has been highlighted as a key factor in the development or maintenance of problematic gambling behaviour, particularly in the case of slot machines, whereby faster 'rounds' are experienced (Harris et al., 2021; Harris & Griffiths, 2018). Moreover, those who exhibit problematic behaviour typically experience higher levels of reward and loss sensitivity (Gaher et al., 2015) with those who are externally motivated being more likely to chase a loss (Lister et al., 2016).

Frequency of micro-transaction use also fully mediated the relationship between extrinsic motivations for gaming and problem gambling behaviours. That is, the relationship between those who play videogames for external reward (i.e., earning ranks, gaining rare items) and problem gambling severity can be explained by how often players engage in micro-transaction use. This could potentially indicate a causal relationship between micro-transaction use and problem gambling whereby extrinsically motivated videogame players who engage in financial micro-transactions more frequently are more likely to develop problematic gambling behaviours, irrespective of whether they engage in any form of gambling externally to the game. Conversely, and as discussed in literature, it could be the case that problem gamblers are more likely to be motivated by external rewards due to their prior involvement in gambling, and consequently, are motivated to play videogames and engage in micro-transaction use for virtual gaming rewards (Spicer, Nicklin, et al., 2022).

5.6.3. Non-Significant Findings: Explanations and Implications

Firstly, it should be noted that the spend variable was not a key variable in the model tested in the present chapter. In fact, the variable had limited predictive and in-sample explanatory power, as well as having a Q^2 value of below zero, indicating that the spend variable was not a significant contributor to the model. One explanation for this finding may be that spend per transaction may be relative to disposable income amounts, and not necessarily concerned with problematic behaviour. Spend amounts are suggested to be concentrated among a small number of videogame players, often titled 'whales' (Close et al., 2021; Hodge et al., 2022). This is similar in gambling-related literature, where it is suggested that problem gambler spend amounts are disproportionate to non-problem gamblers (Orford et al., 2013).

Needs frustration and satisfaction were not significant variables in the serial mediation pathway. That is, they did not form part of an explanation for the relationship between frequency and motivations and problematic behaviour. There are a few potential explanations for this non-significant finding. Firstly, it could be that needs frustration is addressed in real-world contexts or that micro-transactions are not used as a compensatory mechanism or need substitute (Ryan et al., 2015) to cope with a frustration with needs, as originally hypothesised. Consequently, there was no mediation effect, whereby a frustration with needs accounts for higher frequencies of micro-transaction use. T'ng et al. (2023) suggested that online gaming itself is used to provide relief from a frustration with needs, and that specific motivations for gaming mediate the relationship between needs frustration and IGD, as opposed to needs frustration as a mediator as hypothesised in the present chapter. Similarly, it may also be the case that needs frustration and frequency of micro-transaction use act as parallel mediators in the relationship between self-determined motivations and problematic behaviour, rather than sequential. However, further research to test this proposed model is necessary.

Alternatively, research from Hagfors et al. (2023) suggested that needs frustration has a moderating role in the relationship between gambling motivations and problem gambling. It

could therefore be the case that needs frustration moderates, rather than mediates, the relationship between self-determined motivations, frequency of micro-transaction use and problematic behaviour, such that those who engage in financial micro-transaction use more frequently and have thwarted needs, experience higher severity of problem gambling. Additionally, this could also suggest that those who are motivated extrinsically to play videogames or gamble may be more likely to engage in micro-transaction use in higher frequencies when experiencing thwarted needs. That is, needs frustration may moderate the relationship between extrinsic motivation and frequency of micro-transaction use.

Finally, the present chapter hypothesised that those who engaged in multiple forms of micro-transaction use, as opposed to preferring a single type, would exhibit greater problematic behaviour, as well as engage in micro-transaction use more frequently, and spend higher amounts of money on micro-transactions. However, the use of multiple micro-transaction types did not have a moderating effect on the relationship between needs satisfaction and frustration, frequency of use and micro-transaction expenditure. Moreover, it was found that using multiple micro-transaction types had no moderating effect on the relationships between frequency of micro-transaction use and micro-transaction expenditure and problematic behaviour. In the wider gambling literature, it has been suggested that there is an association between higher gambling involvement (defined as the use of multiple forms of gambling) and problem gambling severity (Binde et al., 2017). However, it is suggested that those who only engage in one or two forms of gambling can still exhibit problem gambling behaviour, specifically in the case of those who engage with casino games (Mazar et al., 2020). Therefore, it may be the case that specific types of micro-transactions, each with their own in-game purpose and mechanisms, have different relationships to self-determined motivations and problematic behaviour (i.e., loot box use strengthens the relationship between extrinsic motivation and problematic behaviour whereas single-purchase cosmetic items have a smaller or no effect on

the relationship). To test this theory, multigroup analysis could be conducted to determine the impact of different types of micro-transaction. However, this was beyond the scope of the present chapter.

5.6.4. Limitations

The main limitation of the present chapter lies with the methodology used. For example, the small sample size limited the ability to carry out multigroup analysis and consequently, further research should be conducted analysing models or relationships for each type of microtransaction to identify if there are specific risks of harm from specific forms of micro-transaction. Additionally, the use of self-report data can lead to biases relating to the accuracy of responses. It may be the case that participants respond in ways they perceive to be more socially acceptable (i.e., reporting that they play games less than they do) or do not view their own behaviour accurately. Moreover, non-gamblers were more prevalent than gamblers in the sample, so this may explain lack of significant results relating to problem gambling (i.e., mediating roles of needs satisfaction and frustration in relation to problem gambling). The present chapter was also cross-sectional in nature and was unable to discuss longitudinal impact of motivation profile on problematic behaviour.

Additionally, PLS-SEM does not allow for the inclusion of circular or reciprocal relationships, and consequently, further research utilising CB-SEM methods could identify any reciprocal relationships between variables. For example, there may be a reciprocal relationship between frequency of micro-transaction use and problem gaming and/or gambling. Moreover, PLS-SEM does not allow for goodness of fit tests, so the present chapter cannot be used to confirm and test theory, only to develop and explore it. Further research could replicate the present chapter or develop the present chapter by using CB-SEM to test developed theory.

Finally, the present chapter used gaming and gambling scales to assess micro-transaction use motivation. It may be the case that motivation for micro-transaction use is its own phenomenon and may have differing relationships to problem gaming and gambling. Consequently, it should be assessed as a separate occurrence. Including motivations for micro-transaction use in the model, rather than separate gaming and gambling motivations may give a more accurate picture of relationships between variables. Further research should be conducted to develop and validate a micro-transaction specific motivation instrument, which could then be used to replicate the present chapter.

5.6.5. Implications and Applications

The present chapter has a variety of implications and real-world applications. For example, videogame companies should consider adopting harm prevention and reduction measures for micro-transaction purchase frequency. This could be by preventing players from purchasing micro-transactions in quick succession, or providing real-world statistics of purchase frequency and spend amounts to players. By informing players and increasing time between purchases, this may prevent the development of problematic behaviours by increasing reward reinforcement time periods. Limit setting in wider gambling research has been widely discussed, highlighting potential benefits and uses for both voluntary limit setting (Auer & Griffiths, 2013) and mandatory limit setting (Delfabbro & King, 2021), so this could be adapted for the use of videogame micro-transactions.

From the results of the present chapter, it may be the case that those who are motivated extrinsically experience underlying issues surrounding cognitive beliefs and seek more tangible rewards, or social recognition, leading to increased engagement with micro-transactions. These underlying thought processes could be examined further and addressed through the encouragement of more intrinsically motivated activities. In this sense, interventions may benefit from focusing on behavioural changes whereby participants reflect on their own

thoughts and actions, such as cognitive behavioural therapy. This may be particularly applicable for youth who exhibit problematic behaviour, allowing for the development of conscious decision-making and positive coping strategies. Focuses on well-being and increasing self-esteem may be crucial for altering motivational profiles of videogame players and ensuring harm prevention when engaging with videogames. Promotion and awareness of mindfulness from game companies may be beneficial, akin to gambling advertisements. Moreover, self-help resources could be made readily available in online gaming spaces.

Finally, policy surrounding micro-transactions should focus on limiting or regulating frequency of micro-transaction use, rather than amounts spent on in-game items. Current discourse surrounding the use of micro-transactions in games, most notably loot boxes, have focused on expenditure in videogames, rather than the frequency that purchases are made. The present chapter provides evidence towards frequency of use as a key factor in problematic behaviours and consequently, should be the focus of harm reduction and prevention measures.

5.6.6. Areas for Future Research

Future research surrounding self-determination, motivations and micro-transaction use may be beneficial, particularly in relation to confirmation and development of the findings of the present chapter. That is, the importance of frequency of micro-transaction use in the development of problematic gaming and gambling behaviour. In the present chapter, frustration with psychological needs was not a contributing factor in the relationship between motivations, frequency of micro-transaction use, and problematic behaviour. However, previous literature highlights that needs frustration may play a different role than hypothesised in the present chapter. It could be the case that other variables not specified in the present model may contribute to or exacerbate problematic behaviour. Similarly, the use of different structural equation methodology could identify any reciprocal relationships between variables, which was out of the scope of the present chapter.

Additionally, the present chapter highlighted a key gap in literature surrounding motivation for micro-transaction use, and the relationship between self-determined motivations and problem videogame playing and gambling behaviour. That is, the need for a validated motivation for micro-transaction use scale. Although micro-transaction focused scales, such as the Risky Loot Box Index (Brooks & Clark, 2019) and the Reasons and Facilitators for Loot Box Engagement Scale (Lloyd et al., 2021) are available, these focus solely on one kind of micro-transaction. A broader motivational measure would allow for wider use in a variety of healthcare and videogame user research settings.

5.7. Conclusion

The present chapter utilised complex PLS-SEM methods to analyse the relationship between self-determined motivations for gaming and gambling, needs frustration and satisfaction, micro-transaction use and expenditure, and problematic behaviour. The findings indicated that frequency of micro-transaction use is a key factor in the relationship between motivations for gaming and gambling and problematic behaviour. Namely, in the case of extrinsic motivations. The present chapter discussed the theoretical underpinnings of the findings, including potential explanations for relationships such as a lack of self-esteem and ego, as well as the ability to rapidly engage in micro-transaction use and links to gambling. The present chapter also highlighted key implications and applications its findings. Most importantly, the regulation of micro-transactions and the potential need for limit setting in videogames. Policymakers and videogame companies may find the present chapter particularly useful for harm prevention consideration for future videogames.

Chapter 6. The Motivations for Micro-transaction Use Scale (MMUS): Development and Validation

6. Chapter Overview

The second empirical study of the present thesis (Chapter 5) highlighted the need for a novel psychometric scale measuring motivations for the use of a broad range of micro-transactions. Consequently, the third and final empirical study of the present thesis, the present chapter, aims to develop and validate the MMUS utilising a mixed-methods approach. The present chapter also discusses the importance of the developed scale and its potential cross-sector uses.

6.1. Background

Since their 2006 introduction into Western videogames, micro-transactions have become an increasingly popular form of monetisation method (Zapata, 2023). In 2023, it was estimated that micro-transactions generated $73.27 billion globally, with this figure projected to rise to $80.88 billion in 2024 (The Business Research Company, 2024).

Micro-transactions are typically low-cost digital in-game items that offer players with further customisation options, advancement in the game and advantages to play. Some forms of micro-transaction, such as loot boxes (i.e., digital boxes or crates that are opened using real-world or in-game currency, whereby the exact contents of the crate are initially unknown to the player), are frequently described as a convergence between gaming and gambling (King & Delfabbro, 2020). As described throughout the present thesis, other common forms of micro-transaction include single-purchase cosmetic items (i.e., items that allow players to customise their in-game character or world, such as skins, clothing and furniture), pay-to-win (i.e., items that give players in-game advantages and advancements, such as weapons or extra lives and level skips), and battle passes (i.e., a system that tracks player experience points or in-game

goals and unlocks items or rewards when thresholds of experience points or goals have been met).

6.1.1. Micro-transactions and problem gambling

Academic literature has highlighted concerns surrounding the psychological impact of micro-transaction use on videogame players, with focus on associations between loot boxes and problem gambling behaviour (Wardle & Zendle, 2021; Zendle et al., 2019; Zendle & Cairns, 2018). It has been suggested that loot boxes have structural similarities with slot machines, including similar visuals (i.e., a spinning wheel showing potential prizes or 'near misses' before the reveal of the item obtained) and 'random' reward mechanics (Drummond & Sauer, 2018; Griffiths, 2018; Whittaker, 2019; Xiao et al., 2020). The structural and psychological association between loot boxes and forms of gambling have resulted in suggestions that loot boxes may be a 'gateway' to real-world gambling or, that those who gamble in the real-world are likely to be drawn to loot boxes as a 'reverse gateway' (Brooks & Clark, 2023; Hing et al., 2022; King & Delfabbro, 2020; Rockloff et al., 2021; Spicer, Nicklin, et al., 2022).

Pay-to-win micro-transactions (i.e., those that give players advantages over other players or immediately progress the player in the game) are also suggested to have associations problem gambling, through similar reward responses, whereby players can use pay-to-win micro-transactions in unlimited frequencies to gain advantages, and are consequently rewarded psychologically for their progression or advantage (Lelonek-Kuleta et al., 2021; Steinmetz et al., 2021; von Meduna et al., 2020).

Although less frequently discussed, the battle pass form of micro-transaction has also been likened to forms of gambling and specific playstyles of gambling, whereby players expend a higher amount of money upfront (either real-world money or in-game currency), in the hopes

of unlocking increasingly 'rare' or elite rewards, argued by Johnson and Brock (2020) to be similar to slot machine gambling and 'heavily front-loading' gambling styles, where limited consideration is given to monetary investment after initial expenditure. In the case of the battle pass, players not only expend money, but are required to expend time in the game to obtain experience points or to complete goals that allow for the unlocking of items, potentially leading to a 'sunk cost fallacy' effect (King & Delfabbro, 2018), as highlighted in the first empirical study of the present thesis (Chapter 4).

Key factors suggested to strengthen the association between micro-transaction use and problem gambling behaviour are expenditure on micro-transactions (Close et al., 2021), frequency of micro-transaction use (Spicer, Nicklin, et al., 2022; Zendle, 2020), speed of micro-transaction use and impulsivity (Garrett et al., 2023; Spicer, Nicklin, et al., 2022).

6.1.2. Micro-transactions and problem gaming

Research regarding the association between micro-transactions and problematic gaming behaviour (not only characterised by extended gaming sessions, but higher involvement in gaming) is still unclear (Raneri et al., 2022). It could be suggested that problematic gaming behaviours are broadly associated with spending money in games (Costes & Bonnaire, 2022), but that specific micro-transaction types may have stronger relationships to problem gaming than others.

Lelonek-Kuleta et al. (2021) identified five patterns of gamer involved in pay-to-win games, where two patterns included high involvement in a game, longer gaming sessions on average and more frequent pay-to-win micro-transaction usage. Similarly, loot box purchasers have been suggested to exhibit more severe problem gaming behaviours than non-users (González-Cabrera et al., 2022; Ide et al., 2021; Yokomitsu et al., 2021). Moreover, problematic gaming behaviour is suggested to be associated with higher expenditure on loot boxes (Li et al., 2019)

and 'risky' loot box engagement (Brooks & Clark, 2019; Drummond et al., 2020). Problematic loot box engagement is also suggested to explain the relationship between internet gaming disorder and online gambling disorder (González-Cabrera, Caba-Machado, Díaz-López, et al., 2024). Conversely, King, Russell, et al. (2020) found no significant association between micro-transaction expenditure and problematic gaming behaviour, instead suggesting that expenditure on micro-transactions amongst adolescents was associated with and motivated by peer-purchasing behaviour.

6.1.3. Theoretical Basis

From a physiological perspective, problematic behaviours are often suggested to be driven by serotonin and dopamine systems; in other words, systems that influence how an individual experiences pleasure and rewards (el-Guebaly et al., 2012; Fischer & Ullsperger, 2017; Kranz et al., 2010; Kuss & Griffiths, 2012; Weinstein & Lejoyeux, 2020). From a psychological perspective, it is suggested that motivation (i.e., the underlying thoughts, perceptions and beliefs that drive decisions) is a key factor in how and why an individual develops, or continues to exhibit problematic behaviours (González-Cutre & Sicilia, 2012; Griffiths, 2005; Pontes et al., 2015; Sinclair et al., 2016; West, 1989). Identifying the underpinning motivations of an individual is suggested to be beneficial for targeted harm prevention and treatment of problematic behaviours, allowing for personalised treatment plans and the use of appropriate motivational therapies (Drossel et al., 2023; Kurilla, 2021; Miller, 2023).

Self-determination theory suggests that motivation lies on a continuum between intrinsic motivation (i.e., engagement in an activity is driven by oneself and alignment with an individual's personal goals) and amotivation (i.e., a lack of drive to engage with an activity), with extrinsic motivation (i.e., engagement in an activity is driven by external rewards or to avoid the consequences of not engaging in an activity) positioned between the two (Ryan & Deci, 2000b). Extrinsic motivation is further defined by four types of behaviour regulation,

each categorised by level of internalisation (i.e., the level at which an individual views their behaviour or actions as their own) and proximity to intrinsic motivation (Ryan & Deci, 2000a). The most internal form of extrinsic motivation is integrated regulation (i.e., engagement in an activity due to the perceived congruence with personal identity, but not necessarily due to personal enjoyment) and is often combined with intrinsic motivation. Identified regulation (i.e., engagement in an activity to obtain an outcome of personal value but not due personal enjoyment) is a somewhat internal form of extrinsic motivation. Introjected regulation (i.e., engagement in an activity to boost ego, or to avoid perceived negative consequences of not engaging in the activity) is a somewhat, but not fully, externalised form of extrinsic motivation. The final type of extrinsic motivation is external regulation (i.e., engagement with an activity for tangible rewards or to avoid external punishment), which is suggested to be the least internalised form of motivation.

Individuals driven by intrinsic motivation or more internalised forms of regulation are suggested to experience greater life satisfaction, have greater levels of wellbeing and have higher self-esteem than those driven by externally regulation motivation or those who are not motivated at all (Ryan & Deci, 2000c). On the other hand, extrinsic motivations are associated with increased patterns of problematic behaviour and emotional exhaustion (Mills & Allen, 2020). It is suggested that receiving external rewards can undermine intrinsic motivation, shifting the initial motivation for engaging with the activity or action as the ‘reward’ itself to engaging with the activity or action with the expectation of receiving an external reward (Sansone & Harackiewicz, 2000). In other words, an individual may be conditioned to associate engagement with the activity or action with experiencing temporary positive feelings of reward, perpetuating extrinsically motivated engagement for instant, or quicker, gratification than that obtained intrinsically.

It could be suggested that the development of problematic gambling behaviour may be linked to a shift in motivation for engaging with gambling whereby those initially motivated intrinsically become motivated extrinsically (Carruthers et al., 2006; Griffiths & Delfabbro, 2001). This shift in motivation or reason for gambling could therefore be suggested to be associated with the type and frequency of reward obtained from gambling; gambling games with faster speeds of play and higher frequencies of events are considered to be more exciting and provide instant gratification for both non-problem gamblers and problem gamblers but are considered to be more exciting and engaging for problem gamblers (Harris & Griffiths, 2018).

Extant literature has highlighted key motivations for engaging in gambling, including gambling for personal enhancement through skill development, gambling for excitement or stimulation, gambling to escape negative emotions and gambling for monetary gain (Hagfors et al., 2023). Extrinsic motivations for gambling, such as for monetary gain and escapism have been associated with higher severity of problem gambling behaviour (Komoto, 2024; Milosevic & Ledgerwood, 2010; Nower et al., 2022; Sleczka et al., 2022; Stewart et al., 2016).

Motivations for gaming are suggested to be both intrinsically focused (i.e., for entertainment, fun, curiosity, exploration, and immersion; Demetrovics et al., 2011) and extrinsically focused (i.e., to obtain high scores, achieve in-game goals, gain experience points and obtain virtual items or resources; Wang & Sun, 2011). Like problem gambling, extrinsic motivations for gaming, as well as amotivation towards gaming have been associated with higher severity of problem gaming behaviour (King & Delfabbro, 2009) and subsequently, it may be the case that those initially motivated intrinsically to play videogames receive external rewards, changing their reasons for gaming and the patterns of behaviour associated with these. Extrinsic motivations for gaming that have been associated with problematic behaviour include gaming for emotional escape, fantasy, achievement, and competitive reasons (Bäcklund et al., 2022; Hussain et al., 2015; Kim et al., 2023; Wang & Cheng, 2022; Wang et al., 2021).

Although suggested to be a convergence between gaming and gambling (King & Delfabbro, 2020), it is argued that micro-transactions are their own phenomena (Lloyd et al., 2021) and, as discussed in the previous empirical study chapter, may have their own motivational drivers. Research exploring motivations for micro-transaction use is sparse and dispersed across a range of different forms of micro-transaction.

Motivations for the use of in-game items have broadly been discussed by Cleghorn and Griffiths (2015), with key motivations including to impress others, to collect items, self-expression, attachment to an in-game avatar and to experience superiority over other players. Similarly, Hamari et al. (2017) found that videogame players typically purchased in-game content for unobstructed play (i.e., skipping levels or obtaining rewards quicker), for social status or avatar image, to keep up with other players, to take advantage of limited time offers, and to support the development of the game. Additionally, when assessing purchase motivation in free-to-play games, Alha et al. (2018) found that high spenders typically made purchases to advance faster in the game and to feel powerful over other players, even though this was seen to have a negative impact on social status. These findings were furthered in the first empirical study of the present thesis, with key findings suggesting that videogame players were motivated to use micro-transactions out of obligation, or feeling as though they had no choice to, to reward or 'pay back' game developers, to take advantage of limited time offers, as a result of peer influence, and for social status.

Key motivations for loot box purchase are suggested by Zendle et al. (2019) to include excitement and 'gambling feelings', for gameplay advantages, social capital inside a game and to fit in with social groups. These findings are furthered by Nicklin et al. (2021), who suggested that motivations for loot box purchase include the excitement of opening or unlocking a loot box, the perceived value of loot box contents, to save time in the game, to improve the aesthetics of in-game avatars and to progress or gain advantages in the game. Lloyd et al. (2021)

developed the Reasons and Facilitators for Loot Box Engagement (the RAFFLE), a measure designed to assess key drivers of loot box purchase, utilising self-determination theory. Their study culminated in a 23-item scale with seven key drivers, including game enhancement, progression, social pressure, distraction or compulsion, altruism and the ability to resell items. Motivations for loot box purchase and motivations for engaging with gambling are suggested to be similar across extant literature (Lloyd et al., 2021; Nicklin et al., 2021; Puiras et al., 2023; Zendle et al., 2019). Finally, exposure to loot-box advertisements are suggested to indirectly drive loot box purchase, potentially to the extent that the use of loot boxes becomes problematic (González-Cabrera, Caba-Machado, Feijóo, et al., 2024).

The use of pay-to-win micro-transactions is suggested to be primarily driven by advancement in the game (especially to increase chances of winning), with other motivations including to extend game time or skip waiting times, enhance enjoyment of the game, to improve avatar aesthetics and to support the gaming community (Steinmetz et al., 2021).

Although limited, literature has also discussed motivations involved with the use of battle passes, or micro-transactions with similar mechanisms. These are suggested to include rewards being perceived as good value for money, the ability to connect with other players and contributing to the development or continuation of the game and the game community (Petrovskaya & Zendle, 2020).

Although micro-transaction motivations have been discussed, the ever-evolving nature of videogames may lead to new forms of micro-transaction, or ‘re-packaged’ forms (Johnson & Brock, 2020), meaning current scales measuring motivations for the use of a single form of micro-transaction may become outdated. Furthermore, to the researcher’s knowledge, there is no standard measure for motivational drivers that encompasses a broad range of micro-transactions, which would be beneficial for developing targeted harm prevention measures and

effective interventions for problematic micro-transaction use and associated problematic gaming and gambling behaviours.

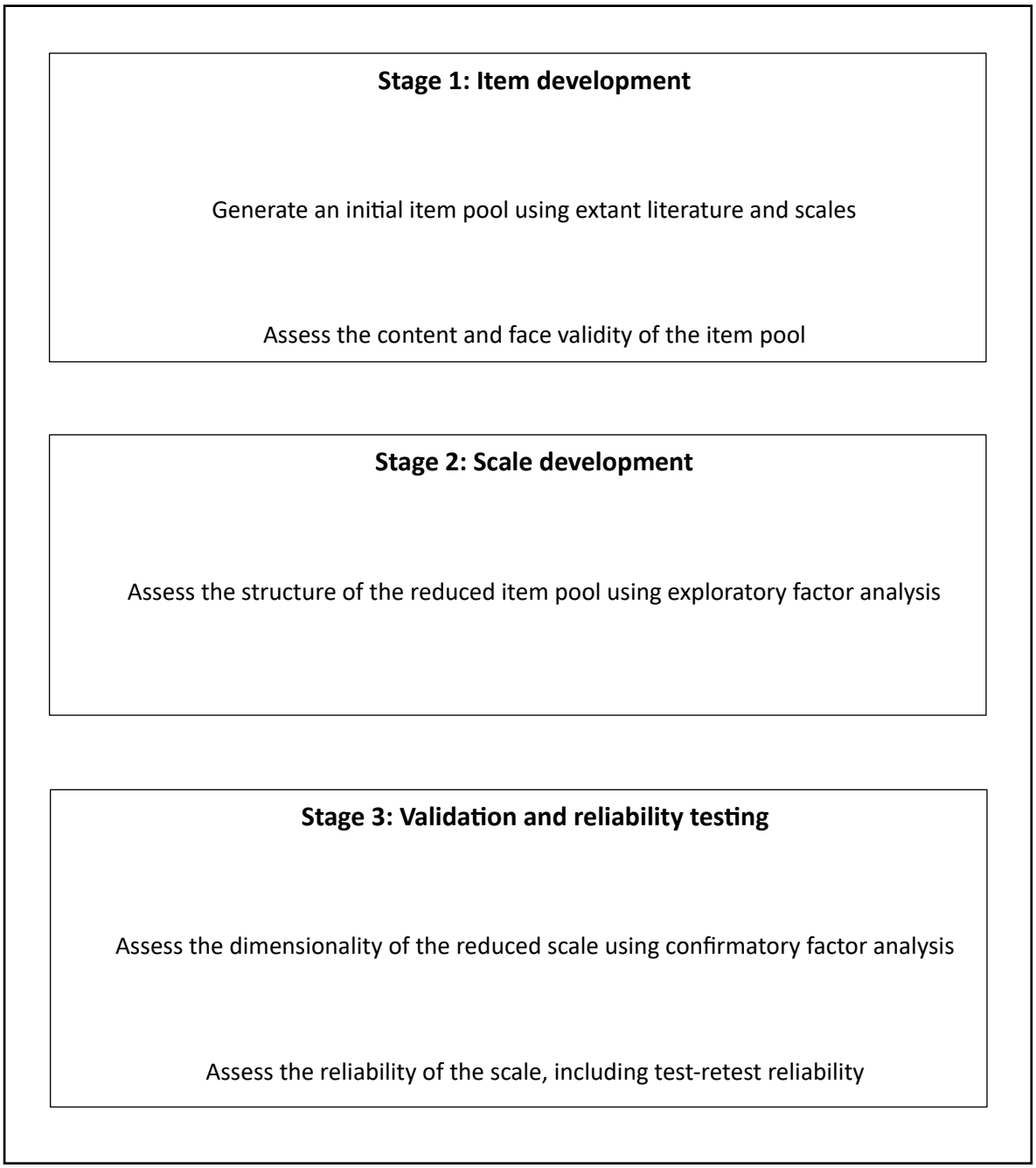
6.1.4. Aims of the Present Chapter

The primary aim of the present chapter was to develop and validate a novel multidimensional scale assessing motivations for the use of micro-transactions (i.e., the Motivations for Micro-transaction Use Scale [MMUS]), utilising mixed methods and following best practice literature (Boateng et al., 2018; DeVellis, 2022; Morgado et al., 2017; Worthington & Whittaker, 2006). The scale development process was carried out in three main stages (Figure 6.1). These were: (i) item development, (ii) scale development, and (iii) scale validation and reliability testing.

The aims of the first stage of the scale development process were to: (i) develop a comprehensive item set, using self-determination theory as the underpinning theoretical basis for the generation of the items and, (ii) to assess the developed item pool for content and face validity. The aims of the second stage of the scale development process were to: (i) conduct exploratory factor analysis to determine the number of factors in the scale, and (ii) reduce the number of items in the proposed scale as appropriate. The aims of the third and final stage of the scale development process were to: (i) test the dimensionality of the scale using confirmatory factor analysis, (ii) test the reliability of the scale and, (iii) test the validity of the scale.

Figure 6.2

The framework for the development and validation of the Motivations for Micro-transaction Use Scale



6.2. Stage 1: Item Development

6.2.1. Method

6.2.1.1. Design and Participants. Stage 1 of the scale development processes consisted of item generation through deductive methods, consisting of a scoping review of literature, presented in the introduction section of the present chapter, and a subsequent review of extant scales. Scales were chosen due to their six-factor structure and alignment with the continuum of motivation and behavioural regulation proposed by Ryan and Deci (Ryan & Deci, 2000a). Five scales, and their respective subscales and items, were reviewed. These were the User Motivation Inventory (Brühlmann et al., 2018), the Revised Sport Motivation Scale (Pelletier et al., 2013), the Work Extrinsic Intrinsic Motivation Scale (Tremblay et al., 2009), the Gaming Motivation Scale (Lafrenière et al., 2012) and, the Modified Gambling Motivation Scale (Shinaprayoon et al., 2017).

It is suggested that initial item pool should be least twice as large as the desired number of items (Boateng et al., 2018; DeVellis, 2022). Consequently, an initial item pool of 90 items (Appendix B) was generated, with the knowledge that items would be reduced following Stages 1 and 2 of the present chapter. Following item generation, it is suggested that content and face validity of the items be tested (Morgado et al., 2017). The present chapter utilised an expert review and two focus groups with target users to test the content and face validity of the scale items.

The expert review was conducted online using the online survey platform *Qualtrics* in January 2024. The expert review panel ($N = 7$) were recruited from known experts in the area via direct contact, based on their area of expertise. Table 6.1 summarises the expert participants, their self-reported area of expertise, and years of experience in their reported area.

Experts were asked to complete an online consent form before taking part in the review. Experts were then asked to review each proposed scale item (Appendix A) for relevance, clarity and completeness on a scale from 1 (i.e., not relevant, not clear, and not complete at all) to 4 (relevant, clear, and complete). Ratings of 2 indicated the item was somewhat relevant, clear or complete, but needed major revision. Ratings of 3 indicated that the item was relevant, clear or complete but needed minor revision. Experts were also given open-text response boxes to provide additional feedback during each round of rating and for the scale as a whole. Following completion of the review, experts were directed to a debrief sheet for more information about the study.

Two focus groups were conducted online using *Microsoft Teams* in January and February 2024. The focus group sample (N = 6) were recruited from the researcher's university using on-campus advertisement and online advertisement on the university's *Microsoft Engage* platform. Participants were eligible to take part if they (i) were over the age of 18 years, and (ii) currently use or had previously used micro-transactions.

To protect anonymity, participants were informed that they did not have to disclose demographic information or be shown on camera during the duration of the focus group unless they wished to do so. Participants all confirmed that they were over the age of 18 years. Participants consisted of university staff members (n = 2), current university students (n = 3) and a former university student (n = 1). After signing up by directly emailing the researcher, participants were directed to an online consent form, hosted on the online survey platform *Qualtrics*. Following confirmation of agreement to consent, participants were sent a meeting link for their respective focus group meeting date and time.

The focus groups were each held for a period of two hours and participants were asked to review items in two phases. The first phase asked participants to review each proposed scale

item for importance, highlighting key important and unimportant items by identifying the item number and providing feedback for the item. Participants also discussed if they agreed/disagreed with feedback given. The second phase asked participants to review the wording of each proposed item and identifying items that would benefit from modification of the item through rewording or combining with other items. The full focus group schedule can be found in Appendix C. Following the focus group, participants were emailed a debrief sheet and a £5 *Love2Shop* voucher code as compensation for their participation. Audio files from each focus group session were transcribed before analysis to produce a single transcript per focus group.

6.2.2. Analysis

As suggested by Boateng et al. (2018), expert reviews were analysed using statistical procedures. Following the review, the content validity index (CVI) was calculated for each item (I-CVI) by counting ratings of 3 (i.e., relevant but needs minor revision) and 4 (i.e., relevant) and dividing by the number of experts who provided a rating. As each expert provided a rating for each item, the grouped 3 and 4 responses were all divided by seven. It is suggested that items with an I-CVI less than 0.70 are eliminated from the scale, those with a rating between 0.70 and 0.79 are modified and those above 0.79 are retained (Rodrigues et al., 2017; Zamanzadeh et al., 2015).

Focus group transcripts were analysed using manifest content analysis (i.e., examining surface level content, rather than searching for deeper or hidden meanings in text), due to participants' explicit identification of perceived important or problematic items. Furthermore, manifest content analysis is beneficial in cases where in-depth interpretation of content is not appropriate (Bengtsson, 2016). The transcript data were coded so that the specific item number participants were discussing was noted, and the feedback given was summarised.

Following analysis of both the expert review and the focus group data, the outcomes for each item were combined to triangulate and compare feedback across the data. Items were labelled with five different outcomes. These were: (i) remove, (ii) move to another subscale, (iii) combine with other item, (iv) reword or (v) retain. A summary of the analysis outcomes for each item can be found in Table 6.2.

6.2.3. Results

A total of 56 items were removed from the initial 90-item pool (Appendix B). The resulting 34-item scale (Table 6.3) for use in the second stage of the scale development and validation process was then shared with the wider research team (i.e., the researcher's supervisors) for triangulation and for further content validation. Once approved by the research team, the second stage of the scale development process commenced.

Table 6.1

Descriptions of each Expert Review Participant

Expert	Area(s) of expertise	Experience (years)
1	Videogame research	1 - 5 years
2	Problem gambling research	5 - 10 years
3	Gambling and behavioural addictions	5 - 10 years
4	Gaming-related topics	5 - 10 years
5	Behavioural addiction, particularly gambling and videogame playing	Over 35 years
6	Addiction, social media, and smartphone use	5 - 10 years
7	Psychometrics	5 - 10 years

Table 6.2

Item Reduction Process following the Expert Review and Focus Groups

Item Code		Decision	Reword	Redrafted Item
Intrinsic Motivation				
Int.1	Because they are enjoyable	Combine (2)	Yes	Because I find them fun or enjoyable to use
Int.2	Because they are fun to use	Combine (1)	No	
Int.3	Because it is very interesting to learn how they work	Combine (7, 9)	No	
Int.4	Because they are exciting	Remove	No	
Int.5	To experience new game options (i.e., weapons, skins, items)	Reword	Yes	To experience new options in the game (e.g., weapons, skins, other cosmetic items)
Int.6	Because they make me feel successful	Remove	No	
Int.7	Because they allow me to try new strategies in the game	Combine (3, 9)	No	
Int.8	I enjoy improving my ability in the game	Reword	Yes	Because they help me to further develop my gaming skills
Int.9	I am curious to know what will happen in the game when I use them	Combine (3, 7)	Yes	Because I am interested to see how they change the gameplay
Int.10	To test my ability to control myself	Remove	No	
Int.11	Because they give me a feeling of control in the game	Remove	No	
Int.12	Because they allow me to experience more challenges in the game	Remove	No	
Int.13	Because they allow me to master the game	Remove	No	
Int.14	Because they make me feel like a good team player	Remove	No	
Int.15	Because they allow me to reach my in-game goals	Reword	Yes	Because they help me to reach my personal gaming goals
Integrated Regulation				
Integ.1	To give back to the game developers	Reword	Yes	To show my support for the creators of the game

Item Code		Decision	Reword	Redrafted Item
Integ.2	Because they allow me to represent myself in the game	Remove	No	
Integ.3	To express my personality in the game	Retain	No	To express my personality in the game
Integ.4	To show that my character/avatar is an extension of myself	Remove	No	
Integ.5	Because they are important to me	Remove	No	
Integ.6	Because they are a fundamental part of my life	Remove	No	
Integ.7	Because they contribute to my gamer identity	Remove	No	
Integ.8	To show my support to the videogame company	Remove	No	
Integ.9	Because I agree with the values of the game developers	Remove	No	
Integ.10	Because they allow me to connect with likeminded people	Reword	Yes	Because they help me to connect with other players
Integ.11	Because they help me to achieve my own life goals	Remove	No	
Integ.12	To express my character/avatar's personality	Reword	Yes	Because they allow me to give my character their own personality
Integ.13	To show that I am an experienced gamer	Retain	No	To show that I have invested a lot of time or money in gaming
Integ.14	To have a collection of in-game items	Remove	No	N/A
Integ.15	To support my favourite streamer/youtuber	Reword	Yes	Because they help me to show than I am a fan of a streamer/Youtuber
Identified Regulation				
Iden.1	Because the advantages I get from them are important to me	Remove	No	
Iden.2	Because they are an important part of being a gamer	Remove	No	
Iden.3	Because they allow me to be a better gamer	Remove	No	
Iden.4	Because they allow me to design my character/avatar the way I want to	Retain	No	Because they allow me to design my character the way I want to
Iden.5	Because I need them to achieve my in-game goals	Retain	No	Because I need them to achieve my in-game goals
Iden.6	Because they allow me to take part in in-game events	Retain	No	Because they allow me to take part in in-game events

Item Code		Decision	Reword	Redrafted Item
Iden.7	So that my character/avatar matches my friends' character/avatars	Reword.	No	
Iden.8	Because my friends use them	Remove	No	
Iden.9	To help me to relax	Remove	No	
Iden.10	Because I need them to complete the game	Remove	No	
Iden.11	Because they allow me to play the game for longer	Remove	No	
Iden.12	Because I want to own as many in-game items as possible	Reword	Yes	Because I want to own or collect as many in-game items as possible
Iden.13	Because I want my character/avatar to look cool	Remove	No	
Iden.14	Because they are a good way to show that I am wealthy	Move (external regulation)	Yes	To show other players that I am wealthy
Iden.15	Because I have saved money/budgeted to obtain specific in-game items	Reword	Yes	Because I have saved money to obtain specific in-game items
Iden.16	Because they are good value for money	Addition		Because they are good value for money
Introjected Regulation				
Intro.1	Because I feel better about myself when I do	Remove	No	
Intro.2	Because I feel that I must	Combine (6, 9)	Yes	Because I feel that I cannot do well in the game without them
Intro.3	Because I feel guilty if I don't	Remove	No	
Intro.4	Because I feel like a bad gamer if I don't	Combine (8, 14)	Yes	To gain the respect of other players and avoid being viewed as inexperienced
Intro.5	To make other players jealous	Reword	Yes	To make other players envious
Intro.6	Because I want to succeed in the game	Combine (2, 9)	No	
Intro.7	To get ahead of or keep up with other players	Reword	Yes	To be better at the game than other players
Intro.8	To gain the respect of other players	Combine (4, 14)	No	
Intro.9	To help me succeed in the game, so that I am not ashamed of myself	Combine (2, 6)	No	

Item Code		Decision	Reword	Redrafted Item
Intro.10	Because my favourite streamer/youtuber does	Reword	Yes	To be like my favourite streamer/Youtuber
Intro.11	Because they are popular with my friends	Remove	No	
Intro.12	Because otherwise I would feel as though I am missing out	Retain	No	Because otherwise I would feel as though I am missing out
Intro.13	To satisfy my temptation, even if I feel guilty afterwards	Remove	No	
Intro.14	To make sure I am not embarrassed by my in-game character/avatar	Combine (4, 8)	No	
Intro.15	To make myself feel better after a bad day	Remove	No	
External Regulation				
Ex.1	Because I feel that my friends would not like me if I didn't	Remove	No	
Ex.2	Because I want to impress my favourite streamer/youtuber	Remove	No	
Ex.3	To gain powerful in-game advantages	Combine (4)	Yes	To gain in-game advantages (e.g., weapons, armour, characters)
Ex.4	To obtain or unlock powerful and rare items (i.e., skins, weapons)	Combine (3)	No	
Ex.5	To unlock hidden or restricted areas of the game (i.e., new characters or maps)	Remove	No	
Ex.6	To become wealthy in the game	Combine (8)	No	
Ex.7	To gain in-game levels, awards, or experience points	Remove	No	
Ex.8	To trade items with other players	Combine (6)	Yes	To trade with other players for better items or in-game currency
Ex.9	To quickly advance in the game	Retain	Yes	To advance quickly in the game (e.g., experience points, skipping levels, extra lives)
Ex.10	To make my character/avatar look cool	Combine (11, 12, 15)	No	
Ex.11	To show my friends that I am cool	Combine (10, 12, 15)	No	

Item Code		Decision	Reword	Redrafted Item
Ex.12	To show other players that I am cool	Combine (10, 11, 15)	No	
Ex.13	Because they are inexpensive	Combine and move (14, identified regulation)	Yes	Because they are good value for money
Ex.14	Because the game offers me a good deal	Combine and move (13, identified regulation)	No	
Ex.15	To obtain limited edition/rare items	Combine (10, 11, 12)	Yes	To show other players that I have limited edition or rare items
Ex.16	To earn real-world money from gambling or selling items	Addition		To earn real-world money from gambling or selling items
Ex.17	To show other players that I am wealthy	Addition		To show other players that I am wealthy
Amotivation				
Amo.1	But I question why I continue to use them	Remove	No	
Amo.2	But I don't see the point in using them	Retain	No	But I don't see the point in using them
Amo.3	But I don't know why; I cannot succeed in the game anyway	Reword	Yes	But I cannot succeed in the game anyway
Amo.4	But I question if they are good for me	Remove	No	
Amo.5	But I don't feel like I get a lot of benefit from them	Remove	No	
Amo.6	But I no longer get any enjoyment from them	Retain	No	But I no longer get any enjoyment from them
Amo.7	But I feel like they have a negative effect on me	Remove	No	
Amo.8	But I don't feel like I should	Remove	No	
Amo.9	Because I have used them for a while and can't stop	Remove	No	
Amo.10	Because I don't feel like I can help myself	Remove	No	
Amo.11	But I am no longer interested in them	Remove	No	
Amo.12	Because I don't have time to 'grind' in the game	Remove	No	
Amo.13	But I never intend to	Remove	No	

Item Code		Decision	Reword	Redrafted Item
Amo.14	But I don’t think about why	Retain	No	But I don’t think about why
Amo.15	But I don’t feel like they enhance my gaming experience	Remove	No	
Amo.16	But I don't know why	Addition	Yes	But I don't know why

Table 6.3

The 34-item Motivations for Micro-transaction Use Scale used during Stages 2 and 3

	Item Code	Item
1	Int.1	Because I find them fun or enjoyable to use
2	Integ.1	To show my support for the creators of the game
3	Iden.1	Because they allow me to design my character the way I want to
4	Intro.1	Because I feel that I cannot do well in the game without them
5	Ex.1	To gain in-game advantages (e.g., weapons, armour, characters)
6	Amo.1	But I don't see the point in using them
7	Int.2	To experience new options in the game (e.g., weapons, skins, other cosmetic items)
8	Integ.2	To express my personality in the game
9	Iden.2	Because I need them to achieve my in-game goals
10	Intro.2	To gain the respect of other players and avoid being viewed as inexperienced
11	Ex.2	To trade with other players for better items or in-game currency
12	Amo.2	But I cannot succeed in the game anyway
13	Int.3	Because they help me to further develop my gaming skills
14	Integ.3	Because they help me to connect with other players
15	Iden.3	Because they allow me to take part in in-game events
16	Intro.3	To make other players envious
17	Ex.3	To advance quickly in the game (e.g., experience points, skipping levels, extra lives)
18	Amo.3	But I no longer get any enjoyment from them
19	Int.4	Because I am interested to see how they change the gameplay
20	Integ.4	Because they allow me to give my character their own personality
21	Iden.4	Because I want to own or collect as many in-game items as possible
22	Intro.4	To be better at the game than other players
23	Ex.4	To show others players that I have limited edition or rare items
24	Amo.4	But I don't think about why
25	Int.5	Because they help me to reach my personal gaming goals
26	Integ.5	To show that I have invested a lot of time or money in gaming
27	Iden.5	Because they are a good way to show that I am wealthy
28	Intro.5	To be like my favourite streamer/Youtuber
29	Ex.5	To earn real-world money from gambling or selling items
30	Amo.5	But I don't know why
31	Integ.6	Because they help me to show than I am a fan of a streamer/Youtuber
32	Iden.6	Because I have saved money to obtain specific in-game items
33	Intro.6	Because otherwise I would feel as though I am missing out
34	Ex.6	To show other players that I am wealthy

Note. Int = Intrinsic motivation, Integ = Integrated regulation, Iden = Identified regulation, Intro = Introjected regulation, Ex = External regulation, Amo = Amotivation

6.3. Stages 2 and 3: Scale development, reliability and validity testing

6.3.1. Method

6.3.1.1. Design and Participants. The next two stages of the scale development and validation process involved conducting a large-scale survey using the 34-item scale (Table 6.3) developed during Stage 1 of the scale development process. Data were collected from May to July 2024 using the online survey platform *Qualtrics*. Participants were recruited from numerous social media and forum-based platforms. This included gaming-related *Reddit* forums, gaming forum platforms *ResetEra* and *AVForums* and social media sites *LinkedIn* and *Facebook.* Participants were eligible to participate if they (i) were over the age of 18 years, and (ii) had previously, or currently use micro-transactions. Participants were provided with an anonymous link to take part in the survey. Following completion of the survey, participants were given the opportunity to take part in a prize draw following the collection of data to win up to £50 of *Love2Shop* vouchers. Participants were also given the opportunity to retake the survey after a two-week period for test-retest reliability purposes. Before exiting the survey, participants were directed to the study debrief page, which provided links to further information about micro-transactions and links to relevant *GamCare* and *GambleAware* support pages, should participants be experiencing issues with micro-transaction use, problem gaming or problem gambling.

An initial sample of 603 participants were recruited to take part in the study. Data were screened for quality, resulting in the removal of six participants from the study, due to straight lining ($n = 1$), duplicate responses ($n = 2$) and non-serious responses (e.g., participants reporting their age as 99; $n = 3$). The final participant sample ($n = 597$, $M_{age} = 31.6$ years, SD = 7.78) were 79.6% male, 14.2% female, 5.0% non-binary or third gender, and 1.2% did not disclose their gender. Participants were also asked about their employment status, average annual

income, the type of micro-transaction they typically used (multiple-choice) and their frequency of micro-transaction use. Demographic details for the total sample can be found in Table 6.4.

The final sample of data were then cleaned for analysis using R (R Core Team, 2022). Missing data were structurally missing (i.e., participants were not gamblers, therefore did not answer gambling related questions) and consequently a value of 0 was imputed to represent a lack of engagement with gambling (Mitra et al., 2023). The data collected were utilised for both exploratory and confirmatory factor analysis, by randomly splitting the final sample into two independent samples (approximately 50% of cases) using IBM SPSS Statistics (Version 29).

The sample size needed for factor analysis is commonly discussed in literature, with suggestions that samples of 5:1 or 10:1 (participants to item ratio) are considered acceptable, or alternatively, a rule-of-thumb minimum sample size of 300 participants is required (Carpenter, 2018). In the case of both the EFA sample (n = 317) testing a 34-item scale and the CFA sample (n = 280) testing a 16-item scale, these requirements were met.

The EFA sample (n = 317, M_{age} = 31.2 years, SD = 7.85) were 78.2% male, 14.5% female, 6.0% non-binary or third gender and 1.3% did not disclose their gender. The employment status, average annual income, typical micro-transaction type used (multiple-choice) and frequency of micro-transaction use of the EFA sample can be found in Table 6.5.

The CFA sample (n = 280, M_{age} = 32.2 years, SD = 7.69) were 81.1% male, 13.9% female, 3.9% non-binary or third gender and 1.1% did not disclose their gender. The employment status, average annual income, typical micro-transaction type used (multiple-choice) and frequency of micro-transaction use of the CFA sample can be found in Table 6.6.

Participants who opted to retake the survey were sent a personalised survey link to their chosen email address two weeks (between May and August 2024) after their initial survey was

completed. Participants were assigned a random ID, which was then linked to the follow-up survey to ensure that only participants who agreed to take part in the follow-up survey were sent a link. The retest sample (n = 123, M_{age} = 32.4 years, SD = 7.60) were 76% male, 17.9% female, 4.9% non-binary or third gender and 0.8% did not disclose their gender. The employment status, average annual income, typical micro-transaction type used (multiple-choice) and frequency of micro-transaction use of the retest sample can be found in Table 6.7.

Table 6.4

Total Sample Characteristics

	n	**%**
Gender identity		
Male	475	79.6
Female	85	14.2
Non-binary/third gender	30	5.0
Prefer not to say	7	1.2
Age group (in years)		
18 – 24	121	20.3
25 – 34	274	45.9
35 – 44	176	29.5
45 – 54	20	3.4
55 – 64	5	0.8
Prefer not to say	1	0.2
Employment status		
Employed – full-time	380	63.7
Employed – part-time	39	6.5
Unemployed looking for work	38	6.4
Unemployed not looking for work	20	3.4
Student	87	14.6
Retired	4	0.7
Other	19	3.2
Prefer not to say	10	1.7
Income group		
£0	24	4.0
£1 - £9,999	76	12.7
£10,000 - £24,999	105	17.6
£100,000 and over	40	6.7
£25,000 - £49,000	173	29.0
£50,000 - £74,999	99	16.6
£75,000 - £99,000	33	5.5
Prefer not to say	47	7.9
Micro-transaction type used		
In-game currency	492	82.4
Loot boxes	279	46.7
Battle or season passes	430	72.0
Skins or other single purchase cosmetic items	396	66.3
Expiration-based items (e.g., extra lives or level skips)	75	12.6
Other	63	10.6

	n	%
Frequency of micro-transaction use		
Daily	4	0.7
Weekly	26	4.4
Monthly	213	35.7
Annually	182	30.5
Less frequently than annually	172	28.8
Gambled in the previous 12 months		
Yes	228	38.2
No	369	61.8

Table 6.5

EFA Sample Characteristics

	n	%
Gender identity		
Male	248	78.2
Female	46	14.5
Non-binary/third gender	19	6.0
Prefer not to say	4	1.3
Age group (in years)		
18 – 24	73	23.0
25 – 34	144	45.4
35 – 44	88	27.8
45 – 54	9	2.8
55 – 64	3	.9
Employment status		
Employed – full-time	206	65.0
Employed – part-time	19	6.0
Unemployed looking for work	22	6.9
Unemployed not looking for work	10	3.2
Student	43	13.6
Retired	1	0.3
Other	9	2.8
Prefer not to say	7	2.2
Income group		
£0	14	4.4
£1 - £9,999	41	12.9
£10,000 - £24,999	50	15.8
£25,000 - £49,000	94	29.7
£50,000 - £74,999	45	14.2
£75,000 - £99,000	20	6.3

	n	%
£100,000 and over	24	7.6
Prefer not to say	29	9.1
Micro-transaction type used		
In-game currency	253	79.8
Loot boxes	147	46.4
Battle or season passes	218	68.8
Skins or other single purchase cosmetic items	209	65.9
Expiration-based items (e.g., extra lives or level skips)	40	12.6
Other	38	12.0
Frequency of micro-transaction use		
Daily	2	0.6
Weekly	16	5.0
Monthly	112	35.3
Annually	91	28.7
Less frequently than annually	96	30.3
Gambled in the previous 12 months		
Yes	120	37.9
No	197	62.1

Table 6.6

CFA Sample Characteristics

	n	%
Gender identity		
Male	227	81.1
Female	39	13.9
Non-binary/third gender	11	3.9
Prefer not to say	3	1.1
Age group (in years)		
18 – 24	48	17.1
25 – 34	130	46.4
35 – 44	88	31.4
45 – 54	11	3.9
55 – 64	2	0.7
Prefer not to say	1	0.4
Employment status		
Employed – full-time	174	62.1
Employed – part-time	20	7.1
Unemployed looking for work	16	5.7
Unemployed not looking for work	10	3.6

	n	%
Student	44	15.7
Retired	3	1.1
Other	10	3.6
Prefer not to say	3	1.1
Income group		
£0	10	3.6
£1 - £9,999	35	12.5
£10,000 - £24,999	55	19.6
£25,000 - £49,000	79	28.2
£50,000 - £74,999	54	19.3
£75,000 - £99,000	13	4.6
£100,000 and over	16	5.7
Prefer not to say	18	6.4
Micro-transaction type used		
In-game currency	239	85.4
Loot boxes	132	47.1
Battle or season passes	212	75.7
Skins or other single purchase cosmetic items	187	66.8
Expiration-based items (e.g., extra lives or level skips)	35	12.5
Other	25	8.9
Frequency of micro-transaction use		
Daily	76	27.1
Weekly	91	32.5
Monthly	101	36.1
Annually	10	3.6
Less frequently than annually	2	0.7
Gambled in the previous 12 months		
Yes	108	38.6
No	172	61.4

Table 6.7

Retest Sample Characteristics

	n	%
Gender identity		
Male	94	76.4
Female	22	17.9
Non-binary/third gender	6	4.9
Prefer not to say	1	0.8
Age group (in years)		

	n	%
18 – 24	21	17.1
25 – 34	54	43.9
35 – 44	42	34.1
45 – 54	6	4.9
Employment status		
Employed – full-time	79	64.2
Employed – part-time	8	6.5
Unemployed looking for work	9	7.3
Unemployed not looking for work	7	5.7
Student	14	11.4
Other	5	4.1
Prefer not to say	1	0.8
Income group		
£0	2	1.6
£1 - £9,999	18	14.6
£10,000 - £24,999	24	19.5
£25,000 - £49,000	34	27.6
£50,000 - £74,999	21	17.1
£75,000 - £99,000	3	2.4
£100,000 and over	12	9.8
Prefer not to say	9	7.3
Micro-transaction type used		
In-game currency	103	83.7
Loot boxes	59	48.0
Battle or season passes	97	78.9
Skins or other single purchase cosmetic items	76	61.8
Expiration-based items (e.g., extra lives or level skips)	14	11.4
Other	13	10.6
Frequency of micro-transaction use		
Weekly	4	3.3
Monthly	44	35.8
Annually	41	33.3
Less frequently than annually	34	27.6
Gambled in the previous 12 months		
Yes	41	33.3
No	82	66.7

6.3.2. Measures

The survey administered to participants at both Time 1 and Time 2 comprised basic demographic questions, demographic style micro-transaction use questions, a question asking if participants had gambled in the last 12 months (i.e., a yes or no response), the proposed 34-item MMUS scale and psychometric measures (assessing gaming and gambling motivation and risky loot box engagement). Psychometric measures assessing gaming and gambling motivation and risky loot box engagement were included in the survey to assess the convergent validity of the MMUS during Stage 3, with expectation that each scale would positively correlate with the MMUS due to the convergence between gambling and gaming outlined in the introduction of the present chapter.

6.3.2.1. Demographic information. Participants were asked questions about their gender, age, employment status and annual income.

6.3.2.2. Micro-transaction use. Participants were asked to select which types of micro-transaction they typically used. Participants could select one or multiple types; in-game currency (e.g., gold, coins, gems), loot boxes, battle or season passes, skins or other single purchase items, expiration based (e.g., extra lives or level skips), or 'other'. Participants were also asked to report how frequently they used micro-transactions; daily, weekly, monthly, annually or less frequently than annually.

6.3.2.3. The proposed 34-item MMUS. The 34-item MMUS scale (Table 6.3) comprised the 34 items developed during Stage 1 of the present chapter. Items were rated on a scale from one to seven (1 = Strongly disagree, 4 = Neither agree nor disagree, 7 = Strongly agree).

6.3.2.4. The Gaming Motivations Scale (GAMS; Lafrenière et al., 2012). The GAMS is an 18-item scale assessing motivation for gaming. Participants are asked why they play their chosen game (e.g., *"Because I feel that I must play regularly"*), with six subscales based on the self-determination theory motivation continuum. The GAMS uses a seven-point Likert scale (1 = do not agree at all, 7 = very strongly agree). The GAMS is scored by summing scores for each subscale, with a maximum score of 21 on each subscale. In the present chapter, the Cronbach's alpha for each subscale was above 0.72 (0.72 – 0.88), apart from the intrinsic motivation subscale, which had a Cronbach's alpha of 0.48. Reliability concerns with the intrinsic subscale of the GAMS have been discussed in previous studies (Mills, Milyavskaya, Mettler, et al., 2018). As highlighted in the previous empirical study chapter of the present thesis. Low reliability scores may occur when items do not accurately assess a construct, or the construct is complex. Item wording may also play a role, with item three of the subscale (*"For the feeling of efficacy I experience when I play"*) may use wording that is not clear to participants, resulting in the inaccurate measurement of intrinsic motivation (Shinaprayoon et al., 2017).

6.3.2.5. The Modified Gambling Motivation Scale (MGMS; Shinaprayoon et al., 2017). The MGMS is a 28-item scale assessing motivations for gambling, with six subscales based on the self-determination theory motivation continuum. Participants are asked why they gamble (e.g., *"I enjoy improving my knowledge of the game"*). The MGMS uses a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree). The MGMS is scored by finding the mean of each subscale, with scores ranging from zero to seven and with a maximum total score of 42. In the present chapter, each subscale had a Cronbach's alpha above 0.89 (0.89 – 0.96). The whole scale Cronbach's alpha was 0.98.

6.3.2.6. The Risky Loot Box Index (RLI; Brooks & Clark, 2019). The RLI is a five-item scale assessing 'risky' use of loot boxes (e.g., *"Once I open a loot box, I often feel compelled to open another"*). The RLI uses a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree). The RLI is scored by summing item scores for a total score ranging from five to 35. Higher scores indicate more risky loot box engagement. In the present chapter, the internal reliability of the scale was calculated to be 0.95 (Cronbach's alpha).

6.3.3. Stage 2: Analysis and results

Stage 2 utilised R studio packages and IBM SPSS Statistics (Version 29) for analysis purposes. Although a theoretical basis for the MMUS was proposed and item generation was based on a review of extant literature surrounding gaming, gambling and the six-factor self-determination theory motivation continuum, academic literature concerning the underpinning theoretical basis of motivation for micro-transaction use is still in its relative infancy. Consequently, and in line with best practice literature (Boateng et al., 2018), exploratory factor analysis was utilised to examine the factor structure of the scale including the identification of subscales from the data, remove poorly performing items before reliability and validity testing and to develop theoretical constructs (Williams et al., 2010).

First, the EFA sample data (n = 317) was assessed for normality using Shapiro-Wilkes, which indicated that the data were not normally distributed ($p < 0.001$). Shapiro-Wilkes can be sensitive to large sample sizes (> 300) and as such, should be reported alongside absolute skewness and kurtosis excess values; skewness values should be ≤ 2 and kurtosis values should be ≤ 4 (Mishra et al., 2019). Skewness and kurtosis excess values indicated that the data were not normally distributed (Table 6.8).

It is recommended to run preliminary tests before conducting actor EFA (Yong & Pearce, 2013). The data were analysed using Bartlett's Test of Sphericity, which tests that the dataset

was a correlation matrix, rather than an identity matrix (Watkins, 2018). In the case that the data is an identity matrix (i.e., a statistically significant Chi-square value is not obtained) it is not appropriate to use factor analysis. In the present chapter, Bartlett's test of sphericity was statistically significant, with a $p < 0.001$, suggesting the data were appropriate for EFA. Watkins (2018) further suggested that The Keiser-Meyer-Olkin (KMO) test is conducted, to supplement Bartlett's test of sphericity; KMO values are recommended to be ≥ 0.70. The KMO value for present chapter was 0.84, further indicating that the data were appropriate for factor analysis.

Finally, it is suggested that parallel analysis is conducted prior to EFA to identify the appropriate number of factors to be extracted from the data, complemented by the Scree test (Williams et al., 2010). Parallel analysis compares actual eigenvalues with simulated eigenvalues and factors are retained where actual eigenvalues surpass simulated eigenvalues (Çokluk & Koçak, 2016). In the present chapter, an initial parallel analysis and assessment of the scree plot concluded that a six-factor structure was appropriate for the data.

Following identification of the appropriate numbers of factors, the EFA was conducted, with a six-factor structure. As suggested by Watkins (2018), principal axis factoring extraction method was used, due to the non-normality of the data. The rotation method used was selected based on the assumption that the factors included in the scale are correlated, rather than distinct factors. Consequently, an oblique rotation (Promax) was used, to ensure that correlation between factors was allowed (Howard, 2016).

The item removal process was iterative, with cross-loading (i.e., items loading onto more than one factor) and low loading items (items loading < 0.40 onto factors) being removed after running the first EFA (Appendix D). It is suggested that the cut-off for item loadings is between 0.3 and 0.4 (Carpenter, 2018). A total of eight items were removed (Table 6.9). The EFA was then conducted a second time (Appendix E). Item with low loadings on their respective factors

and items that did not make theoretical sense were then removed. A further 10 items were removed after the second EFA (Table 6.10). EFA was run a final time, resulting in a stable five-factor solution (KMO = 0.76, Bartlett's test of sphericity < 0.001) with item loadings ranging from 0.466 to 0.902. The five-factor structure explained 57.9% of the variance.

The exploratory factor structure identified during the EFA process highlighted a divergence between the proposed theoretical structure of the scale (i.e., a six-factor structure based on the self-determination theory motivation continuum), and the structure found in the data. Consequently, the resulting scale structure was analysed by each member of the research team to identify and subsequently name the underlying motivation measured by each factor. Consensus between the research team was achieved to name each of the factors. The resulting factors were: (i) *achievement and advancement*, (ii) *social status*, (iii) *personality expression*, (iv) *fanship*, and (v) *non-motivation*. The final scale structure, communalities, loadings and variance explained by each factor can be found in Table 6.11.

Table 6.8

EFA Sample Mean, Standard Deviation, Skewness and Kurtosis (excess) Values

Item Code	Mean	SD	Skewness	Kurtosis (excess)
Int.1	3.98	1.847	-0.221	-1.136
Int.2	4.78	1.738	-0.988	-0.090
Int.3	1.81	1.207	1.798	3.049
Int.4	3.79	1.903	-0.154	-1.274
Int.5	3.07	1.864	0.288	-1.371
Integ.1	4.93	1.838	-0.918	-0.281
Integ.2	3.71	1.982	0.010	-1.353
Integ.3	2.29	1.569	1.035	-0.168
Integ.4	3.75	1.982	-0.105	-1.373
Integ.5	1.80	1.255	1.872	3.266
Integ.6	1.34	0.926	3.502	12.959
Iden.1	4.36	1.851	-0.594	-0.834
Iden.2	2.86	1.835	0.562	-1.034
Iden.3	3.20	1.965	0.289	-1.345
Iden.4	3.42	1.961	0.097	-1.404
Iden.5	2.58	1.808	0.827	-0.644
Iden.6	3.16	1.881	0.258	-1.251
Intro.1	2.45	1.731	1.076	-0.088
Intro.2	1.69	1.300	2.409	5.429
Intro.3	1.90	1.526	1.865	2.536
Intro.4	2.09	1.533	1.489	1.312
Intro.5	1.34	0.926	3.790	16.313
Intro.6	3.28	2.031	0.234	-1.452
Ex.1	3.21	2.090	0.345	-1.419
Ex.2	2.05	1.560	1.375	0.522
Ex.3	3.02	2.086	0.474	-1.300
Ex.4	2.45	1.827	1.039	-0.297
Ex.5	1.34	0.852	3.042	9.629
Ex.6	1.43	0.980	3.264	12.232
Amo.1	3.35	1.837	0.350	-0.898
Amo.2	1.82	1.252	1.567	1.597
Amo.3	3.03	1.897	0.615	-0.675
Amo.4	2.69	1.710	0.670	-0.640
Amo.5	2.26	1.564	0.978	-0.169

Table 6.9

Items Removed after the First EFA

Item code	Item	Reason for removal
Int.3	Because they help me to further develop my gaming skills	Cross-loading
Integ.3	Because they help me to connect with other players	Cross-loading
Intro.4	To be better at the game than other players	Cross-loading
Ex.2	To trade with other players for better items or in-game currency	Low loading
Ex.5	To earn real-world money from gambling or selling items	Low loading
Amo.1	But I don't see the point in using them	Cross-loading
Amo.2	But I cannot succeed in the game anyway	Low loading
Amo.3	But I no longer get any enjoyment from them	Cross-loading

Table 6.10

Items Removed after the Second EFA

Item code	Item	Reason for removal
Int.1	Because I find them fun or enjoyable to use	Not theoretically aligned with factor
Int.2	To experience new options in the game (e.g., weapons, skins, other cosmetic items)	Low loading
Int.4	Because they help me to further develop my gaming skills	Low loading
Integ.1	Because I am interested to see how they change the gameplay	Not theoretically aligned with factor
Iden.3	Because they allow me to take part in in-game events	Low loading
Iden.4	Because I want to own or collect as many in-game items as possible	Low loading
Iden.5	Because they are a good way to show that I am wealthy	Not theoretically aligned with factor
Iden.6	Because I have saved money to obtain specific in-game items	Not theoretically aligned with factor
Intro.2	To gain the respect of other players and avoid being viewed as inexperienced	Low loading
Intro.6	Because otherwise I would feel as though I am missing out	Low loading

Table 6.11

Final Micro-transaction Use Scale Structure

Original item code	New item code	Loadings	Communalities	Item	% variance explained
Achievement and Advancement					**23.5**
Int.5	AA.1	0.626	0.390	Because they help me to reach my personal gaming goals	
Iden.2	AA.2	0.836	0.656	Because I need them to achieve my in-game goals	
Intro.1	AA.3	0.736	0.565	Because I feel that I cannot do well in the game without them	
Ex.1	AA.4	0.726	0.560	To gain in-game advantages (e.g., weapons, armour, characters)	
Ex.3	AA.5	0.466	0.290	To advance quickly in the game (e.g., experience points, skipping levels, extra lives)	
Social Status					**14.8**
Integ.5	SS.1	0.524	0.453	To show that I have invested a lot of time or money in gaming	
Intro.3	SS.2	0.893	0.740	To make other players envious	
Ex.4	SS.3	0.783	0.616	To show other players that I have limited edition or rare items	
Ex.6	SS.4	0.691	0.482	To show other players that I am wealthy	
Personality Expression					**7.7**
Integ.2	PE.1	0.856	0.769	To express my personality in the game	
Integ.4	PE.2	0.902	0.811	Because they allow me to give my character their own personality	
Iden.1	PE.3	0.727	0.525	Because they allow me to design my character the way I want to	

Original item code	New item code	Loadings	Communalities	Item	% variance explained
Fanship					**4.7**
Integ.6	FS.1	0.709	0.496	Because they help me to show than I am a fan of a streamer/Youtuber	
Intro.5	FS.2	0.886	0.651	To be like my favourite streamer/Youtuber	
Non-motivation					**7.2**
Amo.4	NM.1	0.772	0.601	But I don’t think about why	
Amo.5	NM.2	0.809	0.650	But I don't know why	

6.3.4. Stage 3: Analysis

Best practice literature concerning scale development and validation has suggested that following the extraction of factors, the scale should then be tested for dimensionality, reliability and validity (Boateng et al., 2018; Morgado et al., 2017). A common method for assessing dimensionality of the scale is CFA. In the scale development and validation process, CFA is a confirmatory procedure used to test the model, or scale structure, found during the EFA process using model-fit statistics (Worthington & Whittaker, 2006).

Model fit is commonly assessed using the chi-square test, whereby a significant chi-squared value indicates a poor-fitting model (Hox, 2021). However, chi-square is suggested to be sensitive to sample size and normality of data. In cases where data is non-normal and samples sizes are larger, the ratio of chi-square statistic to the degrees of freedom in the model is suggested to be an alternative, whereby a ratio of ≤ 2 indicates superior fit (Alavi et al., 2020).

To account for the sensitivity of the Chi-square test, further assessments of fit are also typically reported (Boateng et al., 2018; Hox, 2021). These are the Comparative Fit Index (CFI; values ≥ 0.95 indicate good fit), the Tucker-Lewis Index (TLI; values ≥ 0.90 or ≥ 0.95 indicate good fit), Root Mean Squared Error of Approximation (RMSEA; values for close fit ≤ 0.05, fair fit ≤ 0.08 and poor fit > 0.10) and the Standardised Root Mean Square Residual (SRMR; values for acceptable model fit ≤ 0.08).

Following analysis of model fit, it is recommended that the scale is then tested for reliability. In the present chapter, reliability was assessed using recommendations from best practice literature (Boateng et al., 2018). Scale and subscale reliability was assessed using Cronbach's alpha (recommended ≥ 0.70), average inter-item correlation (recommended between 0.20 and 0.40 to show a reasonable amount of homogeneity but unique variance) and item-total domain correlation (where items with correlations > 0.3 reflecting good measurement of the subscale).

Test-retest reliability was assessed using the Intraclass Correlation Coefficient (ICC) where a two-way mixed effects model and absolute agreement definition is recommended for test-retest reliability purposes; values between 0.75 and 0.90 indicate good reliability (Koo & Li, 2016).

Finally, it is recommended that the scale is assessed for convergent validity, by assessing average variance extracted (AVE) for each subscale and by assessing the degree at which total scale and subscale scores correlate with extant scales and domains that measure similar constructs (Boateng et al., 2018). The present chapter utilised Pearson product-moment correlation coefficients to test for convergent validity, whereby statistically significant values are then interpreted for their correlation strength (values < 0.29 are considered to be weak, correlations between 0.30 and 0.49 are considered to be moderate and correlations > 0.50 are considered to be strong).

6.3.5. Stage 3: Results

6.3.5.1. Confirmatory Factor Analysis. As with the EFA sample, the CFA sample was first assessed for normality using IBM SPSS Statistics (Version 29) using Shapiro-Wilk's test, which indicated that the data were non-normal ($p < 0.001$). Analysis of the skewness and excess kurtosis values (Table 6.12) further indicated that the data were not normally distributed.

As the data were indicated to be non-normal, it is recommended that Diagonally Weighted Least Squares (DWLS) is used to estimate the model (Kyriazos & Poga-Kyriazou, 2023). The R packages *lavaan* (Rosseel, 2012) and *psych* (Revelle, 2024) were used for CFA purposes.

The model, or scale, showed good fit. The chi-square statistic was suggested to be significant ($\chi^2 = 148.786$, df = 94, $p < 0.001$), however the ratio of the chi-square statistic to degrees of freedom of the model was 1.58, indicating superior fit between the hypothesised scale structure and the sample data. The RMSEA of the hypothesised scale structure was 0.046 (LCI = 0.31,

UCI = 0.59), indicating close fit with the sample data. The TLI was 0.991, the CFI was 0.993 and the SRMR was 0.069, further indicating good model fit.

6.3.5.2. Scale Reliability. Overall scale reliability was acceptable (α = 0.75). Subscale Cronbach's alpha values ranged from 0.60 to 0.85, indicating acceptable to good levels of reliability. The Fanship subscale had a Cronbach's alpha of 0.60, which is below the suggested cut-off of 0.70, although this may be expected with a two-item subscale (Lloyd et al., 2021). Moreover, corrected item-total domain correlation values indicate the item correlation with the subscale score, with scores > 0.30 indicating that items measure the subscale well (Field, 2024). Table 6.13 shows all internal reliability scores for the MMUS, alongside item means and standard deviations.

Average inter-item correlation thresholds are suggested to be between 0.20 and 0.40, indicating homogeneity amongst the items, while still retaining uniqueness in the measure (Piedmont, 2014). The MMUS had an average inter-item correlation of 0.21, indicating that the scale can be regarded as homogenous, but that items contribute to the measurement of unique constructs.

Test-retest reliability was assessed by finding the ICC estimate and 95% confidence intervals between Time 1 MMUS total score and Time 2 MMUS total score. The ICC of the MMUS total score was 0.866 (LCI = 0.838, UCI = 0.921), indicating good test-retest reliability of the scale.

Table 6.12

CFA Sample Mean, Standard Deviation, Skewness and Kurtosis (excess) Values

Item code	Mean	SD	Skewness	Kurtosis (excess)
AA.1	2.93	1.89	0.44	-1.26
AA.2	2.90	1.88	0.58	-1.03
AA.3	2.25	1.60	1.17	0.24
AA.4	3.35	2.10	0.25	-1.45
AA.5	2.99	2.06	0.44	-1.38
SS.1	1.71	1.21	2.07	3.99
SS.2	1.80	1.42	1.97	3.03
SS.3	2.52	1.81	0.97	-0.39
SS.4	1.38	0.90	2.81	7.49
PE.1	3.66	1.97	0.00	-1.38
PE.2	3.63	1.97	-0.03	-1.40
PE.3	4.28	1.94	-0.40	-1.18
FS.1	1.30	0.83	3.70	14.73
FS.2	1.21	0.62	4.28	23.29
NM.1	2.69	1.67	0.60	-0.72
NM.2	2.25	1.47	0.82	-0.59

Table 6.13

Scale Internal Reliability

Item	Cronbach's Alpha	Item-total domain correlation	Mean	SD	Subscale Cronbach's Alpha with 95% CI
Achievement and Advancement (AA)			**2.9**	**1.4**	**0.80 (0.76 – 0.84)**
AA.1	0.73	0.64	2.9	1.9	
AA.2	0.76	0.69	2.9	1.9	
AA.3	0.72	0.65	2.3	1.6	
AA.4	0.80	0.72	3.4	2.1	
AA.5	0.72	0.58	3.0	2.0	
Social Status			**1.9**	**1.1**	**0.78 (0.73 – 0.81)**
SS.1	0.72	0.59	1.7	1.2	
SS.2	0.84	0.78	1.8	1.4	
SS.3	0.87	0.74	2.5	1.8	
SS.4	0.69	0.63	1.4	0.9	
Personality Expression			**3.9**	**1.7**	**0.85 (0.82 – 0.88)**
PE.1	0.88	0.80	3.7	2.0	
PE.2	0.91	0.85	3.6	2.0	
PE.3	0.84	0.71	4.2	1.9	
Fanship			**1.3**	**0.6**	**0.60 (0.51 – 0.69)**
FS.1	0.89	0.57	1.3	0.8	
FS.2	0.80	0.57	1.2	0.6	
Non-motivation			**2.5**	**1.4**	**0.73 (0.67 – 0.79)**
NM.1	0.90	0.68	2.7	1.7	
NM.2	0.87	0.68	2.3	1.5	

6.2.5.3. Scale validity. AVE values are used to assess convergent validity, whereby the subscale accounts for no less than half of the variance in the items used to measure it (Cheung et al., 2024). Values above 0.50 are suggested to show good convergent validity; values of 0.50 and above suggest that the factor explains at least 50% of the variance in the items. Table 6.14 shows the AVE of each of the MMUS subscales.

Pearson product moment correlation coefficients were assessed to indicate associations between the MMUS and its' respective subscales and extant scales and domains expected to measure similar concepts as the MMUS (Boateng et al., 2018). When assessing convergent validity, Pearson product-moment correlation coefficients of < 0.29 are considered to be weak, correlations between 0.30 and 0.49 are considered to be moderate and, correlations > 0.50 are considered to be strong (Schober et al., 2018).

Tables 15–17 show statistically significant correlations between MMUS subscale scores and total score, the MGMS and MGMS subscale scores, the GAMS and GAMS subscale scores, the RLI and with frequency of MT use, with correlations ranging from weak to moderate.

Table 6.15 shows moderate to strong correlations between each subscale of the MMUS and the MMUS total score. Furthermore, the MMUS total score had weak to moderate correlations with total scores from the MGMS, the GAMS, the RLI and with frequency of micro-transaction use. Each subscale of the MMUS had weak to moderate correlations with total GAMS scores.

Table 6.16 shows weak correlations between the MMUS total score and each subscale of the MGMS. Furthermore, each subscale of the MMUS weakly correlated with the social recognition (introjected regulation) subscale of the MGMS.

Table 6.17 shows moderate correlations between the MMUS total score and subscales of the GAMS (i.e., introjected regulation, external regulation and amotivation). All subscales of the MMUS had weak to moderate correlations with the introjected regulation, external regulation

and amotivation subscales of the GAMS, apart from the non-motivation MMUS subscale, which did not significantly correlate with the external motivation GAMS subscale.

Overall, the MMUS shows good convergent validity through weak to moderate positive correlations between MMUS subscales and less self-determined subscales of the GAMS, which may be explained by the nature of external reward received from using micro-transactions. Similarly, MMUS total score had weak positive correlations with MGMS total score and MGMS subscales, which may be expected due to the nature of some, but not all, forms of micro-transaction and their previously highlighted association with gambling. Additionally, MGMS total score and had a weak positive correlation with RLI total scores, which could be explained by loot box purchaser responses to the MMUS. Finally, moderate positive correlation between MMUS total score and frequency of micro-transaction use shows convergent validity and could be explained by the addition of the non-motivation subscale of the MMUS, which did not correlate with frequency of micro-transaction use, as may be expected.

Table 6.14

MMUS Subscale AVE Values

Factor	Average Variance Extracted (AVE)
Achievement and Advancement	0.54
Social Status	0.67
Personality Expression	0.72
Fanship	0.77
Non-motivation	0.69

Table 6.15

Convergent Validity – Scale Totals

	MMUS total	MGMS total	GAMS total	RLI total	MT Freq
MMUS total		0.22^{***}	0.44^{***}	0.24^{***}	0.30^{***}
Achievement and Advancement	0.49^{***}		0.14^{*}		0.23^{***}
Social Status	0.68^{***}	0.16^{**}	0.39^{***}	0.24^{***}	0.26^{***}
Personality Expression	0.62^{***}		0.27^{*}	0.16^{**}	0.27^{***}
Fanship	0.48^{***}	0.17^{**}	0.22^{***}	0.13^{*}	0.15^{*}
Non-motivation	0.57^{***}	0.14^{*}	0.25^{***}		

Note. Significance levels indicated are $p \leq 0.001$ (***), $p \leq 0.01$ (**) and $p \leq 0.05$ (*)

Table 6.16

Convergent Validity – MGMS Subscales

	Intellectual Challenge	Excitement	Socialisation	Social Recognition	Monetary Gain	Amotivation
MMUS total	0.21***	0.21***	0.23***	0.28***	0.16**	0.16**
Achievement and Advancement			0.13*	0.14*		
Social Status	0.15*	0.17**	0.17**	0.23***		
Personality Expression				0.13*		
Fanship	0.15*	0.15*	0.21***	0.23***	0.12*	
Non-motivation				0.14*	0.13*	0.17*

Note. Significance levels indicated are $p \leq 0.001$ (***), $p \leq 0.01$ (**) and $p \leq 0.05$ (*)

Table 6.17

Convergent Validity – GAMS Subscales

	Intrinsic	Integrated	Identified	Introjected	External	Amotivation
MMUS total			0.17**	0.33***	0.42***	0.44***
Achievement and Advancement				0.15**	0.26***	0.20***
Social Status		0.13*	0.13*	0.26***	0..44***	0.26***
Personality Expression		0.18**	0.21***	0.13*	0.24***	0.12*
Fanship				0.14*	0.18**	0.25***
Non-motivation				0.26***		0.36***

Note. Significance levels indicated are $p \leq 0.001$ (***), $p \leq 0.01$ (**) and $p \leq 0.05$ (*)

6.4. Discussion

The aim of the present chapter was to develop and validate a novel scale assessing motivations for micro-transactions use, following the findings of the previous thesis studies (Chapters 2, 4 and 5). The three-stage study resulted in a validated and reliable 16-item scale (the "MMUS"), with five subscales, each containing two to five items. The subscales focused on five areas of motivation: *achievement and advancement, social status, personality expression, fanship,* and *non-motivation.*

It was expected that the items would load onto their respective hypothesised SDT continuum factors. However, a different factor structure emerged from the data. Ryan and Deci (2020) suggested that intentional actions may have multiple motivations, which could explain why the scale structure did not align with the SDT continuum and combinations of the proposed extrinsic items formed the resulting factors.

Moreover, MMUS total scores and MMUS subscale scores correlated with less self-determined and more extrinsic gaming motivations, as well as amotivation for gaming. It should be noted that all but one proposed intrinsic motivation item ("*Because they help me to reach my personal gaming goals*") were removed during the item reduction stage. Therefore, it could be suggested that using micro-transactions, and the action of purchasing in-game items, is inherently an extrinsically motivated action due to the player receiving a virtual reward for 'completing' the action of purchasing, with the ability to receive the reward instantly and in unlimited frequencies. This action may undermine intrinsic motivation for gaming (Ryan & Deci, 2000c; Sansone & Harackiewicz, 2000). Wider literature surrounding gamification and the inclusion of monetary or external rewards discusses the impact of external rewards on behaviour that is intrinsically motivated, suggesting that enjoyment and positive relational effects of intrinsic actions are reduced when external rewards are received (Bauer et al., 2020).

Similarly, as discussed in the introduction of the present chapter, intrinsic motivation to gamble is suggested to be undermined by the monetary rewards obtained from gambling (Carruthers et al., 2006; Griffiths & Delfabbro, 2001). Consequently, the associations found between the MMUS and extrinsic gaming motivation may be reflective of the undermining effect of micro-transactions on intrinsic gaming motivation.

An alternative explanation for the final structure of the MMUS is that the emerging factors are associated with goals, rather than regulations. One of the five self-determination mini theories concerns goal contents theory. Goal contents theory posits that goals focus on the 'what', or the expected outcome, of the 'why', or motivation to carry out an action or behaviour (Grant & Gelety, 2009). In other words, an individual's life goals shape their motivation, resulting behaviour and subsequent well-being. It is suggested that intrinsic goals (i.e., mastery, self-expression, having deep personal relationships, community contribution, personal-growth, and physical health) inherently focus on 'being' whereas extrinsic goals (i.e., fame, wealth, power, popularity, financial success, and having an appealing image) focus on 'having' and are more materialistic in nature but that both intrinsic and extrinsic goals are driven by the common factor of 'striving' (Martela et al., 2019).

It is suggested that the pursuit of a goal can be carried out or acted upon in different ways (Higgins, 2009). In other words, an individual may have a goal, but the approach to achieving the goal is based on the individual's orientation for either autonomy (i.e., for the self) or due to feeling controlled (i.e., for external reasons) and the associated regulations (e.g., external, introjected). An individual's environment is suggested to highly impact the behaviour they engage in to achieve the goal; controlled environments (i.e., an individual feels as though they have no choice to act in a particular manner, or act to avoid negative consequences) are suggested to undermine an individual's ability to achieve an originally intrinsic goal through intrinsically framed means (Bradshaw, 2023). In the context of the present chapter, it could be

suggested that a player strives for the intrinsic goal of achievement but feels as though they can only achieve the goal through the pursuit of controlled external reward (e.g., using skins and other cosmetic items), consequently reframing the goal as extrinsic. This may explain the associations between the MMUS and extrinsic gaming and social recognition-related motivations.

Finally, it is suggested that extrinsic goals can be directly created through an individuals' close relationships (i.e., with family or friends), or indirectly created through advertising and admiration of celebrities, particularly when exposed to messages with materialistic focus (Bradshaw, 2023). In the case of the present chapter, extant literature has suggested that micro-transaction use, particularly expenditure on micro-transaction, is associated with peer purchasing behaviour (King, Russell, et al., 2020). Exposure to materialistic goals through peers may potentially create and perpetuate extrinsic goals related to videogames. Similarly, previous literature has highlighted loot box advertising, suggested to be similar to gambling advertisement, as a contributing factor to problematic loot box engagement (González-Cabrera, Caba-Machado, Feijóo, et al., 2024), potentially through a focus on materialistic outcomes from using loot boxes. Consequently, the direct and indirect influences on goal creation may explain the extrinsic nature of the emerging factor structure of the MMUS and its' respective subscales.

The first subscale that emerged during the present chapter was titled '*Achievement and advancement'* with five items focusing on advancing quickly, using micro-transactions to achieve in-game and personal gaming goals and to gain advantages. The subscale also includes an item related to feeling obligated to use micro-transactions to achieve in the game. Achievement motivations have been readily discussed in extant literature, particularly in relation to gaming and gambling and engaging in these to obtain a feeling of competence (Ryan et al., 2006; Shinaprayoon et al., 2017; Yee, 2006a). However, achievement and advancement

in gaming and gambling literature has typically been discussed in terms of intrinsic motivation, or the internal drive for progression and skill development.

In the present chapter, the *Achievement and advancement* subscale is grounded in the feeling of obligation or need to engage with micro-transactions, to keep up with, or gain advantages over other players. This is in alignment with the findings of the first empirical study of the present thesis, with key findings suggesting that players often felt tricked into using micro-transactions due to the progression boost associated with their use. Moreover, previous literature concerning motivations for the use of in-game items and micro-transactions has found that videogame players typically purchased in-game items to be able to finish or continue playing the game with limited restriction (Hamari et al., 2017) and for competition or to feel powerful over other players (Alha et al., 2018). This was also found to be the case with both pay-to-win micro-transactions and loot boxes, where players used micro-transactions with the specific goal of gaining advantages in the game, and to reduce the time needed to play the game (Nicklin et al., 2021; Steinmetz et al., 2021). Taken together, it could be suggested that the *Achievement and advancement* subscale found during the present chapter is indicative of players' extrinsic performance related goals discussed in wider goal orientation literature, which are characterised by goals related to ego or ability to perform better than, or have power over others (Lee et al., 2010; Vansteenkiste et al., 2007).

The second subscale that emerged during the present chapter was titled '*Social status*' with four items focusing on 'showing off' to others in the game to invoke envy, including time and monetary investment, real-world wealth and limited-edition items. The motivation for social status is similar to those discussed in extant gambling motivation literature, particularly in relation to the need of a gambler to display their ability to consume or spend to gain social status and to compete with others (Binde, 2013). These motivations are suggested to be ego-driven and contingent on self-worth, with greater association to problem gambling behaviour

than those motivated to gamble for intrinsically driven enjoyment or skill-based achievement (Carruthers et al., 2006). In relation to wider gaming literature, social status and the potential in game symbolism associated with status have been highlighted as key motivations for play (Yee, 2006a), particularly in relation to time spent playing the game (Hellström et al., 2012).

Social status is also readily discussed in relation to micro-transaction use, with focus on the need to impress other players (Cleghorn & Griffiths, 2015), self-esteem boosting through 'bragging rights' and power that comes with status symbols (Nicklin et al., 2021). The first empirical study of the present thesis (Chapter 4) also highlighted that visible virtual items can earn videogame players respect and that players purchased items with the purpose of showing off to other players through their avatars. Although typically discussed in terms of the real-world, it could be suggested that social status related motivations could be associated with achieving 'fame' or renown in a game, particularly if players visibly display symbols of status in online games and communities (Cruz et al., 2017). Real-world peer influence, or the extrinsic goals for popularity and image may also play a role in the social status subscale, with King, Russell, et al. (2020) highlighting that peer micro-transaction spending was related to higher spending in the *Fortnite* videogame

The third subscale that emerged during the present chapter was titled '*Personality expression*' with three items focusing on character design and expression of real-world and character personality in the game. In the present chapter, expression of personality was more associated with extrinsic gaming and social recognition related gambling motivations. In gaming literature, expression of the self through avatars has been linked to the need to conform to social norms through an individuals' drive to represent themselves as an idealised version of themselves, both in the case personality expression and avatar attractiveness (Zimmermann et al., 2023). Wider literature concerning compulsive buying may further offer an explanation for the extrinsic nature of the *personality expression* subscale found in the present chapter. Those

suggested to be high risk of compulsive purchasing behaviour were more likely to place importance on image, popularity and conformity related goals, and place little importance on goals for self-acceptance than those in low-risk groups (Otero-López & Villardefrancos, 2015).

In relation to previous micro-transaction motivation studies, videogame players are suggested to use loot boxes due to the aesthetic value they add to the game, both to obtain an item to make a character look 'better' and due to the shame that is associated with 'default' cosmetic items (Nicklin et al., 2021). This is furthered by Marder et al.'s (2019) study exploring the purchase of non-functional (i.e., items that don't alter gameplay), in which the social motivation for distinction (i.e., separating one group of players from another through visual design of characters) was prominent. Therefore, it could be suggested that the personality expression motivation is driven by extrinsic goals related to image or social adherence (Martela et al., 2019).

The fourth subscale that emerged during the present chapter was titled '*Fanship*', a novel subscale that included two items related to showing support for a streamer or Youtuber, or to emulate a favourite streamer or Youtuber. The advancement of new media sharing platforms, such as *Twitch* or *YouTube* has enabled the real-time sharing of videogame play and simulated gambling, including the streaming of micro-transaction use. A popular form of gaming related stream is loot box opening; audiences watch other videogame players spend money on and open loot boxes live (Grosemans et al., 2024). Some videogame streamers obtain high levels of online fame, through viewership numbers or 'subscribers' leading to 'influencer' status (Church, 2024). In other words, companies pay 'influencers' to market gaming related services, products and merchandise to their audience. In relation to micro-transaction use, Nicklin et al. (2021) discussed videogame players engagement with loot boxes as a result of streamer or professional gamer influence, suggesting that for some videogame players, the 'marketing' associated with viewing influencers opening loot boxes drives purchase intention.

In wider research concerning newer forms of ‘celebrity’, it is suggested that influencers are viewed as ‘moral exemplars’, particularly if they are skilled in particular areas and as a consequently, ‘viewers’ are encouraged to emulate their behaviour in order to achieve the same level of wealth and fortune (Archer & Robb, 2024; Woodcock & Johnson, 2019). As part of the ‘influencer’ lifestyle, videogame streamers and Youtubers are often monetised through personalised sponsorships or collaborations with mobile games, in which they advertise limited edition or ‘themed’ items based on their influencer branding. It is suggested that viewers or ‘fans’ of influencers engage with branded items as a form of financially supporting influencers (Wohn & Freeman, 2020), and potentially, to be recognised as a fan. The motivation to support streamers of Youtubers could be suggested to be related to social recognition through the action of community contribution. In other words, extrinsic aspirations related to image can be achieved through intrinsic action related to community (Bradshaw, 2023).

The final subscale that emerged during the present chapter was titled ‘*Non-motivation*’, including two items about not knowing an individual engaged with micro-transactions, or not consciously thinking about why. Non-motivation refers to the lack of drive to engage in a behaviour or action due to the belief that the desired outcome is not possible, or no value is placed on the activity (Ryan & Deci, 2000a). In wider gaming and gambling literature, non-motivation, or amotivation is associated with a lack of conscious engagement with gaming and gambling, no longer knowing the reasons for engaging with gaming and gambling or feeling incompetent (Lafrenière et al., 2012; Shinaprayoon et al., 2017). As may be expected, in the present chapter, non-motivation was unrelated to frequency of micro-transaction use, where all other subscales were positively related, indicating that those who do engage but experience non-motivation may do so without specific goals, or engage passively, leading to a lack of value placed on the action of using a micro-transaction.

In summary, the MMUS comprises 16 items and five subscales: *achievement and advancement, social status, personality expression, fanship,* and *non-motivation.* Each of the subscales can be related to previous gaming, gambling and micro-transaction motivation literature and self-determination theory. Moreover, it is suggested that each of the subscales, excluding non-motivation, can be related to extrinsic goals. Overall, the MMUS was shown to have good levels of reliability and validity.

6.4.1. Limitations

The present chapter recruited participants based on their current or previous micro-transaction use and participants were recruited from numerous gaming-related forums. This could be suggested to add to the overall reliability and validity of the developed MMUS through direct input from target users who play a variety of genres of game that include multiple forms of micro-transaction. However, the data collected relied on self-report measures, which could be impacted by social desirability bias (Morgado et al., 2017). Consequently, future studies should replicate the present chapter to further assess the reliability and validity of the MMUS for those who play a variety of genres of game and who use multiple forms of micro-transaction.

Additionally, the present chapter tested the reliability and validity of the MMUS on a sample of adult (aged 18 years and over) videogame players and consequently the MMUS should be tested using more diverse samples of participants to ensure reliability and validity for all micro-transaction users. Moreover, while shown to have good reliability and validity overall, only weak to moderate correlations were found between extant SDT-based gaming and gambling scales. While this has been explained in the discussion of the present chapter, the MMUS should be further validated by assessing correlations with extrinsic goal or aspirations focused measures.

Two of the subscales that emerged during the scale validation process contained only two items. It is typically recommended that for factor analysis, three items per factor is a minimum requirement due to the implications of an under-identified model during factor analysis, and subsequent reliability limitations (Yong & Pearce, 2013). In the present chapter, two-item factors were appropriately identified during factor analysis by constraining the items, or indicators and setting the factor variance to 1. Reliability analysis indicated that the fanship subscale was below the recommended Cronbach's alpha reliability threshold of 0.7. However, it is suggested that Cronbach's alpha may not be the best measure of reliability for two item factors that are relevant and should be retained during the scale development process (Eisinga et al., 2013). Consequently, the fanship factor was considered to have face validity and highlighted a relatively novel concept concerning micro-transaction motivation and was deemed as appropriate to retain.

6.4.2. Implications and areas for future research

The present chapter provides a novel validated scale for assessing motivations for micro-transactions, allowing for use across a broad range of micro-transaction types. The factor structure found during the exploratory stage was not as expected but allowed for the development of theory surrounding motivations for micro-transaction use, self-determination theory and goal contents theory.

To the researcher's knowledge, the present chapter is the first to assess motivations for the use of multiple forms of micro-transaction. The validated MMUS enables researchers to contribute to the limited body of literature and to further develop theory concerning motivation in digital spaces. Beyond use in academic research, the validated MMUS has important practical applications for developing targeted harm prevention measures and interventions associated with potential problematic gaming, gambling and micro-transaction use behaviour.

Moreover, by identifying underlying motivations associated with micro-transaction use, motivational therapy could be used to address problematic behaviour.

Future research should further test the reliability and validity of the MMUS on a more diverse sample, to ensure reliability and validity across the general population, including young children, adolescents and provide adaptations for non-English speaking videogame players. Additionally, future research should utilise the MMUS to develop motivational profiles associated with micro-transaction use and assess how underpinning motivations may or may not be associated with problematic gaming and gambling behaviour and problematic micro-transaction engagement.

6.5. Conclusion

The present chapter developed and validated the 16-item MMUS, which comprised five subscales: *Achievement and advancement, social status, personality expression, fanship,* and *non-motivation*. Although not directly aligning with the self-determination theory motivation continuum, the structure of the scale highlights the primarily extrinsic nature of micro-transactions. The present chapter discusses how each subscale relates to previous gaming-, gambling-, and micro-transaction-related literature, as well as wider research concerning theories of motivation and goals. The validated MMUS has important practical applications for both academic research and harm prevention in digital spaces.

Chapter 7. Summary of Findings and Conclusion

7. Summary of Aims and Original Contribution to Knowledge

Micro-transaction use is a contemporary phenomenon, and a reflection of an industry shift towards a 'games as a service' business model (Tomić, 2017). While for some, micro-transactions pose little harm and are a means of gaining extra enjoyment in videogames, it is suggested that some players may be at risk of developing or maintaining problem behaviour through their use (Griffiths, 2018; King, Wong-Padoongpatt, et al., 2020). Of concern to the present thesis is the development of theory surrounding micro-transactions, motivations for their use, and potential relationships to problem gaming and gambling, in order to begin developing harm prevention measures and establish the need for social responsibility in the gaming industry.

This thesis aimed to assess the currently available research concerning the relationship between micro-transaction use, problem gaming and problem gambling by conducting a systematic review of literature (Chapter 2). To the researcher's knowledge, at the time of its publication, the resulting review was the first of its kind to assess a broad range of micro-transactions beyond loot boxes and their relationship to both problem gaming and gambling behaviour.

The thesis also aimed to contribute methodologically diverse research to the growing body of academic literature concerning micro-transactions by conducting a qualitative study exploring videogame player experiences with micro-transactions (Chapter 4), and a complex structural equation modelling study to test motivation-based models and the role of micro-transactions in problem gaming and gambling (Chapter 5).

Chapter 4 utilised Interpretative Phenomenological Analysis (IPA; Smith & Osborn, 2015) to develop a novel set of themes concerning player experiences with a broad range of micro-transactions. Emergent academic literature has explored motivations for micro-transaction use, with a focus on loot boxes and battle passes (Lloyd et al., 2021; Nicklin et al., 2021; Petrovskaya & Zendle, 2020; Thio & Pangaribuan, 2023; Zendle et al., 2019). However, to the researcher's knowledge, there are no other qualitative studies that explore the breadth of micro-transactions available in videogames. At the time of its publication, the resulting study from Chapter 4 was the first the utilise IPA for a deeper understanding of lived experiences, capturing the nuances in experiences with micro-transactions.

Chapter 5 utilised structural equation modelling methods to examine a complex model, focusing on self-determination theory (Ryan & Deci, 2000b) and the underpinning relationships between motivations for gaming and gambling, basic psychological needs, micro-transaction use, and both problem gaming and gambling behaviour. Although wider gaming and gambling literature has utilised structural equation modelling methods to analyse relationships between self-determined motivations for gaming and gambling and problematic behaviour (Mills et al., 2021; Mills, Milyavskaya, Heath, et al., 2018; Mills & Allen, 2020; T'ng et al., 2023), at the time of its publication, the resulting study from Chapter 5 was the first to focus on the role of microtransactions.

Finally, the thesis aimed to contribute applicable research to promote social responsibility, harm prevention, and ethical businesses practices in the videogame industry by developing and validating a novel psychometric scale assessing motivation for micro-transaction use. To the researcher's knowledge, there is only one available instrument related to motivations for micro-transaction use, i.e., the Reasons and Facilitators for Loot Box Engagement (RAFFLE) measure (Lloyd et al., 2021). Although the RAFFLE is suggested to be a reliable and valid measure, it does not assess motivations for the use of a broad range of microtransactions.

Furthermore, monetisation methods in videogames are continuously developing, which may result in loot boxes becoming an outdated form of monetisation in games (Johnson & Brock, 2020). Consequently, Chapter 6 outlined the development and validation of a novel and future-proof psychometric instrument assessing motivations for the use of a broad range of micro-transaction types, including, but not limited to loot boxes.

Overall, the present thesis comprises novel studies that contribute methodological diversity and knowledge to a currently under-researched area. Furthermore, the findings of each study enable the development of theory concerning micro-transaction use, motivations and problem gaming and gambling behaviour, providing valuable future research recommendations. The findings of each study also have important implications and applications in the real-world, with the potential to aid social responsibility and ethical business practices for the gaming industry, as well as contributing to the development of harm prevention measures in healthcare settings.

7.1. Discussion of Key Findings

Chapter 2 comprised a systematic review of the relationship between videogame micro-transaction and both problem gaming and gambling behaviour. Multiple empirical studies were identified during the review process, with most studies focusing on loot boxes. The findings indicated that there was a general consensus of a positive association between loot box engagement (i.e., purchased or free-to-use loot boxes) and problem gambling severity, irrespective of demographic differences. This applied even among youth samples, for whom gambling activities are often illegal and unlicensed (Calado et al., 2017), suggesting that loot box engagement may have a ‘gateway’ or ‘reverse gateway’ effect (Brooks & Clark, 2023; Hing et al., 2022; King & Delfabbro, 2020; Rockloff et al., 2021; Spicer, Fullwood, et al., 2022). However, the research reviewed was correlational in nature, and so causational relationships could not be inferred.

There was limited consensus concerning other forms of micro-transaction and problem gambling. This was suggested to be the result of the relative infancy of literature focusing on forms of micro-transactions other than loot box buying. Pay-to-win micro-transactions were associated with gambling, through a bi-directional relationship with frequency of use. The more often pay-to-win micro-transactions were used, the more frequent payments in gambling games were made and vice versa. Frequency of use was also found to be a key factor in the association between loot box engagement and problem gambling, aligning with wider gambling literature concerning 'speeds of play' and problem gambling behaviour (Harris et al., 2021; Harris & Griffiths, 2018).

The review found a lack of consensus concerning micro-transaction use and problem gaming behaviour, with some studies reporting an association between loot box buying and pay-to-win micro-transactions, and IGD or problem gaming symptomology, but some reporting no association. This highlighted a need for further research concerning micro-transaction use and problem gaming.

Across the literature reviewed, those who engaged with loot boxes were more likely to be younger and male, aligning with wider gambling research (Calado & Griffiths, 2016; Gambling Commission, 2022; Ghelfi et al., 2024). Pay-to-win micro-transaction users were found to more likely be older and female, which was consistent with research concerning gender differences and game genre suggesting that females are more likely to engage with puzzle-based games and males are more likely to engage with action-based and competitive games (Romrell, 2013). This finding was also consistent with literature concerning gender differences in motivation for gaming, suggesting that males are more likely motivated by competition than females (Martucci et al., 2023).

The review highlighted a lack of academic literature focusing on motivations for micro-transaction use, with only one study investigating this at the time of writing (Zendle et al., 2019). Consequently, the first empirical study (Chapter 4) aimed to address this research gap.

Chapter 4 comprised a novel qualitative study, utilising IPA methods to explore videogame player experiences with micro-transactions. Six superordinate themes were identified. These were: (i) self-control vs. impulsivity, (ii) motivations for use, (iii) obligation to play after purchases, (iv) guilt and regret, (v) feeling tricked or cheated, and (vi) comparing micro-transaction use and gambling. The 'motivations for use' theme had three subordinate themes (i.e., rewarding developers, limited time offers, and peer influence and social status), and the 'comparing micro-transaction use and gambling' theme had two subordinate themes (i.e., similar feelings of excitement and euphoria, and similarities between loot boxes and gambling). The findings of the study were consistent with wider literature concerning in-game purchase motivations, particularly in relation to themes concerning impulsivity, limited time offers, peer and social influence, and rewarding game developers (Alha et al., 2018; Cleghorn & Griffiths, 2015; Nicklin et al., 2021; Petrovskaya & Zendle, 2020; Puiras et al., 2023), but found several novel themes that had not previously been identified, particularly in relation to feelings of obligation, guilt and regret, and feeling tricked or cheated related to micro-transaction use.

It was found that irrespective of the micro-transaction type used, the speed and frequency at which micro-transactions can be used was a key factor in player experiences, particularly for participants who scored highly on problem gambling measures. This aligned with the findings of the systematic review (Chapter 2) and wider gambling literature (Harris et al., 2021; Harris & Griffiths, 2018), suggesting that more frequent external reward processes are associated with problem gambling behaviour.

Additionally, participants experienced dysfunctional cognitive beliefs related to their micro-transaction use, particularly in relation to their feelings after using a micro-transaction and distorted perceptions of value related to micro-transactions. In other words, the value that participants placed on the rewards of a micro-transaction impacted their ability to stop playing the game, even if they were no longer enjoying playing. For example, some participants felt obligated to continue playing after purchasing a battle pass, in order to get 'rare' rewards. Similarly, some participants experienced feelings of guilt following purchases, whereas others felt autonomous in their decision to engage with micro-transactions.

Morality, personal ethics, and social identity were all found to play a crucial role in participants' experiences with micro-transactions, particularly in relation to functional micro-transactions and those that gain advantages from their use. Some micro-transactions were viewed by participants as 'bad' due to their perceived unfair nature, violating participants' ethical beliefs relating to autonomy (i.e., feeling pressured to use functional micro-transactions to keep up with other gamers) and community or social identity (i.e., as members of groups or circles who play videogames for skill and refrain from purchasing functional micro-transactions). This resulted in participants' feelings of being cheated or tricked by the inclusion of micro-transactions in a game. However, for some participants, feeling unique through the purchase of limited edition or 'rare' items was a key driver.

Each of the emerging themes had links to self-determination theory (Ryan & Deci, 2000b, 2000a, 2000b, 2020), highlighting that those who use micro-transactions may be doing so in order to fulfil basic psychological needs for autonomy, competence and relatedness, and may be more extrinsically motivated. This aligned with wider gaming and gambling literature, suggesting that a frustration with needs and being motivated extrinsically is associated with limited self-control, and problematic gaming and gambling behaviour (Mills, Milyavskaya, Mettler, et al., 2018, Mills et al., 2021; Mills & Allen, 2020; T'ng et al., 2023). As a result,

Chapter 5 aimed to quantitatively explore the role of micro-transactions in the relationship between motivations, basic psychological needs, and problem gaming and gambling behaviour.

Chapter 5 comprised the testing of a complex model, whereby it was hypothesised that self-determination-based motivations for gaming and gambling and amotivation would predict levels of satisfaction or frustration with three basic psychological needs and frequency of micro-transaction use, which would further predict severity of problem gaming and gambling behaviour. Preferred micro-transaction type was also hypothesised to have a moderation effect on basic psychological needs, spend per micro-transaction, and severity of problem behaviour. The hypothesised model was analysed using partial least squares structural equation modelling (PLS-SEM). During the measurement model testing, the intrinsic motivation variable was removed from testing, as a result of low reliability. The assessment of pathways between variables resulting in the finding that frequency of micro-transaction use was suggested to be a key component of the hypothesised model, concurring with the findings of Chapter 2 and Chapter 4.

Three key significant pathways emerged during the hypothesis testing process. The first key finding was that externally regulated gaming motivation (i.e., gaming for in-game levels, item, gaming 'prestige' and social status), introjected regulated gaming motivation (i.e., gaming to boost self-esteem, or due to feelings of obligation), and extrinsic gambling motivation (i.e., for financial gain) predicted higher frequency of micro-transaction use. This indicated that some videogame players were more likely than others to make micro-transactions at higher frequencies, particularly those who were extrinsically motivated. While not inherently problematic, wider gambling literature concerning 'speeds of play' has suggested that high frequencies of events or 'wins' and more frequent feelings of rewards are particularly attractive to problem gamblers (Harris & Griffiths, 2018).

This was further assessed, with the finding that frequency of micro-transaction use partially explained the relationship between extrinsic gambling motivation and problem gambling severity. This aligns with findings from previous studies suggesting that frequency of loot box purchases had a significant positive relationship with problem gambling (von Meduna et al., 2020) and that higher frequencies of pay-to-win micro-transactions predicted higher frequencies of gambling (Steinmetz et al., 2021).

Finally, frequency of micro-transaction fully explained the relationship between externally regulated gaming motivation and problem gambling behaviour. This could be an indication of the 'gateway' hypothesis whereby micro-transaction use leads to participation in gambling (Delfabbro & King, 2020). Alternatively, those already involved in gambling may be motivated by external rewards in videogames, and consequently make micro-transactions in higher frequencies (Spicer, Fullwood, et al., 2022).

It should be noted that Chapter 5 utilised gaming and gambling motivation measures, due to the lack of availability of a micro-transaction motivation measure. While there has been a convergence between gaming and gambling (King & Delfabbro, 2020), engaging in micro-transactions is a behaviour in and of itself, and may have its motivational drivers (Lloyd et al., 2021). Consequently, Chapter 6 aimed to address this gap by developing and validating the Motivations for Micro-transaction Use Scale (MMUS).

Chapter 6 comprised the development and validation of the MMUS utilising an integrated mixed methods design. Following the findings of both Chapter 4 and Chapter 5, as well as a review of extant literature and motivation-related scales, initial scale items were developed and organised into a six-subscale structure, in alignment with the self-determination theory continuum of motivation (Ryan & Deci, 2000a). It was expected that the factor structure would be assessed during the scale development process, and that the proposed structure may not be

the resulting scale structure. An initial pool of 90 scale items were developed and subsequently reviewed by both a panel of experts and two focus groups of target scale users for content and face validity. Following the analysis and triangulation of the expert panel responses and the focus group transcripts, the 90-item pool was reduced to a 34-item scale.

Following item reduction, the factor structure of the 34-item scale was assessed using exploratory factor analysis. The factor structure did not directly align with the self-determination theory continuum as expected. Instead, a stable five-factor solution, with 16 items was obtained. The five subscales were named: (i) achievement and advancement, (ii) social status, (iii) personality expression, (iv) fanship, and (v) non-motivation. Each subscale contained two to five items.

The reliability and validity of the scale was then assessed. Overall, the scale had good reliability, as well as good construct and convergent validity. Test-retest reliability was also established utilising data captured from the original sample, two-weeks after Time 1. Based on these findings, the newly developed MMUS appeared to be a reliable and valid instrument to assess motivations for micro-transaction use among adult populations of micro-transaction users.

While the scale structure did not directly align with the six-factor self-determination theory motivation continuum (Ryan & Deci, 2000a), each of the emerging subscales was associated almost exclusively with extrinsic gaming and gambling motivations, with all but one intrinsic-based items being removed during the scale development process. This may be indicative of a solely extrinsic nature of micro-transactions (i.e., an item obtained by purchasing using in-game currency or real-world money) and associated reward reinforcement processes (i.e., instant gratification and positive reinforcement). Alternatively, it is suggested that the emerging subscales may reflect extrinsic life goals for fame, power, image and wealth in alignment with

the self-determination mini-theory concerning aspirations and goal contents (Bradshaw, 2023). However further research should be conducted to explore this finding in more depth.

The emerging subscales were consistent with previous literature concerning motivations for micro-transaction use (Cleghorn & Griffiths, 2015; Lloyd et al., 2021; Ryan et al., 2006; Shinaprayoon et al., 2017; Yee, 2006a), with the fanship subscale emerging as a novel subscale, with items concerning supporting or emulating videogame streamers or YouTubers. This may be explained by the increase in popularity of loot box opening media (Grosemans et al., 2024) and the rise in popularity of online 'influencers' who advertise micro-transactions to their audiences (Nicklin et al., 2021). The overall scale, and each subscale (excluding the non-motivation subscale) was also associated with frequency of micro-transaction use, indicating convergent validity and consistency with the findings of Chapters 2 and 5 of the present thesis.

In conclusion, each of the studies comprising the present thesis reported consistent findings with wider gaming, gambling, and motivation related literature and contributed knowledge to the limited base of academic literature concerning micro-transaction use. Key findings include: (i) the importance of frequency of micro-transaction use in relation to extrinsic motivation, problem gaming, and problem gambling, (ii) novel motivational drivers associated with a broad range of micro-transactions (i.e., fanship), and (iii) the extrinsic nature of micro-transactions. The findings of each chapter have valuable implications and real-world applications and provide recommendations for future research (see Sections 7.2 and 7.3 of the present chapter).

7.2. Strengths and Limitations

The present thesis presents novel findings concerning motivations for micro-transaction and their relationship to problem gaming and gambling. The thesis comprises a systematic literature review, and three empirical studies, resulting in a mixed-methods thesis.

Chapter 2 of the present thesis comprises a systematic literature review. At the time of its publication, few studies were available for review and were, for the most part, correlational in nature. Since the publication of the review paper comprising Chapter 2, there has been an increase in peer-reviewed academic literature concerning the use of micro-transactions in games, utilising a range of methods. Consequently, frequent reviews of literature should be conducted to synthesise and report the most current knowledge concerning micro-transactions and their relationship to problem gaming and gambling.

Chapter 4 of the present thesis comprised a qualitative investigation of videogame player experiences with a broad range of micro-transaction. The resulting publication was, to the researcher's knowledge, the first of its kind and explored the emerging themes in relation to extant psychological literature. Although the findings provided a rich understanding of the nuances involved with the use of micro-transactions, qualitative studies are limited in their ability to be generalised due to the sample size involved. In order to address this limitation, the present thesis further explored motivations for micro-transaction use in Chapter 6 utilising a larger sample of micro-transaction users.

Furthermore, the findings of Chapter 4 may be subjective due to the phenomenological nature (i.e., the researcher has their own experiences that may impact interpretation) and hermeneutic nature (i.e., the researcher must interpret the experience and underpinning meaning of experiences) of the analytical method used (Tuffour, 2017). To address this limitation, the researcher triangulated emerging themes and findings with the supervisory team, and a reflexivity statement was included in the study to identify any interpretative bias associated with the researcher's own experiences.

Chapters 5 and 6 of the present thesis comprised quantitative studies, both utilising online self-report surveys to collect data. While the use of online surveys is a cost-effective and

accessible method of data collection, bias may be overrepresented by the resulting samples. That is, individuals self-select to take part in the survey based on where the survey link is shared and subsequently, only those with increased engagement and involvement in specific online communities are represented (Andrade, 2020). This may also present through self-report bias, a measurement error associated with the participants' understanding of the questions being asked and participants' responses reflecting social desirability (Bauhoff, 2014). To address these limitations, survey links were shared among a wide variety of large-scale gaming communities and across multiple platforms, resulting in a heterogeneous sample of micro-transaction users. Furthermore, the online surveys administered were anonymised, and participants were able to stop taking part immediately, or withdraw their data if desired (Ried et al., 2022). Future studies should replicate the studies conducted in Chapters 5 and 6 for across different populations, including youth and adolescent samples to ensure that the findings are consistent.

Chapters 5 and 6 also involved the use of previously validated psychometric measures. The rationale for the choice of psychometric measures used can be found in Chapter 3 of the present thesis. In both Chapter 5 and Chapter 6, the intrinsic subscale of the Gaming Motivation Scale (GAMS; Lafrenière et al., 2012) was found not to be reliable. To address this limitation, Chapter 5 excluded the intrinsic motivation subscale of the GAMS from analysis. This is consistent with more recent studies utilising the GAMS (Mills, Milyavskaya, Heath, et al., 2018), indicating that future studies should re-examine the psychometric properties of the GAMS.

Chapter 5 assessed relationships between gaming and gambling motivations, basic psychological needs, micro-transaction engagement, and problem behaviour. The findings did not indicate significant relationships between motivations, needs, micro-transaction engagement and problem gaming behaviour. It may be the case that there are extant variables

associated with the development or maintenance of problem gaming behaviour that were not accounted for in the resulting study of Chapter 5, although these findings are consistent literature reviewed in Chapter 2 (King, Russell, et al., 2020). Therefore, future research should further analyse the association between micro-transaction use and problem gaming.

Chapter 6 utilised extant scales (Lafrenière et al., 2012; Shinaprayoon et al., 2017) to assess the developed scale for convergent validity. The sample used for exploratory factor analysis and confirmatory factor analysis were split equally from a total sample resulting from a single online survey. Therefore, the psychometric scales utilised for assessment of convergent validity were based on the six-factor self-determination theory motivation continuum, with the expectation that the developed scale would align with this structure. This was not found to be the case and may explain the significant, but weak to moderate, correlations between the MMUS and the extant scales used. Consequently, future studies should further assess the validity of the MMUS using extant scales that assess the same underlying theoretical concepts. For example, measures of life goals and aspirations (Kasser & Ryan, 1993, 1996).

7.3. Future Research Directions

Beyond the future studies recommended in section 7.2. of the present chapter, several future research directions were identified throughout the present thesis.

Chapter 2 of the present thesis highlighted key research gaps concerning micro-transactions and their relationship to problem gaming and problem gambling. The present thesis aimed to contribute to the knowledge base through the empirical studies presented (Chapters 4, 5 and 6). However, future research should focus on utilising experimental and longitudinal research methods to establish the direction of relationships between micro-transactions, problem gaming and problem gambling. Furthermore, more in-depth research should be conducted concerning forms of micro-transaction beyond loot boxes and pay-to-win micro-transactions.

Considering the fast-changing nature of monetisation methods in games (Johnson & Brock, 2020), a focus on the underlying mechanisms involved in different micro-transaction forms and their psychological impact would be beneficial.

Chapter 4 of the present thesis also highlighted the need for experimental and longitudinal research concerning micro-transaction use, but with a particular focus on the motivations of micro-transaction users who may also exhibit problem gaming and gambling behaviours. The developed and validated MMUS (Chapter 6) could be utilised congruently to establish if the motivational drivers associated with micro-transaction use change over time in relation to the severity of problem gaming and gambling behaviour and problematic micro-transaction engagement, as is suggested to occur with the development of disordered gambling behaviour (Carruthers et al., 2006).

Chapter 5 of the present thesis found that frequency of micro-transaction use explained the relationship between extrinsic motivations for gaming and gambling and problem gambling behaviour. Future research should focus on the frequency of use of different forms of micro-transaction and identify if the relationships found in chapter 5 are reciprocal to further develop of these findings. Additionally, the role of needs satisfaction in relation to micro-transaction use should be studied further, to develop on theory concerning the development or maintenance of problem behaviour.

Chapter 6 developed and validated the MMUS, a novel measure of motivation for the use of multiple types of micro-transaction. Future research should further validate the MMUS for use in youth and non-English speaking populations. The MMUS could also be utilised in future research studies to develop key motivational profiles associated with micro-transaction users who may also exhibit problem gaming and gambling behaviour, in order to further develop

theory concerning the association between micro-transactions and problem behaviour, as well as 'risky' or problematic micro-transaction engagement.

Taken together, the present thesis offer a vital basis for the further development of theory concerning micro-transaction use, with numerous implications and practical cross-sector applications.

7.4. Implications and Applications

A consistent finding throughout the present thesis concerns frequency of micro-transaction use. Chapter 2 highlighted that frequency of micro-transaction use is associated with problem gambling behaviour. Chapter 4 reported participant experiences with the ability to continuously use micro-transactions with few limits and minimal awareness of the amount spent on micro-transactions. Chapter 5 found that frequency of micro-transaction use partially explained the relationship between extrinsic gambling motivations and problem gambling behaviour and fully explained the relationship between externally regulated gaming motivation and problem gambling behaviour. Chapter 6 indicted that the MMUS and each of its respective subscales were significantly associated with frequency of micro-transaction use, apart from the non-motivation subscale.

Overall, these findings indicate that for some individuals, particularly those motivated extrinsically, the ability to set limits on the number of micro-transactions able to be made in a given time could be beneficial, and potentially aid in harm prevention. As established throughout the present thesis, the speed of rewards and reward schedules in gambling games are associated with problem gambling behaviour and reduced response inhibition (Harris et al., 2021; Harris & Griffiths, 2018). Harris & Griffiths (2017) highlighted key tools for harm minimisation in electronic gambling games, which may be beneficial if implemented into videogame environments. For example, voluntary limit setting based on personal values and

motivations may be applicable for use in videogames (Auer, Hopfgartner, et al., 2020; Auer, Reiestad, et al., 2020). As suggested by self-determination theory (Deci & Ryan, 2008), satisfying needs for autonomy and being motivated autonomously can encourage flourishing, well-being, and adherence to responsible gambling practices (Tong et al., 2022). Although further research is needed to assess if this is the case for those who engage in micro-transaction use, voluntary limit setting offers a promising potential tool that could be implemented by videogame companies to promote their social responsibility and use of ethical businesses practices.

Beyond voluntary, or self-regulatory, forms of harm prevention, the findings of the present thesis have important implications for the mandatory regulation of micro-transactions in videogames. As discussed in Chapter 1 of the present thesis, micro-transaction regulations are not consistent globally and are typically based on each country's gambling related policy. However, the present thesis has highlighted consistent findings across a range of populations (see Chapters 2, 4, 5 and 6) related to frequency of micro-transaction use, regardless of the proposed similarities of the micro-transaction with gambling. Consequently, public policy could focus on the regulation of micro-transactions based on their associated reward processes (i.e., the frequency at which virtual items or rewards can be obtained), rather than real-world financial loss and the ability to 'cash-out'. For example, implementing restrictions on the number of consecutive micro-transactions that can be made, or by introducing pauses after a micro-transaction is made may aid in the restriction of rapid or 'risky' engagement and allow for more mindful engagement with in-game purchasing, as is suggested to be beneficial in wider literature (Parke et al., 2022). This may be particularly beneficial for youth and adolescent populations (Passanisi et al., 2019), and those who are more likely to engage in risky behaviour (Mettler et al., 2020; Sala et al., 2020).

The culmination of the present thesis was the development and validation of the MMUS. To the researcher's knowledge, the MMUS is the first psychometric instrument to provide a reliable and valid measure of the motivational drivers of micro-transaction use beyond loot boxes. Therefore, the MMUS has valuable applications in a variety of sectors. The MMUS could be used to develop motivational profiles of micro-transaction users. Taken together with the findings of Chapter 5 of the present thesis, motivational profiles of micro-transaction users may be effectively utilised to identify 'at-risk' users. This is beneficial for future research aiming to identify causal relationships between micro-transaction use and problematic behaviour.

Furthermore, the MMUS may be beneficial in healthcare settings, particularly in relation to the prevention of, or interventions for problematic behaviour. For example, targeted motivational approaches to the treatment of substance use disorders are suggested to be effective (Dellazizzo et al., 2023; Miller, 2023). Given the argued similarity between substance use disorders and behavioural addictions (Griffiths, 2005), targeted motivational approaches to preventing or treating problem behaviour associated with micro-transaction use could be developed, based on the motivational profiles of micro-transaction users.

It could be argued that videogame companies and developers may utilise the MMUS and the findings of the present thesis to develop targeted advertising and forms of monetisation aimed at 'at-risk' players to increase profits. However, there is increasing suggestion that collaborative efforts between researchers and the videogame industry would be beneficial for videogame companies and developers through increased credibility and implementation of responsible practices (Griffiths & Pontes, 2020). In this instance, the findings of the present thesis and the MMUS could aid videogame companies and developers in designing ethical and socially responsible forms of monetisation, with the aim of protecting players and enabling more individuals to enjoy videogame play without the risk of harm.

Finally, the present thesis has wider implications and applications in the development of the internet and associated technologies. The concept of the 'metaverse' (i.e., an online, immersive world with no spatial or temporal limits) and other Web3 (i.e., the third iteration of the internet, following the current Web2 form) related technologies are readily discussed in academic literature (Wang et al., 2023). Of importance to the present thesis is the digital economy associated with the metaverse, whereby businesses and individuals can take part in investment, selling, trading and purchasing of digital goods using decentralised digital currencies (George et al., 2021), mirroring the real world value of tangible goods and currencies (Chen & Cheng, 2022). It is suggested that micro-transactions may play a central role in the digital economy of the metaverse, particularly in relation to owning unique virtual goods, such as non-fungible tokens (NFTs) that can be traded for real-world and digital currency (Yoo et al., 2023). Concerns surrounding the metaverse, the psychological impact of virtual realities and the role of micro-transactions in virtual spaces beyond videogames are becoming increasingly prominent (Sánchez-Adame et al., 2023). Consequently, the findings of the present thesis may contribute towards the development of an ethical metaverse economy.

7.5. Concluding Remarks

In conclusion, the present thesis and the resulting studies contributed valuable and novel research to the extant academic literature concerning motivations for micro-transaction use and their relationship to problem gaming and gambling. More specifically, this thesis highlighted the importance of frequency of micro-transaction use and linked motivational drivers of micro-transaction use in the association between micro-transactions and problem gambling. Moreover, the thesis further contributed to the development of theory concerning extrinsic motivation and micro-transaction use, particularly in relation to psychological reward processes and potential problematic behaviour. Finally, the thesis developed a reliable and valid measure of motivations for micro-transaction use. Future research should explore and develop

on the findings of the present thesis, to establish casual relationships between micro-transaction use and problem behaviour and to develop motivational profiles of micro-transaction users that may be ‘at-risk’. Taken together, the present thesis provides the theoretical basis for the implementation of both voluntary and mandatory harm prevention measures in videogames.

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Appendices

Appendix A – Interview Schedule

1. How would you identify yourself as a video game player? (PROMPT: Casual/competitive; based on platform or genre; based on engagement with communities?)
2. Can you describe your personal feelings towards videogaming?
3. How would you describe your engagement with other video game-based media? (PROMPT: Streams, YouTube videos, forums, magazines, books?)

Thinking about in-game purchases…

4. How would you define micro-transactions?
5. How would describe your engagement with micro-transactions?
6. How do you personally feel about in-game micro-transactions? (PROMPT: Their inclusion in games, their value or how they're marketed?)
7. How do you personally feel about purchasing micro-transactions?
8. How do you feel about people in your social circle/community purchasing micro-transactions?
9. How would you say micro-transactions impact your engagement with video games? (PROMPT: Time spent playing or immersion levels?)
10. How would you say engaging with other video game media impacts your intention to purchase micro-transactions? (PROMPT: Watching streams or YouTube videos that include the use of micro-transactions?)

Thinking about times that you have purchased micro-transactions…

11. How would you describe the type or micro-transactions you purchase or have previously purchased? (PROMPT: DLC, skins, loot boxes, battle or season passes?)
12. How would you describe your feelings immediately after purchasing a micro-transaction?
13. How would you say an initial micro-transaction purchase impacts your intention to re-purchase? (PROMPT: Do you avoid purchasing for a while or do you purchase more?)

14. Can you describe any times you've felt more inclined to purchase micro-transactions? (PROMPT: After particular day-to-day occurrences; social situations or in-game events?)
15. Why would you say you personally purchase micro-transactions?

Thinking about potential issues with gambling and gaming…

16. Can you describe your personal feelings towards gambling?
17. Can you describe any problem gambling behaviours you currently exhibit?
18. Can you describe any problem gambling behaviours you may have previously exhibited?
19. To what extent would you consider purchasing micro-transactions a form of gambling?
20. Can you describe any problem gaming behaviours you currently exhibit?
21. Can you describe any problem gaming behaviours you have previously exhibited?
22. To what extent would you say that purchasing micro-transactions impacts on your gaming behaviours?

Can you think of anything else to add that hasn't previously been mentioned?

Appendix B – Initial 90-item MMUS

Underlying Motivation	**Item – I use micro-transactions…**
Intrinsic Motivation	
	Because they are enjoyable
	Because they are fun to use
	Because it is very interesting to learn how they work
	Because they are exciting
	To experience new game options (i.e., weapons, skins, items)
	Because they make me feel successful
	Because they allow me to try new strategies in the game
	I enjoy improving my ability in the game
	I am curious to know what will happen in the game when I use them
	To test my ability to control myself
	Because they give me a feeling of control in the game
	Because they allow me to experience more challenges in the game
	Because they allow me to master the game
	Because they make me feel like a good team player
	Because they allow me to reach my in-game goals
Integrated Regulation	

Underlying Motivation	Item – I use micro-transactions…
	To give back to the game developers
	Because they allow me to represent myself in the game
	To express my personality in the game
	To show that my character/avatar is an extension of myself
	Because they are important to me
	Because they are a fundamental part of my life
	Because they contribute to my gamer identity
	To show my support to the videogame company
	Because I agree with the values of the game developers
	Because they allow me to connect with likeminded people
	Because they help me to achieve my own life goals
	To express my character/avatar's personality
	To show that I am an experienced gamer
	To have a collection of in-game items
	To support my favourite streamer/youtuber
Identified Regulation	
	Because the advantages I get from them are important to me
	Because they are an important part of being a gamer
	Because they allow me to be a better gamer

Underlying Motivation	Item – I use micro-transactions…
	Because they allow me to design my character/avatar the way I want to
	Because I need them to achieve my in-game goals
	Because they allow me to take part in in-game events
	So that my character/avatar matches my friends' character/avatars
	Because my friends use them
	To help me to relax
	Because I need them to complete the game
	Because they allow me to play the game for longer
	Because I want to own as many in-game items as possible
	Because I want my character/avatar to look cool
	Because they are a good way to show that I am wealthy
	Because I have saved money/budgeted to obtain specific in-game items
Introjected Regulation	
	Because I feel better about myself when I do
	Because I feel that I must
	Because I feel guilty if I don't
	Because I feel like a bad gamer if I don't
	To make other players jealous
	Because I want to succeed in the game

Underlying Motivation	Item – I use micro-transactions…
	To get ahead of or keep up with other players
	To gain the respect of other players
	To help me succeed in the game, so that I am not ashamed of myself
	Because my favourite streamer/youtuber does
	Because they are popular with my friends
	Because otherwise I would feel as though I am missing out
	To satisfy my temptation, even if I feel guilty afterwards
	To make sure I am not embarrassed by my in-game character/avatar
	To make myself feel better after a bad day
External Regulation	
	Because I feel that my friends would not like me if I didn't
	Because I want to impress my favourite streamer/youtuber
	To gain powerful in-game advantages
	To obtain or unlock powerful and rare items (i.e., skins, weapons)
	To unlock hidden or restricted areas of the game (i.e., new characters or maps)
	To become wealthy in the game
	To gain in-game levels, awards, or experience points
	To trade items with other players
	To quickly advance in the game

Underlying Motivation	Item – I use micro-transactions…
	To make my character/avatar look cool
	To show my friends that I am cool
	To show other players that I am cool
	Because they are inexpensive
	Because the game offers me a good deal
	To obtain limited edition/rare items
Amotivation	
	But I question why I continue to use them
	But I don't see the point in using them
	But I don't know why; I cannot succeed in the game anyway
	But I question if they are good for me
	But I don't feel like I get a lot of benefit from them
	But I no longer get any enjoyment from them
	But I feel like they have a negative effect on me
	But I don't feel like I should
	Because I have used them for a while and can't stop
	Because I don't feel like I can help myself
	But I am no longer interested in them
	Because I don't have time to 'grind' in the game

Underlying Motivation	Item – I use micro-transactions…
	But I never intend to
	But I don’t think about why
	But I don’t feel like they enhance my gaming experience

Appendix C – Focus Group Schedule

Agenda	Materials Needed	Output
Introduction: Participants will be introduced to the researcher, the topic of study and the purpose of the focus group. Participants will be asked to introduce themselves to other participants. Participants will be given time to ask any relevant questions or for further clarification about underlying constructs or the study itself. (15 minutes)	Supporting documents will be provided through Qualtrics and via email if needed, before the focus group session.	N/A
Discussion 1: Importance of the items Participants will be asked to discuss which items they consider to be the most important. (40 minutes)	Participants will be provided with a list containing the item pool before the focus group session.	A single spreadsheet containing the groups' rating of each item and any points of note.
BREAK During this period, participants may ask any questions to the researcher regarding the study or the scale itself. (5 minutes)	N/A	N/A
Discussion 2: Clarity and coherence Participants will be asked to discuss the clarity and coherence of items, making amendments to wording to improve understanding. This will be a group exercise, resulting in consensus. (45 minutes)	N/A	An audio recording of participants' cognitive processes when reading the items. This will be transcribed into a word document.

Discussion 3: Open discussion Participants will be given the opportunity to discuss any other relevant changes or comments about the item pool. This may also include a discussion of the number of items included in the overall scale and any missed items that participants feel should be included in the scale. (10 minutes)	Participants will be given copies of the briefing materials to inform the discussion ahead of the session.	An audio recording of participants' thoughts and views of the scale. This will be transcribed into a word document.
End Participants will be thanked for taking part and given compensation for their participation. Participants will be sent a debrief sheet and individually emailed with their £5 Amazon voucher code. (5 minutes)	The researcher will provide participants with a £5 Love2Shop voucher for taking part.	N/A

Appendix D – First EFA Item Loadings

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Iden.2	0.879					
Intro.1	0.808					
Ex.1	0.803					
Int.5	0.671					
Ex.3	0.524					
Int.3	0.471			0.315		
Intro.4	0.439	0.358				
Int.4	0.422					
Iden.3	0.406					
Intro.6	0.391					
Iden.4	0.375					
Amo.2	0.252					
Intro.3		0.924				
Ex.4		0.824				
Ex.6		0.736				
Integ.5		0.561				
Integ.3		0.387	0.347			
Intro.2		0.351				
Integ.4			0.867			
Integ.2			0.857			
Iden.1			0.797			
Int.2			0.373			
Intro.5				0.743		
Integ.6				0.652		
Ex.5				0.259		
Ex.2				0.295		
Iden.6					0.613	
Amo.3					-0.515	0.340
Integ.1					0.512	
Int.1					0.509	
Amo.1					-0.385	0.322
Iden.5					0.324	
Amo.5						0.846
Amo.4						0.715

Appendix E – Second EFA Item Loadings

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Int.4	0.400					
Int.5	0.638					
Iden.2	0.919					
Iden.3	0.401					
Iden.4	0.348					
Intro.1	0.828					
Intro.6	0.398					
Ex.1	0.833					
Ex.3	0.529					
Integ.5		0.567				
Intro.2		0.348				
Intro.3		0.942				
Ex.4		0.815				
Ex.6		0.760				
Int.2			0.382			
Integ.2			0.865			
Integ.4			0.880			
Iden.1			0.820			
Integ.6				0.715		
Intro.5				0.797		
Int.1					0.453	
Integ.1					0.546	
Iden.5					0.333	
Iden.6					0.646	
Amo.4						0.728
Amo.5						0.892