Gaming Disorder and Microtransactions: Understanding the Cognitive Processes behind In-Game Purchases

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Abstract

With the increasing reach and accessibility of modern video gaming, individuals have become more invested in gaming. In recent years, increased levels of global video game consumption has led to Internet Gaming Disorder (IGD) being included in international health classifications, such as the DSM-5 and ICD-11, and is defined as a behavioural addiction by the WHO. Over-engagement in gaming has been exacerbated by the emergence of new business models by gaming companies, particularly the 'recurring revenue model' that incentivises players to spend more money in games via options like downloadable content or microtransactions. Previous research has examined the associations between behaviours like FoMO (Fear of Missing Out) and impulsiveness, and their role in contributing to gaming disorder symptoms. However, little is known about the relationships between these predictive behaviours and how they may influence additional spending. This study examined the relationships between gaming disorder symptoms and in-game purchases. It also investigated whether traits such as FoMO, impulsivity, maximization and regret have any influence on additional purchases. The study involved 377 gamers recruited from an online platform who were asked to complete measures of problem gaming, personality and to describe their gaming expenditure. The results showed that there were modest relationships between IGD, platform choice and FoMO with additional purchases. Additional findings also showed that gender, impulsivity and regret were significantly linked to additional purchases. The results of the study provide preliminary evidence that influential behavioural traits associated with IGD symptoms are related to increased levels of in-game purchases.

Keywords: Gaming disorder; downloadable content (DLC); microtransactions (MT)

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any University, and, to the best of my knowledge, this thesis contains no materials previously published except where due reference is made. I give permission for the digital version of this thesis to be made available on the web, via the University of Adelaide's digital thesis repository, the Library Search and through web search engines, unless permission has been granted by the School to restrict access for a period of time.

Contribution Statement

In writing this thesis, my supervisors and I collaborated to generate the hypotheses of interest and design the appropriate methodology. I conducted the literature search, the design of the survey questions, completed the ethics application, created the online survey, uploaded all relevant information and materials to my primary supervisor's Prolific account. I was responsible for all participant recruitment and testing, and my supervisor provided all participation incentives. I ran all of the analyses in SPSS and wrote up all aspects of the thesis.

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Game Purchases

Chapter 1: Introduction

1.1. Video Gaming

Video gaming plays a big part in the lives of many people, and is currently one of the

most popular leisure activities world-wide, due to its accessibility, portability and immersive-

ness. Technological developments in the industry have allowed for the growth of many

innovations and the creation of different gaming experiences as based on the differences in game

genre, gaming platforms (e.g. console, PC, etc.), in-game modes, online connectivity, and game

structures and objectives (King & Delfabbro, 2019). For many people, video gaming has proven

to be a beneficial recreational activity, that helps players relax and reduce stress (Griffiths, 2003;

Ryan et al., 2006), interact socially with other people and as a way to develop cognitive,

communicative and cooperative skills (Steinkuehler & Williams et al., 2006; Nuyens et al., 2016;

Stockdale & Coyne, 2018). Despite this, research also shows that some people choose to play

games excessively to the extent that it can interfere with their social relationships, work or

education performance, as well as their sleep (Gentile et al., 2011). It has been suggested that

high levels of participation in gaming has drastically increased due to government imposed

lockdowns and state quarantines relating to the coronavirus (COVID-19) pandemic (Javed, 2020).

As will be outlined presently, this has led to concerns that higher levels of gaming can increase

the risk of developing problems in a minority of individuals (Mihara & Higuchi, 2017), and

potentially symptoms of gaming disorder.

One of the major ways in which the industry has changed over the last decade is how people become engage with and pay for gaming content. In the past, the gaming industry traditionally depended on a one-time purchase model, or "transactional model". This involved an upfront payment and one time transaction, that enables gamers access to a game in its entirety, limited only by their motivation and/or skill. However, in recent years, and as a way to increase revenue, the industry has adopted new business models that involve a continuous or "recurring revenue model" which utilises many types of in-game purchasing mechanics known as microtransactions. As a result, the financial cost of gaming is now higher than before and now shares some features common to gambling: namely, an ongoing financial commitment to outcomes that sometimes can have uncertain outcomes (e.g., loot boxes) as well as a need to spend money on downloadable content or other features to take full advantage of the game. These developments are reviewed below as a prelude to the introduction of a study examined the potential role of these new features in higher risk gaming.

In this present study, we explore and analyse the relationships between gaming disorder, described more fully in Section 1.2, and the purchase of downloadable content and microtransactions, discussed in Section 1.3. In the process, we examine the psychological factors that influence the motives for gaming (Section 1.4), and additional game purchasing, such as impulsiveness (Section 1.5), fear of missing out (Section 1.6), and regret (Section 1.7). The formulation of the present study is explained in more detail in Section 1.8. The collection of quantitative data is documented in Chapter 2, and these data are summarised in Chapter 3 and discussed in Chapter 4.

1.2. Gaming Disorder

'Internet gaming disorder' (IGD) has now been included in the Diagnostics and Statistical Manual of Mental Disorder 5th edition (DSM-5) as a disorder which required further study (APA, 2013), it was officially included in the 11th revision of the International Classification of Diseases (ICD-11) by the World Health Organisation (WHO) as 'gaming disorder' (GD) (WHO, 2019). Gaming disorder is currently classified by the WHO as gaming behaviours, which are persistent or recurrent, that display an impaired control over gaming, which increasingly prioritises gaming over other pursuits or events, even when faced with harmful consequences (World Health Organisation, 2018). It has been estimated that gaming disorder has a prevalence rate of 4.7% worldwide (Feng et al., 2017), although a review of gaming disorder studies have seen a diverse range of prevalence rate from 0.7%-27.5% (Mihara & Higuchi, 2017).

Although sharing common criteria with other behavioural addictions, such as substance abuse and gambling disorders (e.g., preoccupation, impaired control), gaming disorder is also recognised as having several important differences. For example, in contrast to gambling, the primary way in which pathological gamers are negatively impacted by their gaming habits relates to extreme levels of time investment in gaming (Baggio et al., 2016). Carey, Delfabbro and King (2021), for example, showed that excessive gaming is more likely to be associated with poorer sleep, dietary habits and disruption to work and study rather than leading to significant financial hardship. In relation to risk factors, it has been found that males are generally at a greater risk of developing GD symptoms compared to females (Andreassen et al, 2016) by a factor of 2:1 (King et al., 2012). This is because males not only have a much higher reported level of participation in gaming, both in the frequency and intensity of gaming, but also because they are more likely to engage in video games that are geared specifically towards males

(e.g. competitive and violent video games) and risk-taking behaviour (Cross et al., 2011; De

Bolle et al., 2015; Sariyska et al., 2017). Studies on problem gaming and GD found that gaming

is usually more frequent in adolescent populations (Brand et al., 2017), and that young adult

males transitioning from late-adolescence to adulthood are at the greatest risk for gaming

disorder symptoms, due partly to the ability of higher education students to have flexible study

hours (King et al., 2012), and developmental immaturity that often leads them to be more

impulsive and less mindful of negative consequences.

1.2. The new business model in video gaming

In the past, the monetary profits of video game companies relied on the consumers' initial

purchases of their games, with the purchasers then able to enjoy the games in their entirety

without the need for further spending. However, companies now release game content more

gradually so as to to keep their player-base interested for extended periods of time (Mannikko et

al., 2017). Games that commonly use this model are referred to as 'free-to-play', in which

players do not need to spend any money to play such games. However, typically these games

also offer small optional purchases, known as "microtransactions" or MT, that enable or activate

enhanced game features, such as improved weapons or heroes. Another form of additional

monetization is downloadable content, commonly referred to as DLC, which permits the use of,

for example, newly created storylines not present in the original game. This mechanism enables

publishers to receive extra revenue, on top of the initial game purchases, once the original titles

have been launched. DLC has been a prevalent feature in video games since adapting to internet

connectivity.

Whilst the use of these game monetization schemes is perfectly legal, and they are a proven and legitimate business strategy, they have been described in the literature as leading to a form of "predatory monetization" (King & Delfabbro, 2018). These kinds of schemes are designed and used to encourage players to continuously spend money in the game in a way that often disguises the true long-term cost of the game from the players. Such games have now become the normative model in the gaming industry, and generate 78% of gaming revenue ($98.4 billion) worldwide (SuperData, 2020).

Much of the research into microtransactions has, in particular, focused on '*loot boxes*'. Such features are considered controversial because they deliver the player a randomly determined prize from a large pool of items, and thus have been likened to a form of gambling not dissimilar to an electronic version of an instant win ticket (Drummond & Sauer, 2018). There has been a considerable debate around the classification of loot boxes as gambling; however, since spending money on loot boxes is not necessarily considered to be a financial loss and that virtual items are counted as 'something of value', they might not meet the legal definitions of gambling. Another phenomenon which involves microtransactional purchases are known as pay-to-win games, these games are notorious for being unfair as players who spend higher quantities of money in the game are given a distinct advantage (Alha et al., 2018).

It is important to note that the distinction between DLC and microtransactions can often be difficult to make, so that some definitional clarity is required. DLC is often defined as new (and substantial) in-game content that includes extra levels, more game modes, additional characters and weapons, and larger expansions that involve more storylines. However, microtransactions can involve a wide variety of cosmetic items (e.g. character/weapon skins), or premium items (e.g. in-game currency, chests, cards, weapons), that typically only serve to help

the player progress in the game. Additionally, these microtransactional items often have hidden payment options, and usually take the form of transient rewards (e.g. random-chance loot boxes, or time-expiration purchases). However, given the similarities between DLC and microtransactions, it is convenient to refer to them collectively as "additional purchases".

1.4. Motives for Gaming

An important area for understanding excessive gaming is motivational research. The most commonly used measure (Demetrovics et al., 2011) for assessing the motives for gaming is the Motives for Online Gaming Questionnaire (MOGQ). This identified seven motivational dimensions: *social* (building and maintaining social relationships); *escape* (escaping from reality); *competition* (challenging and competing with others); *skill development* (such as attention and coordination); *coping* (coping with stress and distress); *fantasy* (in-game identities and experience); and *recreation* (entertainment and enjoyment).

Research has shown that recreational motives for gaming are the most common and are usually not associated with psychiatric symptoms nor the problematic use of games (Kiraly et al., 2015). Such work shows that when people play video games moderately, and balance it with their other responsibilities, it can be a healthy form of entertainment. On the other hand, studies show that people who use gaming as a form of coping strategy (e.g. to escape other problems) tend to be disordered gamers (Kim et al., 2016; Columb et al., 2020). Using gaming for these motives can be quite destructive because, although it can help ease psychiatric distress in the short-term, ultimately it can lead to the development and continuance of problematic behaviours (Kiraly et al., 2015). Thus, it is important to analyse the specific motives each player has for gaming. In particular, research has suggested that not only are self-reported gaming motives

indicative of the player's in-game behaviours, but they are also a predictor of future in-game behaviours (Billeux et al., 2013).

1.5. Impulsivity

Meta-analyses of various studies have highlighted the influential role that impulsivity plays in addictive behaviours, such as gaming disorder (Canale et al., 2015; Argyriou et al., 2017; Salvarli & Griffiths, 2019). Impulsive behaviour is considered as a failure in cognitive control, in which one acts prematurely without considering alternate solutions or assessing the consequences (D'Zurilla et al., 2003; Dalley et al., 2011). Impulsivity has been associated with a number of features such as impatience, taking risks, carelessness, seeking excitement, and lack of deep thinking (Savci & Aysan, 2016). Impulsivity has been found by a number of studies to be a significant predictor of gaming disorder (GD), particularly in adolescent and emerging adult populations (Hu et al., 2017; Paulus et al., 2018). Research on neurocognitive features have proposed that impulsivity in gaming disorder is more pronounced compared to other behavioural addictions like gambling disorder (Choi et al., 2014). In addition, impulsivity has been associated with depression and failures in interpersonal relationships (Swann et al., 2008; Savci & Aysan, 2016). Furthermore, functional magnetic resonance imaging (fMRI) studies on addicted players found abnormal cortex activations and executive control problems when performing impulse control tasks (Dong et al., 2012; Ding et al., 2014).

1.6. Fear of Missing Out

In recent years, the concept of the Fear of Missing Out (FoMO) has been a popular emerging topic of research in consumer psychology, and has been found to be positively

associated with excessive social media and mobile phone usage, as well as gaming disorder symptoms (Alt & Boniel-Nissim, 2018; Duman & Ozkara, 2019; Li et al., 2021). FoMO is a psychological trait in which individuals are reluctant to miss out on rewarding experiences to stay connected with their social network (Przybylski et al., 2013). FoMO is regarded as a form of social anxiety, and appears to be caused by depressive symptoms (Oberst et al., 2017). Meeting these social needs has proven to play major role in problematic use of the internet and technology in general (King & Delfabbro, 2016).

FoMO can also be used in marketing as a tool to increase impulsive consumption (Aydin et al., 2019), as people may fear missing valuable events/activities (Beyens et al., 2016). Time-limited offers in videogames have shown to invoke FoMO behaviours which influence microtransactional spending behaviours on loot boxes (Nicklin et al., 2021). Recently, some studies have proposed that FoMO consists of two dimensions, namely the trait-state model (Wegmann et al., 2017), or the personal-social model (Zhang et al. 2020). The personal or trait FoMO (hereafter labelled as FoMO Personal) refers to the fear of missing out on experiences they wanted for themselves, whereas the social or state FoMO (hereafter labelled as FoMO Social) is the fear of missing out on experiences that other people enjoy.

1.7. Maximisation and Regret

When a person is given a wide variety of choices they often compare their options so as to maximise their preferences, values, or utilities. However, whenever people try to maximise their outcomes, that often leaves room for self-doubt and regret. Upon examining the behaviours of *maximisers* (i.e. people who attempt to maximise their outcomes), studies have found (Schwartz et al., 2002) that they usually have significantly lower levels of satisfaction with life,

self-esteem, optimism, and happiness, and significantly higher levels of regret and depression, compared to *satisfiers* (those who choose any option that exceeds their acceptability threshold). In regards to purchasing behaviours, maximisers experienced more regret and less happiness compared to satisfiers. Maximisation has also been shown to be significantly correlated with perfectionism. A systematic review by King and Delfabbro (2014) found that perfectionism and regret were two main categories of maladaptive cognitions related to gaming disorder. In regards to gaming, perfectionists strive to be the best at the game they are playing, and are unable to cease playing if close to completing an in-game objective (King et al., 2010; Delfabbro and King, 2013). Gamers often regret their gaming habits when their playing leads to negative consequences in their personal life, such as being unable to reduce how often they play (Chiou and Wan, 2007; Forrest et al., 2016).

1.8. Present Study

This study sought to contribute to the growing literature that has investigated the factors contributing to gaming disorder, but also look more closely at the personality and motivational factors that might influence the purchase of additional content in gaming. The research had four principal aims. The first aim was to examine whether the severity of gaming disorder symptoms was associated with higher frequency and quantity of additional purchases. It was hypothesised that GD symptoms are associated with increased spending in games (Delfabbro et al., 2021). The second aim was to see whether the choice of primary gaming platforms was related to the quantum of DLC and microtransactions. Notably, studies have shown that disordered gamers are more likely to play on PC than other consoles (Kiraly et al., 2017). The third aim was to determine whether greater FoMO traits were associated with greater use of microtransactions,

particularly those related to game progression and additional content. The fourth and final aim

was to test whether people with stronger maximising or perfectionistic traits were more likely to

purchase additional content. Those with perfectionistic traits would be more likely to have

completionist tendencies in gaming, for example that they would prefer to obtain every possible

item involved with the game.

In summary, we aimed to address the following research hypotheses:

H1: Is the severity of gaming disorder symptoms related to higher frequency and quantity of additional purchases?

H2: Is the choice of primary gaming platform related to the amount of additional purchases?

H3: Are stronger FOMO traits associated with greater use of additional purchases, particularly those related to game progression and additional content?

H4: Are people with stronger maximising or perfectionistic traits more likely to purchase additional content?

Chapter 2: Methods

2.1. Participants

The sample was recruited via self-selection using the UK-based recruitment platform Prolific. There was a total of 377 (M = 256, F = 112) completed responses (after removing those that were incomplete). The eligibility criteria required to participate in the study restricted participants over 18 years old who had a Prolific account and. The demographic characteristics shown in Table 1 indicate a male-female gender ratio of approximately 2:1. The prominent age group in this study was 21-25 years old, and the employment status of our participants were mainly unemployed and employed full-time.

Table 1: Demographic Characteristics of the Sample

Characteristic	N	%
Gender		
Male	256	67.9
Female	112	29.7
Non-binary / third gender	9	2.4
Age (in years)		
18-20	74	19.6
21-25	174	46.2
26-30	67	17.8
31-35	27	7.2
36-40	17	4.5
40+	18	4.8
Employment status		
Employed full-time	83	22.0
Employed part-time	58	15.4
Casually employed	36	9.5
Unemployed	122	32.4
Home duties	13	3.4
Other	65	17.2
Total	**377**	**100.0**

2.2. Measures

Participants responded to a variety of demographic and gaming-related questions before completing a series of validated psychometric measures.

2.2.1. Demographics

The demographic questions included age, gender, and employment status. Age was categorised into 6 groups ranging from 1 (18-20 years) to 6 (40+ years). Participants were able to select their gender from 3 groups (male, female and non-binary/third gender). They were also asked to provide their employment status from 6 available categories, namely: Employed full-time; Employed part-time; Casually employed; Unemployed; Home duties; or Other.

2.2.2. Gaming questions

There were 6 gaming questions which enquired about gaming frequency, gaming session length (on weekends and weekdays), and the primary device used for gaming. Gaming frequency was measured on a scale of playing video games from 1 (once a year) to 8 (6-7 days per week). Gaming session (average) duration was measured on a scale from 1 (0 minutes per day) to 8 (12+ hours per day), for both weekdays and weekends separately. Participants selected their primary device from four options which included: (1) personal computer (PC) gaming; (2) console gaming; (3) handheld gaming; and (4) mobile gaming. Participants were also asked to report in free text format up to three console/PC games and three mobile games that they had played the most over the past 12 months.

A further 10 gaming questions also captured how often respondents reported making gaming-related purchases including: participant's payment for DLC and microtransactions; the

types of packs/transactions purchased; the reasons for purchase or non-purchase; and the estimated amounts spent on each of DLC and microtransactions in the past 12 months. Additional purchase frequency was ordered on a scale of 1 (never) to 7 (more than once per week). To determine the reasons for purchasing additional content, participants were able to select multiple choices from the 15 reasons, there being 7 choices for DLC and 8 choices for microtransactions. To determine the types of additional purchases, participants were asked to select multiple choices from the 8 types of purchases they might have made in the past 12 months, there being 3 options for DLC and 5 options for microtransactions. Those participants who had not purchased either DLC or microtransactions were given a further 3 options as to why they had not purchased additional content (e.g. 'the price of the content was too much for what was offered').

Finally, respondents who made additional purchases were asked to answer four additional questions. To determine the total spending on additional purchases in the last 12 months, participants were required to pick the estimated range of expenditure for both DLC and microtransactions separately, ranging from 1 ($1-$20) to 7 (>$1000). Also, to get a deeper understanding of people's decisions to make in-game purchases, participants were asked to report in free text format what kinds of in-game purchases they had made, and what games they had bought them for.

2.2.3. Motives for Online Gaming Questionnaire (MOGQ)

The MOGQ (Demetrovics et al., 2011) is a 27-item scale which assesses seven types of motives for gaming, namely social, escape, competition, coping, skill development, fantasy, and recreation. Questions are scored on a Likert scale ranging from 1 (almost never) to 5 (almost

always/always). All of the motives were scored with a total ranging from 4-20, except for recreation which was scored from 3-15. The sample would then be ranked from the mean scores of each motive, to determine the common motives. The Cronbach's alpha for the scale in this study was 0.91.

2.2.4.   Two Dimensional Fear of Missing Out Scale (2D-FOMO)

The 2D-FoMO (Zhang et al., 2020) was used to assess the level of FoMO in our participants. The 9-item 2D-FoMO includes a FoMO Personal dimension (a fear missing out on experiences they had wished for themselves) and a FoMO Social dimension (a fear missing out on experiences other people enjoy). Participants rated items on a Likert scale from 1 (totally disagree) to 7 (totally agree). FoMO behaviours were scored from a range of 9-63, whilst the individual dimensions we scored from 5-30 (Personal) and 4-28 (Social) respectively. Higher scores determined stronger levels of FoMO behaviours. The Cronbach's alpha for the total scale was 0.89 in this study, with separate scores of 0.88 in the FoMO Personal dimension, and 0.93 in the FoMO Social dimension.

2.2.5.   Barratt Impulsiveness Scale-Brief (BIS-Brief)

The BIS-Brief (Steinberg et al., 2013) was utilised to assess impulsivity. The BIS-Brief is comprised of eight items that are each scored on a Likert scale from 1 (rarely/never) to 4 (almost always/always). Four of the questions were reverse ranked, from 1 (almost always/always) to 4 (rarely/never). After accounting for these reversals, the total (summed) scores ranged from 8 to 32. Participants who scored highly were likely to be more impulsive. The Cronbach's alpha for the total scale was 0.62 in this study.

2.2.6.   Petry Internet Gaming Disorder (IGD)

The IGD Scale (Petry et al., 2014) is a 13-item questionnaire that is based on the criteria for Internet Gaming Disorder outlined in the Diagnostics and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association 2013). Participants were asked to indicate yes or no to whether any of these symptoms had occurred to them in the past 12 months (0 = no, 1 = yes). A cut-off of 5 was suggested in (APA, 2013, Columb et al., 2020) study, indicating gaming disorder. For the analyses of this scale, all individual IGD scores ranged from 0-9. The Cronbach's alpha for the total scale was 0.81 in this study.

2.2.7.   The Maximising Scale and the Regret Scale (MSRS)

The MSRS (Schwartz et al., 2002) is an 18-item questionnaire, comprised of a 13-item Maximising Scale (MS) to assesses whether a person tries to maximise their outcomes, and a 5-item Regret Scale (RS) that assesses how much regret each participant feels. Participants were asked to rate all but one item on a Likert scale from 1 (completely disagree) to 7 (completely agree). There was one reversed question for the regret scale, ranging from 1 (completely agree) to 7 (completely disagree). Maximisation scores were totalled from 13-91, and then rescaled into the new range 1.0-7.0. These rescaled scores indicated the participants' classification of maximising behaviours: 1.0-2.5 were extreme satisfiers; 2.5-4.0 were satisfiers; 4.0-5.5 were maximisers; and 5.5-7.0 were extreme maximisers. After allowing for the single reversal, the total (summed) regret scores ranged from 7-35, with higher scores indicating higher levels of regret. The combined Cronbach's Alpha of both scales is 0.75, whereas separately it is 0.69 for MS, and 0.74 for RS.

2.3. Procedure

Ethical approval for this study was obtained from the School of Psychology Human Research Ethics subcommittee prior to commencement. The survey, hosted by Qualtrics, was posted on the online website Prolific. Participants completed the survey for a small remuneration (around 3 GBP).

2.4. Data Analysis and Preliminary Analysis

A power analysis was conducted using G-Power (two-tailed t-test, α=0.05), indicating that a sample of 352 was needed to detect a moderate (0.3) effect size correlation with 80% power. The obtained sample exceeded this requirement. The principal hypotheses were investigated using Pearson and/or Spearman correlations. Multiple linear regressions were used to test hypotheses H1, H3 and H4. Kruskal-Wallis H tests were conducted to test hypothesis H2. The analyses for this entire study analysis were performed using SPSS v27 (IBM Corp, 2021).

Chapter 3: Results

3.1. Descriptive Statistics

Table 2 provides a summary of the descriptive statistics for the principal variables of interest in this study.

Table 2: Descriptive statistics of the study variables of interest

Variable	M	SD	Observed Min	Observed Max	Theoretical Min	Theoretical Max
DLC Frequency	5.08[a]	6.85	0	30	0	104
DLC Quantity	60.07[b]	100.18	10	1200	10	1200
Microtransaction Frequency	5.95[a]	10.76	0	104	0	104
Microtransaction Quantity	70.49[b]	144.79	10	1200	10	1200
FoMO Personal	19.73	7.08	5	35	5	35
FoMO Social	12.08	6.67	4	28	4	28
Maximisation	55.62	10.53	25	85	13	91
Regret	23.46	5.72	6	35	5	35
Impulsivity	22.08	3.31	14	32	8	32
Gaming Disorder	2.72	2.06	0	9	0	9
Gaming Frequency	221.08[c]	125.31	1	338	1	338
Gaming Duration Weekday	2.67[d]	2.32	0	14	0	14
Gaming Duration Weekend	4.10[d]	3.01	0	14	0	14

[a] Frequency = Purchases/Year. [b] Quantity = $/Year. [c] Gaming Frequency = Days/Year. [d]

Gaming Duration = Hours/Day

3.1.1. Personality Variables

From Table 2 we can see that participants made on average about 11 additional content purchases (DLC plus microtransactions) per year, spending an average of $131 in the last 12 months. This mean expenditure appears to be higher than usual in the overall gamer population. Participants played video games around 4 days per week. The average playing time, aggregated over weekdays and the weekend, was about 22 hours per week. The average playing times on a weekend and on a weekday are reasonably consistent with the individual responses, where

respondents most frequently selected the questionnaire choices of 1-2 hours per day on weekdays and 2-5 hours per day on weekends.

The mean FoMO score (combining both personal and social aspects) was around 32, indicating a mild level of FoMO in the sample. Individually, the mean FoMO Personal and FoMO Social scores indicate a mild to medium level of FoMO, indicating that personal and social scores may sometimes be in opposition.

The mean impulsivity score suggests that the sample reported a medium level of impulsivity. Overall, 1.3% of the sample scored a total score between 8-15, which indicated a lower level of impulsivity. The majority of the sample (56.5%) scored a total score between 16-22, which indicated a medium level of impulsivity. Just over one-third of the sample (39.8%) scored between 23-29, which indicated a high level of impulsivity. Lastly, 2.4% of the sample reported a total score between 30-32, which indicated an extremely high level of impulsive behaviours.

The scale used to measure the level of maximisation behaviours had an initial range of 13 to 91, which was then *rescaled* into a range of 1 to 7. The average rescaled maximisation score was 4.28, which suggests that overall the sample reported to having maximiser-like behaviours (i.e. more maximiser than satisfier). In this study, 242 (64.2%) participants can be classed as having maximizing behaviours with a score between 4.0-5.5. N=24 (6.4%) participants scored between 5.5-7.0, which indicated a higher level of maximizing behaviours, labelled *extreme maximisers*. In contrast to the maximisers, just over a quarter of the sample (N = 108, 28.6%) scored between 2.5-4.0, which indicates a normal level of satisfier behaviours. Lastly, only 3 (0.7%) participants of this sample scored between 1.0-2.5, which indicates a higher level of satisfier like behaviours.

The mean regret score suggests that the sample had a medium to high level of regret. However, just under half (47%) of the sample scored in the high and extremely high range of regretful behaviours.

3.1.2. Gaming Behaviours

Table 3 summarises the descriptive statistics of the gaming behaviours of the sample. The majority of participants (N = 286, 75.9%) in this survey reported playing video games more than once per week. Of these, 166 participants reported playing video games up to 6-7 times per week.

Of the specified primary gaming platforms, PC was by far the most popular gaming device (N=241, 69.0%) to play video games on. The PC players reported they play for an average of 3.64 hours per day, followed by console gamers with 2.67 hours per day, then handheld gamers with 1.58 hours per day, and mobile gamers with 1.41 hours per day. PC gamers were also most likely to play video games 6-7 days per week.

Table 3: Gaming Behaviours of the Study Sample

Gaming Behaviours	N	%
Gaming Frequency		
1-2 times per year	5	1.3
3 times per year up to monthly	8	2.1
About once per month	21	5.6
2-3 times per month	19	5.0
About once per week	37	9.8
2-3 days per week	35	9.3
4-5 days per week	85	22.5
6-7 days per week	166	44.0
Total	377	100.0
Gaming Platform		
Home gaming console (*e.g. PlayStation, XBOX, Nintendo Switch*)	68	18.0
Desktop/laptop computer (*e.g. PC, Mac*)	241	63.9
Handheld gaming console (*e.g. portable Nintendo Switch, PS Vita*)	9	2.4
Mobile phone/tablet (*e.g. Android phone, iPhone, iPad*)	58	15.4
Missing	1	0.3
Total	377	100.0

3.1.3. Additional Purchases

Table 4 summarises the descriptive statistics for DLC and microtransactional spending habits. Over half of the sample (N = 217, 57.6%) reported spending money on both kinds of additional purchases in the last 12 months. Three quarters of the sample (N = 285, 75.6%) reported spending money on DLC in the last 12 months, in which they primarily reported to having purchased DLC a few times a year, spending between $20-$50 in total. The primary motivation to purchase DLC was to unlock additional story content (N = 199, 69.8%), which was also the most purchased type of DLC. Those who had not purchased DLC noted it was because the price of the content was too much for what was on offer.

Two-thirds of the sample (N = 246, 65.3%) reported spending money on microtransactions in the last 12 months. They primarily reported having purchased microtransactions a few times a year, and usually spent between $1-$50 in total. The primary

motivation to purchase microtransactions (N = 145, 58.9%) was to purchase cosmetic features,

such as character and weapon skins, which were also the most purchased item reported. Those

who had not purchased microtransactions noted it was because the price of the content was too

much for what was on offer.

Table 4: Descriptive Statistics of Additional Content Purchasing Habits

Characteristic	DLC		Microtransactions	
	N	%	N	%
Purchase Frequency				
Once a year	87	33.7	56	22.8
Few times a year	151	52.9	131	53.3
Once a month	27	9.5	30	12.2
2-3 times a month	20	7.0	26	10.6
Once a week	0	0.0	1	0.4
More than once a week	0	0.0	2	0.8
Total	285	100.0	246	100.0
Purchase Amount				
$1-$20	79	27.7	90	36.6
$20-$450	118	41.4	89	36.2
$50-$100	54	18.9	37	15.0
$100-$200	25	8.8	16	6.5
$200-$500	7	2.5	7	2.8
$500-$1000	1	0.4	6	2.4
>$1000	1	0.4	1	0.4
Total	285	100.0	246	100.0

3.1.4. Motives for Gaming

Participants were required to answer a 27-item questionnaire that determined their main

motives for online gaming. Table 5 summarises the mean (M) and standard deviation (SD) scores

for each of the 7 main motives of gaming, separated into three groups, namely: Total population;

Non-disordered gamers; and Disordered gamers. The main motivation for gaming was *recreation*,

followed by *coping*, and *escape*. For those not classified with gaming disorder (GD), the main

motives were *recreation*, *coping*, and *skill development*. Participants who were classified as

having gaming disorder (by their scores on the IGD scale) were motivated to play games for

escape, *coping*, and *recreation*.

Table 5*: Descriptive Statistics of Motives for Online Gaming*

Motive	Mean	SD
Total (n=377)		
Social	10.1	4.1
Escape	13.1	4.4
Competition	11.8	4.2
Coping	13.2	3.2
SkillDev	12.9	4.3
Fantasy	10.8	4.7
Recreation	13.4	1.9
Non-Disordered Gamers		
Social	9.7	4.0
Escape	12.4	4.3
Competition	11.5	4.1
Coping	12.9	3.2
SkillDev	12.9	4.4
Fantasy	10.1	4.5
Recreation	13.4	2.0
Disordered Gamers (n = 72)		
Social	11.9	4.1
Escape	16.2	3.1
Competition	12.9	4.5
Coping	14.4	2.8
SkillDev	13.1	4.1
Fantasy	13.5	4.6
Recreation	13.6	1.6

3.1.5. Internet Gaming Disorder Measure

Based on the IGD measure's criteria listed for classification of gaming disorder, 19.1%

(N = 72; see Table 5) of participants scored 5 or higher out of 9, which means they met the IGD

criteria for disordered gaming. Conversely, 80.9% (N = 305) of participants did not score high enough to meet the criteria for IGD.

3.2. Correlations between Study Variables

Table 6 presents a Spearman's correlation matrix used to identify correlations between additional content spending, IGD scores, the personal and social dimensions of FoMO, maximization, regret and impulsivity. The matrix showed that there were many statistically significant correlations between the major behaviour variables, IGD scores and additional spending habits.

Every major behaviour variable, bar from impulsiveness, was significantly positively correlated with IGD scores. Both dimensions of FoMO were significantly positively correlated with both maximization and regret. Amongst the behaviour variables, maximization was the only one to have a significantly positive correlation with impulsivity.

IGD had a significant positive relationship with all facets of additional content spending, which supports hypothesis H1. Impulsivity was only significantly positively correlated with the frequency of DLC and microtransactional purchases (r = .13, n = 377, p = .01), (r = .14, n = 377, p < .01).

Table 6: *Bivariate Correlation Analysis of the Study Variables*

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	FoMO[a] Personal													
2	FoMO Social	.43**												
3	Maximisation	.30**	.26**											
4	Regret	.34**	.16**	.43**										
5	Impulsivity	.02	-.02	.19**	.04									
6	Gaming Disorder	.26**	.22**	.21**	.16**	-.01								
7	DLC[b] Frequency	.002	-.07	.04	-.02	.13*	.23**							
8	DLC Quantity	-.02	-.07	-.02	-.06	-.01	.18**	.50**						
9	MT[c] Frequency	.04	-.05	.02	.04	.14*	.29**	.55**	.35**					
10	MT Quantity	.06	.04	-.01	.01	.04	.13*	.31**	.54**	.51**				
11	Game Frequency	.06	-.07	-.04	.05	.09	.30**	.26**	.16**	.31**	.24**			
12	Hours/Weekday	.06	-.02	.01	.05	.07	.32**	.29**	.26**	.31**	.31**	.54**		
13	Hours/Weekend	.07	.01	-.01	.04	.04	.34**	.26**	.27**	.33**	.27**	.52**	.69**	
14	Gender	-.01	.05	.02	-.02	-.11*	-.09	-.12*	.01	-.09	.09	-.19**	-.20**	-.17**

[a] FOMO = Fear of Missing Out. [b] DLC = Downloadable Content. [c] MT = Microtransaction.

[*] $p = < .05$. ** $p = < .01$.

3.3. Exploratory Analyses of Additional Purchases

The four hypotheses (H1-H4) in this study were predicated on various explanatory variables being significant predictors of Additional Purchases. Hypotheses H1, H3, and H4 utilised ratio variables (gaming disorder score, FoMO score, and maximiser score, respectively), for which we ran four separate hierarchical multiple regression analyses (DLC frequency and quantity, see Section 3.3.1; and microtransaction frequency and quantity, see Section 3.3.2). The model hierarchy was designed to control for dispositional and pre-existing characteristics first: (1) demographics (Gender); (2) personality (Impulsivity, FoMO Personal, FoMO Social, Maximisation, and Regret); and (3) IGD scores. It should be noted from Table 6 that the explanatory variables are not all independent, but instead shown some significant intercorrelations. The supporting evidence for these hypotheses is discussed in Section 3.3.3.

Hypothesis H2 utilised a nominal variable (choice of primary gaming platform), for which we ran four corresponding Kruskal Wallis tests (see Section 3.3.4).

3.3.1. Predicting DLC Purchases from Behaviours Variables and GD

Two separate hierarchical multiple regressions were conducted with DLC frequency and DLC quantity, respectively, as the dependent variables. The results are shown in Table 7.

Table 7: *Hierarchical Multiple Regression Analysis for Variables Predicting DLC Purchases*

Predictors	Model 1			Model 2			Model 3		
	B	Beta	t	B	Beta	t	B	Beta	t
DLC Frequency									
Gender	-1.55	-.12	-2.31*	-1.36	-.10	-2.02*	-1.17	-.90	-1.74
BIS				.22	.10	1.99*	.23	.11	2.14*
FoMO-P				.03	.03	.55	.01	.01	.13
FoMO-S				-.10	-.09	-1.58	-.11	-.11	-1.84
Maximisation				.03	.05	.82	.02	.03	.46
Regret				-.04	-.03	-.52	-.03	-.03	-.49
GD							.47	.14	2.60**
DLC Quantity									
Gender	1.50	.01	.13	-2.87	-.01	-.25	-2.37	-.01	-.20
BIS				-.71	-.02	-.39	-.60	-.02	-.33
FoMO-P				.90	.06	.88	.79	.06	.77
FoMO-S				-1.02	-.07	-.99	-1.10	-.07	-1.07
Maximisation				.62	.07	.95	.56	.06	.85
Regret				-4.16	-.23	-3.42***	-4.13	-.23	-3.39***
GD							2.20	.05	.74

*p = <.05, **p = <.01

The DLC frequency hierarchical regression revealed that at stage one, gender contributed significantly to the regression model ($F_{(1,376)} = 5.34$, $p < .05$) and accounted for 1.4% of the variation. Introducing the behavioural variables accounted for an additional 2.0% of variation, and the change in R^2 was not significant ($F_{(5,371)} = 1.52$, $p > .05$). Adding Gaming Disorder accounted for a further 1.7% of the variation, and this change in R^2 was significant ($F_{(1,370)} = 6.76$, $p = .01$). For the full model in stage three, none of the behavioural variables were significant predictors of DLC frequency. The most important predictor was Gaming Disorder, which accounted for 1.7% of the variation in DLC frequency. Collectively, all explanatory variables accounted for 5.1% of the variance in DLC frequency. The significant predictors of DLC Frequency in this analysis were Gender, Impulsivity and GD scores.

The DLC quantity hierarchical regression revealed that at stage one, gender did not contribute significantly to the regression model ($F_{(1,376)} = .02$, $p > .05$) and accounted for 0% of the variation. Stage two accounted for an additional 4.5% of variation, and the change in R^2 was significant ($F_{(5,371)} = 2.59$, $p < .05$). Stage three accounted for a further .2% of the variation, and the change in R^2 was not significant ($F_{(1,370)} = .55$, $p > .05$). For the full (stage 3) model, neither Gender or Gaming Disorder were significant predictors of DLC quantity. The most important predictor were the behavioural variables which accounted for 4.5% of the variation in DLC quantity. Collectively, all variables accounted for 4.7% of the variance in DLC quantity. The only variable that was shown the be a significant predictor of DLC quantity was regret.

3.3.2. Predicting Microtransaction Purchases from Behavioural Variables and GD

Two additional separate three stage hierarchical multiple regressions were conducted with MT frequency and MT quantity as the dependent variables, shown in Table 8.

The Microtransaction frequency hierarchical regression revealed that at stage one, gender did not contribute significantly to the regression model ($F_{(1,376)} = 2.73$, $p > .05$) and accounted for .7% of the variation. Introducing the behavioural variables accounted for an additional 2.1% of variation, and this change in R^2 was not significant ($F_{(5,371)} = 1.59$, $p > .05$). Adding Gaming Disorder accounted for a further .8% of the variation, and this change in R^2 was not significant ($F_{(1,370)} = 3.00$, $p > .05$). For the full model in stage 3, none of the independent variables were significant predictors of Microtransaction frequency. The most important predictor were the behaviour variables which uniquely explained 2.1% of the variation in Microtransaction frequency. Collectively, all variables accounted for 3.6% of the variance in Microtransaction frequency. Both dimensions of FoMO were the only variables shown to be significant predictors of Microtransactional Frequency.

Table 8: Hierarchical Multiple Regression Analysis for Variables predicting Microtransactional Purchases

Predictors	Model 1			Model 2			Model 3			
	B	Beta	t	B	Beta	t	B	Beta	t	*p = <.05,
MT Frequency										
Gender	-1.75	-.09	-1.65	-1.53	-.07	-1.44	-1.33	-.07	-1.25	**p = <.01
BIS				.06	.02	.34	.07	.02	.44	
FoMO-P				.20	.13	2.17*	.17	.11	1.86	
FoMO-S				-.21	-.13	-2.25*	-.23	-.14	-2.42*	
Maximisation				-.01	-.01	-.17	-.03	-.02	-.41	
Regret				.05	.03	.42	.05	.03	.44	
GD							.49	.09	1.73	
MT Quantity										
Gender	26.05	.09	1.45	26.82	.10	1.48	27.98	.10	1.54	
BIS				2.91	.07	1.05	3.43	.08	1.24	
FoMO-P				.68	.03	.43	.35	.02	.83	
FoMO-S				.34	.02	.22	.10	.004	.06	
Maximisation				-.51	-.04	-.53	-.77	-.06	-.78	
Regret				-2.18	-.09	-1.19	-2.20	-.09	-1.20	
GD							7.60	.11	1.60	

The Microtransaction hierarchical regression revealed that at Stage one, gender did not contribute significantly to the model ($F_{(1,376)} = 2.10$, $p > .05$) and accounted for .9% of the variation. Introducing the behavioural variables accounted for an additional 1.4% of variation, and this change in R^2 was significant ($F_{(5,371)} = .67$, $p > .05$). Adding Gaming Disorder accounted for a further 1% of the variation, and this change in R^2 was not significant, $F_{(1,370)} = 2.57$, $p > .05$). For the full model in stage 3, none of the independent variables were significant predictors of Microtransaction quantity. The most important predictor of Microtransaction quantity were the behaviour variables which uniquely explained 1.4% of the variation in Microtransaction quantity. Collectively, all variables accounted for 3.3% of the variance in MT quantity. As can be seen in Table 8, there were no variables that were able to significantly predict Microtransaction quantity.

3.3.3. Assessment of Personality Variable Hypotheses

Hypothesis H1 had partial support. From Table 7, GD scores were a significant predictor of DLC frequency in Step 3 of the model. However, GD scores were not significantly associated with the other types of additional purchases. From Table 8, GD was approaching significance in Step 3 of the Microtransaction Frequency Model ($p = .08$).

Hypothesis H3 had partial support. From Table 8, FoMO Social was a significant predictor of microtransaction frequency in Steps 2 and 3 of the analysis. FoMO Personal was significant in Step 2, but no longer significant in Step 3. Neither dimension of FoMO was associated with microtransaction quantity. From Table 7, the relationship between FoMO Social and DLC frequency was approaching significance in Step 3 of the Model ($p = .07$).

Hypothesis H4 had no support. From both Table 7 and Table 8, there were no significant relationships between maximisation scores and additional purchases.

3.3.4. Choice of Gaming Platform

Hypothesis H2 was supported. The data were found to violate normality via a Shapiro-Wilk test (p = .00), and hence the planned ANOVA was replaced by a Kruskal-Wallis H test. The data met the four assumptions of Kruskal-Wallis.

The test for DLC Frequency showed that there was a statistically significant difference between the primary choice of console ($X^2(3) = 36.46$, p = .00), with a mean DLC frequency score of 196.26 for Home Console, 204.76 for PC Console, 137.33 for Handheld Console, and 116.84 for Mobile Phone.

A Mann Whitney U Test was used to determine where the differences lie between groups. Frequency of DLC purchases were significantly higher in Home Console players than Mobile Phone players (U = 1124, p = .00), and significantly higher in PC Console players than Mobile Phone players (U = 3696, p = .00).

The Kruskal-Wallis H test for DLC Quantity showed a statistically significant difference between the primary choice of console ($X^2(3) = 8.62$, p = .04), with a mean DLC Quantity score of 149.63 for Home Console, 146.36 for PC Console, 160.00 for Handheld Console, and 100.54 for Mobile Phone. The Mann Whitney U test showed DLC purchases were significantly higher in Home Console players than Mobile Phone players (U = 460.50, p = .006), and significantly higher in PC Console players than Mobile Phone players (U = 1775.5, p = .006).

The Kruskal-Wallis H test for microtransaction frequency showed a statistically significant difference between the primary choice of console ($X^2(3) = 19.84$, p = .00), with a

mean MT frequency score of 178.70 for Home Console, 204.28 for PC Console, 148.67 for

Handheld Console, and 140.62 for Mobile Phone. The Mann Whitney U test showed that MT

frequency was significantly higher in Home Console players than Mobile Phone players (U =

1581, p = .04), and significantly higher in PC Console players than Mobile Phone players (U =

4595.50, p = .00). Difference in Frequency of MT purchases was indicative of a difference

between PC Console players and Home Console players (p = .074).

The Kruskal-Wallis H test for microtransaction quantity showed a statistically significant

difference between the primary choice of console ($X^2(3)$ = 12.09, p = .007), with a mean MT

Quantity score of 110.50 for Home Console, 131.81 for PC Console, 141.00 for Handheld

Console, and 87.43 for Mobile Phone. The Mann Whitney U test showed that MT Quantity was

significantly higher in PC Console players than Mobile Phone players (U = 1513.0, p = .002),

but not significantly higher in PC Console players than Home Console players (p = .066).

Chapter 4: Discussion

4.1. Overview of the Study

The principal aim of this study was to broadly examine what behavioural traits may be associated with increased risk of IGD symptoms in adults. It also examined whether these behavioural traits were related to increased levels of additional content purchases, which can contribute to the risk of problematic gaming amongst adults. Four hypotheses were investigated. In general, there was support for hypotheses H1, H2 and H3, but no significant support for hypothesis H4. Overall, the study demonstrated that there was a significant link between participants meeting the criteria for IGD and their purchasing of additional content. There was some support that console choice and FoMO behaviours were associated with additional content purchases. However, exploratory analyses revealed little to no support for maximisation behaviours on the frequency or quantity of additional purchases.

4.2. Main Findings

4.2.1. Gaming Disorder and Additional Purchases

The results showed strong support, consistent with the literature discussed below, that individuals who were more invested in gaming (frequency and length of gaming sessions) were more likely to purchase, and to spend more money on, additional purchases compared to non-disordered gamers. The time invested in gaming was also related to higher IGD scores. A correlation analysis (see Table 6) showed that those who met the criteria for having IGD were significantly, positively correlated with more frequently purchasing additional content (both DLC and microtransactions) over the past 12 months. This is consistent with the findings of

(King et al., 2019), who found that the frequency of microtransactional purchases is associated with problematic gaming behaviours.

Findings from additional analyses (not reported in Section 3) found that GD symptoms were significantly, positively correlated with nearly all types of additional content purchases, except for in-game advantages. The relationship between loot box purchasing and GD symptoms is particularly of interest, as much of the literature (e.g. Li et al., 2019; Zendle & Cairns, 2019) has noted that loot box purchases were related to higher levels of problem video gaming. As a consequence, playing video games to pursue a desired item can lead to a form of entrapment (Karlsen, 2011), where players invest more time and money into gaming, which can lead to financial costs beyond their means (King & Delfabbro, 2018). In-game currencies were one of the most common types of microtransactions in this study; the purchase of in-game currency has been shown (Duverge, 2016) to be related to increased spending of real money. This is primarily because it allows players to skip past sections of a game, which would otherwise normally require many of hours of gameplay to achieve (Columb et al., 2019).

Unlike previous findings, it is interesting to note that there was no significant association found in this study between IGD symptoms and the quantity of additional purchases. However, there was a significant, positive, Spearman correlation between these variables (see Table 6). This suggests that there might be a nonlinear relationship between these variables which was not detected via the linear regression analysis; thus, further exploration of this relationship might be a topic for future research.

4.2.2. Gaming Habits and Additional Purchases

Exploratory analyses (see Section 3.3.4.) demonstrated support for hypothesis H2, that the choice of primary gaming device would be associated with the level of additional purchases. In particular, the Kruskal-Wallis H test showed that there was a significant difference between the types of *primary* console in relation to the frequency and quantity of additional purchases. The Mann Whitney U test revealed that there were significant differences in the frequency and quantity of additional purchases between PC and home console gamers compared to mobile gamers. However, when comparing the two most popular choices, PC and console, of primary device together, it was found that there was no overall significant difference in the level of additional purchases. Despite this general lack of significance, the results were indicative of some apparent difference between PC and console gamers in the frequency and quantity of microtransactional purchases, with p-values that were close to achieving significance.

The PC was the device most primarily used for gaming in our survey; this observation is consistent with previous studies in this area (Kiraly et al., 2017, Columb et al., 2020). PC gaming was found in this current study to be the most problematic device, as it was significantly positively correlated with GD scores, gaming and microtransactional frequency, and in particular with cosmetic microtransactions. This is in line with previous research conducted on Steam and PC gaming, which showed that microtransactional exposure on Steam grew 60-80% between 2010-2019 (Zendle et al., 2020), especially for cosmetic features. This is understandable, considering that Steam is a dominant platform for video game and additional content purchases for PC gamers (Brunt et al., 2020).

An additional correlational analysis (see Table 6) found that mobile gaming had a significant negative correlation with GD scores, gaming and additional purchasing frequency.

This finding is in agreement with previous research that mobile users do not appear to have problematic gaming addiction (Lopez-Fernandez et al., 2018). However, it should be noted that there was a limited number of primary mobile users in this sample, so such results are to be taken with caution.

4.2.3. Behavioural Traits and Additional Purchases

Hypothesis H3 predicted that stronger FoMO behaviours should be associated with increases in both the frequency and quantity of additional purchases. The results, however, only partially supported hypothesis H3. The hierarchical multiple regression analysis in Table 7 and Table 8 showed that both FoMO dimensions had a significant but low-magnitude (linear) relationship with the frequency of microtransactional purchases. This is consistent with a recent study (Nicklin et al., 2021) that showed that other motivations, in conjunction with FoMO behaviours, influenced microtransactional purchasing. The results did reveal, however, that FoMO Social exhibits a significant, positive association with the frequency of DLC purchases. This lends partial support to the idea that social motivations can influence the use of real money to purchase virtual goods (Wohn, 2014; Hamari et al., 2017).

On the other hand, maximisation behaviour was not found to be a significant predictor of increased additional purchases, and consequently hypothesis H4 was not supported. Theoretically, however, we expect there should be an association because maximisers aim to complete video games in their entirety (King and Delfabbro, 2014), and DLC often offers additional story or challenges for players to complete. Indeed, the exploratory analyses suggest that there might be an indirect relationship between maximisation and DLC purchasing, based on the observation

that maximisation is significantly correlated with other behaviours like FoMO and impulsivity, which themselves do have an association with additional purchases, as discussed above.

4.3. Additional Findings

4.3.1. Behavioural Traits and Gaming Disorder

An analysis of the relationship between FoMO and gaming disorder revealed that both the personal and social dimensions of FoMO were significant positive predictors of GD symptoms. These results are consistent with previous findings on trait (personal) and state (social) FoMO, which found them to be predictors of IGD (Gonzalez-Bueso et al., 2018; Li et al., 2021). Additionally, the social dimension of social anxiety has been shown to be a stronger predictor of IGD than the personal dimension (Mehroof & Griffiths, 2010). However, in this current study there appeared to be no significant difference between the predictive strengths of personal and social FoMO.

The correlation analysis shown in Table 6 revealed that maximisation behaviours were found to be significantly associated with gaming disorder. This supports previous research that maximising or perfectionistic behaviours are a significant predictor of gaming disorder (Forrest et al., 2016), and that, conversely, gamers whose habits were non-problematic tended to have lower maximisation scores than disordered gamers.

One unexpected finding in this study was that, despite the sample reporting moderate levels of impulsivity, multiple analyses showed that impulsivity was not a significant predictor of additional purchasing frequency or quantity, or gaming frequency, or GD symptoms. These findings (or lack thereof) stand in contrast to previous research that found links between impulsivity and: (i) spending and microtransactional behaviours (Muller et al., 2015; Kim et al.,

2017); (ii) problematic gaming (King et al., 2020); and (iii) gaming frequency and quantity (Puerta-Cortes et al., 2017). Impulsivity was also discovered to have had no mediating effect on the relationship between the behavioural variables, such as FoMO, and GD. This also stands in contrast to previous findings that impulsivity has mediating properties (Li et al., 2021). These findings show that the measure of impulsivity was insufficient to explain the level of additional content purchases and IGD symptoms found in this study's sample.

The last behaviour variable which was analysed in this study was regret. There was a significant positive correlation between regret and IGD symptoms. This relationship is quite noteworthy as it shows that the behaviours which are aligned with gaming disorder are associated with feelings of regret. This finding lends support to the argument increased levels of regret are experienced by IGD individuals, thus substantiating claims of disordered gamers' inability to regulate negative emotions (Forrest et al., 2016; Wang et al., 2021). Additional regressions also showed that there was a significant positive relationship between additional content expenditure and regret. This is consistent with the literature as those who invest large amounts of money into additional content may experience significant regret, deeming their purchases to be less valuable then expected (King & Delfabbro, 2019b).

4.3.3. Gaming Habits

The majority of participants in this sample primarily engaged in gaming between 1-5hrs a day, averaging around 3.07 hours per day and 21.55 hours per week. This was in line with average gaming times documented in previous studies, namely 2.49 hours per day (Grusser et al., 2006) and 25 hours per week (Griffiths et al., 2004). Participants in this study who were classified as disordered gamers had increased hours and frequency of gaming compared to the

non-disordered gamers. It had previously been shown (Gentile, 2009) that disordered gamers spend more time gaming. Additionally, gaming frequency was shown to have a significant, positive association with gaming disorder symptoms. This finding is also consistent with the literature in that high gaming frequency was a risk factor for developing gaming disorder (Bilieux et al., 2015; Mihara & Higuchi, 2017).

The primary motives (of participants) for gaming in this current study were recreation, escape, and coping. Recreation was the most common motive for non-disordered gamers, a finding in keeping with similar, previous studies (Kim et al., 2016). However, escape and coping were the strongest gaming motives for those classified with IGD, which is consistent with other problem gaming studies (Blaisi et al., 2019, Chen & Chang, 2019). Using video games as an escape or coping mechanism can reduce psychiatric distress (Kiraly et al., 2015); however, it increases the risk of developing problematic gaming behaviours (King et al., 2020).

4.3.4. Gender and Gaming

The majority (67.9%) of participants in this study were male (from Table 1). However, in contrast to other comparable studies that utilized an online recruitment strategy, our research population was slightly more diverse. For example, the sample of (Hussain et al., 2012) comprised 77% males. Additionally, this current study found that there was higher IGD prevalence in males than females, which is consistent with other studies (Strittmatter, 2015; Mihara & Higuchi, 2017). Finally, males were found to game and purchase additional content significantly more frequently than females, which is again consistent with the literature (Mentzoni et al., 2011; A. King et al., 2020).

4.4. Limitations and Methodological Considerations

One major limitation of this study was the use of a self-selected sampling method. This meant that the study was more likely to attract participants who may be more invested in gaming than the average user. Thus, participants may have viewed this study as being personally relevant to themselves, and possibly also more likely to be classified as having gaming disorder. It is therefore important to note that caution should be applied when generalising the findings of this current study to gamers in the wider community.

Another limitation of the current study was the heavy reliance on a self-report method that can be subject to recall biases. Additionally, as the survey was posted online, and thus unsupervised, there was little control over how much attention participants paid to various parts of the questionnaire. Lastly, there was no way to clarify any confusion that might have occurred over any of the text of the questions, possibly explaining only why small amounts of information were provided to some questions in the survey.

A further limitation could be from the measurement of Gaming Disorder itself. It has been argued (Castro-Calvo et al., 2021) that the DSM-5 criteria, which the Petry et al. (2014) IGD measure utilises, does not accurately measure harmful usage, and thus may result in inflated prevalence rates of gaming disorder, such as has occurred in this study. However, in defence of the study, it could be argued that this measure has been a widely used and accepted measure in GD research, it is a useful screen to use to compare samples with other studies.

It should also be noted that the current study, by design, did not allow for respondents under the age of 18 to participate in the survey. However, the under-18 group has been well researched in the literature as being at-risk for gaming-related problems.

4.5. Implications and Future Research

This study has highlighted that some behavioural traits could be major risk factors not only for problematic gaming but also for increased levels of additional content purchases. Problem gaming studies have often looked into the relationship with microtransactional spending and the behaviours that influence IGD symptoms. The current study relates the frequency of additional purchases, both DLC and microtransactions, to behavioural traits of impulsivity, and to both the personal and social dimensions of FoMO. This suggests that future research on monetisation schemes should also include DLC, as it has similar properties to microtransactions, but is influenced in different ways by some behaviours.

PC gamers in this sample displayed the highest problematic gaming behaviours, such as frequency and length of gaming and microtransactional purchases, compared to players of other devices. This suggests that the accessibility of games and microtransactions on PC gaming platforms may exacerbate problematic gaming and gambling behaviours by exploiting the vulnerabilities of gamers. Therefore, future research should take a longitudinal approach to compare the gaming habits and additional content expenditures on PC platforms, which might provide more accurate means to predict IGD behaviours in PC gamers.

Future research should also explore other personality behaviours that are associated with problematic gaming symptoms and investigate whether there are any significant relationships with additional content purchases. The literature would benefit from replication of this study, looking into understanding the relationships between IGD related personality traits and additional content spending.

Lastly, the findings from a recent Delphi study (Castro-Calvo et al., 2021) argued that the diagnostic criteria defined by the ICD-11 showed more clinical relevance than the DSM-5

criteria. A successfully validated questionnaire, called GADIS-A, was developed to assess ICD-11 GD criteria in adolescents in clinical and research settings (Paschke et al., 2020). Thus, use of a validated scale that can accurately assess ICD-11 GD criteria in the adult population would benefit future IGD studies.

4.6. Conclusion

Online gaming has become easier to access and more immersive for the player. In addition, increased levels of gaming has been observed, in part as a response to lockdowns due to the current pandemic. These factors have raised serious concerns about a potential increase in IGD symptoms in adults, and the corresponding increased amount of money spent on additional purchases. These concerns are based on the hypothesis that higher frequencies of gaming, along with higher quantities of in-game purchases and higher frequencies of purchase, could be associated with an increased risk of forming problematic gaming behaviours.

The current study expands the existing literature on the relationship between behavioural traits and video gaming habits. The results indicate that additional content purchases are partially influenced by behaviours associated with IGD. Furthermore, the results demonstrated that spending behaviour can be driven by social and personal influences of social anxiety, rather than characteristics traits like impulsivity, which can lead to higher levels of regret, particularly in relation to adult male PC gamers. Despite the importance of these findings, it should be noted that they are still exploratory in nature. Therefore, added replication and research on the behavioural predictors of additional content purchases are necessary to further understand why gamers make these transactions.

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Appendix A: Participant Information Sheet

PARTICIPANT INFORMATION SHEET

PROJECT TITLE: Gaming Disorder and Microtransactions: Understanding the Cognitive Processes behind In-Game Purchases
HUMAN RESEARCH ETHICS COMMITTEE APPROVAL NUMBER: 21/25
PRINCIPAL INVESTIGATOR: Professor Paul Delfabbro
SENIOR RESEARCHER: Dr. Daniel King
STUDENT RESEARCHER: Andrew Jarrad
STUDENT'S DEGREE: Honours of Psychological Science

Dear Participant,
You are invited to participate in the research project described below

What is the project about?
The purpose of this study is to explore and expand on the currently limited knowledge regarding gamers and their expenditure on microtransactions. It will look at the extent that behaviours and traits related to video gaming may be related to the purchase of in-game additions.

Who is undertaking the project?
This project is being undertaken by Andrew Jarrad and will form the basis of his Honours degree of Psychological Science. The project is being supervised by Professor Paul Delfabbro and Dr. Daniel King of the School of Psychology at the University of Adelaide. This research will form the basis for the degree of Honours of Psychological Science at the University of Adelaide.

What am I being invited to do?
You are invited to participate in this survey if you play video games at least occasionally, this includes console/pc or mobile games.

How much time will my involvement in the project take?
The survey will take approximately 15-20 minutes for you to complete.
- If you are a University of Adelaide student in the School of Psychology, you will be eligible for course credit as part of your research participation requirements.
- If you are participating in this survey through the Prolific site, you will be eligible for monetary reimbursement as per Prolific policy.

Are there any risks associated with participating in this project?
It is not expected that you will experience any harm as a result of your participation, but some respondents might feel some discomfort as a result of reflecting upon any negative gaming experiences.

What are the potential benefits of the research project?
This research will provide further insights into the relations between gaming and purchasing microtransactions. The results of this project will allow us to understand the relationships between individual behaviours and gaming and how they might be related to microtransactional purchases.

Can I withdraw from the project?
Participation in this project is completely voluntary. If you agree to participate, you can withdraw from the study at any time prior to your submission of the survey.

What will happen to my information?

Your privacy is very important to us. Your participation in this study and any information you provide will be treated in a confidential manner. Your participation will be anonymous, and data will be collated for the purpose of analysis. As this study is being conducted as part of the requirements of an Honours degree, summary data will be presented in the form of a thesis. The findings may also be written with intent for journal publication, under the guide of supervisor Paul Delfabbro. Individual responses will not be identifiable in any reporting of results. After submitting your survey responses, you are welcome provide your email address and we will email a summary of our findings to you. If you provide your email address, this will not be connected to your survey responses.

All data you provide will be de-identified and kept secure on password-protected and secure databases for a period of 5 years. The data may be used in the future as a source of comparison for other data collected on a similar topic.

Because some of the research team are teaching staff associated with this university, whether you elect to participate or not will be kept entirely confidential. Any members of the research team associated with the coordination or administration of University of Adelaide Psychology units will not know whether you have elected to participate and will only view anonymous data.

Your information will only be used as described in this participant information sheet and it will only be disclosed according to the consent provided, except as required by law.

Who do I contact if I have any questions about the project?

If you have any questions, you are welcome to contact either researcher via the details listed below:

Principal Researcher: Professor Paul Delfabbro   paul.delfabbro@adelaide.edu.au

Student Researcher: Andrew Jarrad   andrew.jarrad@student.adelaide.edu.au

What if I have a complaint or any concerns?

The study has been approved by the Human Research Ethics Subcommittee in the School of Psychology at the University of Adelaide (approval number 21/25). This research project will be conducted according to the NHMRC National Statement on Ethical Conduct in Human Research 2007 (Updated 2018). If you have questions or problems associated with the practical aspects of your participation in the project, or wish to raise a concern or complaint about the project, then you should consult the Principal Investigator. If you wish to speak with an independent person regarding concerns or a complaint, the University's policy on research involving human participants, or your rights as a participant, please contact the acting chair of the Subcommittee, Dr. Diana Dorstyn (Diana.Dorstyn@adelaide.edu.au)

If I want to participate, what do I do?

If you are happy to participate in our study please click "next" and you will be directed to the consent page.

Yours sincerely,
Professor Paul Delfabbro, and Andrew Jarrad

Appendix B: Consent Form

Human Research Ethics Committee (HREC)

CONSENT FORM

1. I have read the attached Information Sheet and agree to take part in the following research project:

Title:	Gaming Disorder and Microtransactions: Understanding the Cognitive Processes behind In-Game Purchases
Ethics Approval Number:	21/25

2. I have had the project, so far as it affects me, and the potential risks and burdens fully explained to my satisfaction by the research worker. I have had the opportunity to ask any questions I may have about the project and my participation. My consent is given freely.

3. I have been given the opportunity to have a member of my family or a friend present while the project was explained to me.

4. Although I understand the purpose of the research project, it has also been explained that my involvement may not be of any benefit to me.

5. I agree to participate in the activities outlined in the participant information sheet.

6. I understand that as my participation is anonymous, I can withdraw any time up until submission of the survey. If I am a current University of Adelaide student, I am aware that if I decide to withdraw this will not affect my study at the University now or in the future.

7. I acknowledge that if I am participating in this survey with the expectation of receiving course credits or monetary reward in remuneration, I may no longer be eligible if I withdraw consent at any point before completion.

8. I have been informed that the information gained in the project will likely be published as a thesis and may be published as a journal article.

9. I have been informed that in the published materials I will not be identified and my personal results will not be divulged.

10. I hereby provide 'extended' consent for the use of my data or tissue in future research projects that are:
    - (i) an extension of, or closely related to, the original project: Yes ☐ No ☐

- (ii) in the same general area of research (for example, genealogical, ethnographical, epidemiological, or chronic illness research):   Yes ☐ No ☐

    OR

11. I hereby provide 'unspecified' consent for the use of my data or tissue in any future research:
    Yes ☐ No ☐

12. I understand my information will only be disclosed according to the consent provided, except where disclosure is required by law.

13. I am aware that I should keep a copy of this Consent Form, when completed, and the attached Information Sheet.

Should you wish to proceed, please click "I consent" below. If you do not wish to proceed with the survey, please simply close this window to exit.

Appendix C: Survey Questionnaire Items

Demographics

Please indicate your age in years

- ⭕ 18-20
- ⭕ 21-25
- ⭕ 26-30
- ⭕ 31-35
- ⭕ 36-40
- ⭕ 40+

Which gender do you identify as?

- ⭕ Male
- ⭕ Female
- ⭕ Non-binary / third gender
- ⭕ Prefer not to say

What is your current employment status?

- ⭕ Employed full-time
- ⭕ Employed part-time
- ⭕ Casually employed
- ⭕ Unemployed
- ⭕ Home duties
- ⭕ Other

Video Game Use

Video games include any games you have played on a console, PC, mobile device or other platform. How often have you played video games over the last 12 months?

- ⭕ 1-2 times per year
- ⭕ 3 times per year up to monthly
- ⭕ About once per month
- ⭕ 2-3 times per month
- ⭕ About once per week
- ⭕ More than once per week

If you said 'more than once per week', how many days a week?

- ⭕ 2-3 days per week
- ⭕ 4-5 days per week
- ⭕ 6-7 days per week

Additional Content Transactions

Downloadable Content (DLC) is defined as additional content that can be purchased online and added on to a video game, such as new story, weapons, characters, etc. How often do you spend money on DLC for video games?

○ Never
○ Once a year
○ Few times a year
○ Once a month
○ 2-3 times a month
○ Once a week
○ More than once a week

Which of the reasons below correspond with your decision to purchase DLC? Please indicate as many reasons as apply.

☐ To unlock more story to the game?
☐ To unlock more levels/challenges to complete?
☐ To unlock additional characters to play?
☐ To unlock additional weapons to use in-game?
☐ To get limited addition items that come with a pre-order?
☐ To get a season pass, which unlocks all additional content for a cheaper rate?
☐ To feel a sense of completeness or that I've done everything in the game

Which of the reasons below correspond with your decision to not purchase?

☐ The content on offer was not interesting enough
☐ The price of the content was too much for what was offered
☐ I wanted to move on to another game

What type/s of DLC have you purchased?

☐ Additional story and/or levels
☐ Character/Weapon Packs
☐ Pre-Order Bonuses or Season Passes

Approximately how much do you spend on DLC on a yearly basis?

○ $1-20
○ $20-50
○ $50-100
○ $100-200
○ $200-500
○ $500-1000
○ >$1000

Which video games have you purchased DLC for in the past? Please specify in the text box below.

Microtransactions are defined as small in-game purchases to obtain extra features, useful items, character features, etc. How often do you spend money on microtransactions?

○ Never
○ Once a year
○ Few times a year
○ Once a month
○ 2-3 times a month
○ Once a week
○ More than once a week

What made you decide to make microtransactions in the game? Please indicate as many reasons as apply.

☐ To help progress in the game
☐ To get extra lives/stamina
☐ To get a limited-time item or weapon
☐ To get character/weapon skins
☐ To get more in-game currency
☐ To keep up with the game performance of others
☐ Because other people were doing it
☐ To feel a sense of completeness or that I've done everything in the game

Which of the reasons below match with your decision to not make microtransactional purchases?

☐ The content on offer was not interesting enough
☐ The price of the content was too much for what was on offer

What type/s of microtransactions have you purchased?

☐ In-Game Currencies
☐ Random Chance Purchases/Loot Boxes (Chests, Cases, Boxes, Card packs)
☐ In-Game Advantages (Items needed to progress or strengthen)
☐ Expiration Purchases (Time-limited purchases to continue playing)
☐ Cosmetic Features (Character/Weapon Skins)

Approximately how much do you spend on microtransactions on a yearly basis?

- ○ $1-20
- ○ $20-50
- ○ $50-100
- ○ $100-200
- ○ $200-500
- ○ $500-1000
- ○ >$1000

Which video games have you purchased microtransactions for in the past? Please specify in the text box below.

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Gaming Motivations

People play video games for a variety of reasons. Some reasons are listed below. Please indicate how often you play video games for the reasons listed below.

	Almost never/never	Some of the time	Half of the time	Most of the time	Almost always/always
Because I can get to know people	○	○	○	○	○
Because gaming helps me to forget about daily hassles	○	○	○	○	○
Because I enjoy competing with others	○	○	○	○	○
Because gaming helps me get into a better mood	○	○	○	○	○
Because gaming sharpens my senses	○	○	○	○	○
Because I can do things that I am unable to do or I am not allowed to do in real life	○	○	○	○	○
For recreation	○	○	○	○	○
Because I can meet many different people	○	○	○	○	○
Because it makes me forget real life	○	○	○	○	○
Because I like to win	○	○	○	○	○
Because it helps me get rid of stress	○	○	○	○	○
Because it improves my skills	○	○	○	○	○

	Almost never/never	Some of the time	Half of the time	Most of the time	Almost always/always
To feel as if I was somebody else	○	○	○	○	○
Because it is entertaining	○	○	○	○	○
Because it is a good social experience	○	○	○	○	○
Because gaming helps escape reality	○	○	○	○	○
Because it is good to feel that I am better than others	○	○	○	○	○
Because it helps me channel my aggression	○	○	○	○	○
Because it helps improve my concentration	○	○	○	○	○
To be somebody else for a while	○	○	○	○	○
Because I enjoy gaming	○	○	○	○	○
Because gaming gives me company	○	○	○	○	○
To forget about unpleasant things or offences	○	○	○	○	○
For the pleasure of defeating others	○	○	○	○	○
Because it reduces tension	○	○	○	○	○
Because it improves my coordination skills	○	○	○	○	○
Because I can be in another world	○	○	○	○	○

Gaming Pathology

In the last 12 months…

	Yes	No	N/A
Have you found it hard to control how often or how long you play video games? (e.g., schoolwork, face-to-face socialising, sleep, physical exercise)	○	○	○
Have you increasingly prioritised gaming over other important activities? (e.g., schoolwork, face-to-face socialising, sleep, physical exercise)	○	○	○

	Yes	No	N/A
Has your gaming caused problems in your life? (e.g, decreased well-being, conflict with parents/family; friends; schoolwork, worse sleep)	◯	◯	◯
Have you contiued to play games despite experiencing problems?	◯	◯	◯
Have you spent a lot of time thinking about games even when you were not playing, or planning when you could play next?	◯	◯	◯
Have you felt restless, irritiable, moody, angry, anxious or sad when attempting to cut down or stop gaming, or when you were unable to play?	◯	◯	◯
Did you feel the need to play for increasing amounts of time, play more exciting games, or use more powerful equipment to get the same amount of excitement you used to get?	◯	◯	◯
Did you feel that you should play less, but were unable to cut back on the amount of time you spent playing games?	◯	◯	◯
Did you lose interest in or reduce participation in other recreational activities (hobbies, meetings with friends) due to gaming?	◯	◯	◯
Did you continue to play games even though you were aware of negative consequences, such as not getting enough sleep, being late to school/work, spending too much money, having arguments with others, or neglecting important duties?	◯	◯	◯

	Yes	No	N/A
Did you lie to family, friends or others about how much you game, or try to keep your family or friends from knowing how much you game?	O	O	O
Did you game to escape from or forget about personal problems, or to relieve uncomfortable feelings such as guilt, anxiety, helplessness or depression?	O	O	O
Did you risk or lose significant relationships, or job, educational or career opportunities because of gaming?	O	O	O

Behavioural Traits

Please indicate how often each of the statements below is descriptive of you.

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
I feel anxious when I do not experience events/opportunities	O	O	O	O	O	O	O
I believe I am falling behind compared with others when I miss events/opportunities	O	O	O	O	O	O	O
I feel anxious because I know something important or fun must happen when I miss events opportunities	O	O	O	O	O	O	O
I feel sad if I am not capable of participating in events due to constraints of other things	O	O	O	O	O	O	O
I feel regretful of missing events/opportunities	O	O	O	O	O	O	O
I think my social groups view me as unimportant when I miss events/opportunities	O	O	O	O	O	O	O
I think I do not fit in social groups when I miss events/opportunities	O	O	O	O	O	O	O

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
I think I am excluded by my social groups when I miss events/opportunities	○	○	○	○	○	○	○
I feel ignored/forgotten by my social groups when I miss events/opportunities	○	○	○	○	○	○	○

Please indicate how often each of the statements below is descriptive of you.

	Rarely/Never	Occasionally	Often	Almost Always	Always
I plan tasks carefully	○	○	○	○	○
I do things without thinking	○	○	○	○	○
I don't "pay attention"	○	○	○	○	○
I am self-controlled	○	○	○	○	○
I concentrate easily	○	○	○	○	○
I am a careful thinker	○	○	○	○	○
I say things without thinking	○	○	○	○	○
I act on the spur of the moment	○	○	○	○	○

Please indicate how often each of the statements below is descriptive of you.

	Completely disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Completely agree
No matter how satisfied I am with my job, it's only right for me to be on the lookout for better opportunities.	○	○	○	○	○	○	○
When I am in the car listening to the radio, I often check other stations to see if something better is playing, even if I am relatively satisfied with what I'm listening to.	○	○	○	○	○	○	○
When I watch TV, I channel surf, often scanning through the available options even while attempting to watch one program.	○	○	○	○	○	○	○

	Completely disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Completely agree
I treat relationships like clothing: I expect to try a lot on before finding the perfect fit.	O	O	O	O	O	O	O
I find it difficult to shop for a gift for a friend	O	O	O	O	O	O	O
Renting videos is really difficult. I'm always struggling to pick the best one.	O	O	O	O	O	O	O
When shopping, I have a hard time finding clothes that I really love.	O	O	O	O	O	O	O
I'm a big fan of lists that attempt to rank things (the best movies, the best singers, the best athletes, the best novels, etc.).	O	O	O	O	O	O	O
I find that writing is very difficult, even if it's just writing a letter to a friend, because it's so hard to word things just right. I often do several drafts of even simple things	O	O	O	O	O	O	O
I never settle for second best	O	O	O	O	O	O	O
Whenever I'm faced with a choice, I try to imagine what all the other possibilities are, even ones that aren't present at the moment.	O	O	O	O	O	O	O
I often fantasise about living in ways that are quite different from my actual life	O	O	O	O	O	O	O
No matter what I do, I have the highest standards for myself.	O	O	O	O	O	O	O

Please indicate how often each of the statements below is descriptive of you.

	Completely disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Completely agree
Once I make a decision, I don't look back.	○	○	○	○	○	○	○
Whenever I make a choice, I'm curious about what would have happened if I had chosen differently.	○	○	○	○	○	○	○
Whenever I make a choice, I try to get information about how the other alternatives turned out.	○	○	○	○	○	○	○
If I make a choice and it turns out well, I still feel like something of a failure if I find out that another choice would have turned out better.	○	○	○	○	○	○	○
When I think about how I'm doing in life, I often assess opportunities I have passed up.	○	○	○	○	○	○	○

Conclusion

You have reached the end of this survey. If you wish to receive information about the research outcomes of this project when completed, please select yes.

○ Yes

○ No

Please enter the email address you want to be contacted via.

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