Dispositional Mindfulness and Problematic Gaming: Does Dispositional Mindfulness Predict Better Outcomes?

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Abstract

The overarching goal of this thesis was to investigate the role of dispositional mindfulness in relation to problematic gaming. Three main objectives, explored in two studies, were proposed to examine whether dispositional mindfulness is a) related to problematic gaming, b) distinct from an experience of flow while gaming, and c) a protective factor against negative consequences arising from problematic gaming. In Study 1, the contribution of dispositional mindfulness in predicting problematic gaming while controlling for the experience of flow while gaming and time spent gaming was explored in an online sample consisting of 1015 young adults who frequently game (29.7% female; *M*age = 23.29 years, *SD* = 4.58). Subsequently, in Study 2, the mediational role of dispositional mindfulness on the relation between problematic gaming and subjective well-being (life satisfaction, positive affect, and negative affect) was assessed in an online sample of frequent gamers (37.9% female; *M* age = 22.56 years, *SD* = 4.3). In both studies, results indicated that gamers reporting higher dispositional mindfulness also reported significantly fewer problematic gaming symptoms. Additionally, results from a hierarchical multiple regression in Study 1 highlighted the unique contribution of dispositional mindfulness in significantly negatively predicting problematic gaming symptoms even when controlling for flow and hours spent gaming. Finally, in Study 2, results from structural equation modeling revealed a partial mediation of mindfulness on the relation between problematic gaming and both life satisfaction and negative affect as well as a full mediation for positive affect. These results indicate that high problematic gaming influences life satisfaction, positive affect, and negative affect through individuals' low reports of dispositional mindfulness. Overall, findings from the current thesis provide evidence of the importance of dispositional mindfulness in both influencing problematic gaming and mitigating its detrimental impact on well-being. Given that

dispositional mindfulness is a dynamic factor modifiable through mindfulness-based interventions, these findings suggest mindfulness training may be useful in preventing and intervening in problematic gaming.

Résumé

L'objectif global de cette thèse était d'investiguer le rôle de la disposition à la pleine conscience en relation à l'engagement problématique envers les jeux vidéo. Trois objectifs principaux ont été explorés au cours de deux études afin d'examiner si la disposition à la pleine conscience est (a) associée à l'engagement problématique envers les jeux vidéo, (b) distincte des expériences optimales (i.e., « flow ») lors de session de jeux vidéo, et (c) un facteur de protection face aux conséquences négatives résultant d'un engagement problématique envers les jeux vidéo. Le premier manuscrit explorait la contribution relative de la pleine conscience sur l'engagement problématique envers les jeux vidéo tout en tenant compte de l'expérience du « flow » lors de session de jeux vidéo et du nombre d'heures passé à jouer aux jeux vidéo. Une série de questionnaires ont été complétés en ligne par 1015 jeunes adultes qui jouent fréquemment aux jeux vidéo (29.7% femmes ; *M*age = 23.29 ans, *SD* = 4.58). Par la suite, lors du deuxième manuscrit, le rôle médiateur de la disposition à la pleine conscience sur la relation entre l'engagement problématique envers les jeux vidéo et le bien-être subjectif (satisfaction dans la vie, affect positif, affect négatif) a été évalué dans un échantillon en ligne de joueurs fréquent (37.9% femmes ; *M*age = 22.56 ans, *SD* = 4.3). Les résultats de ces deux études ont indiqué que les joueurs reportant de niveaux plus élevés de disposition à la pleine conscience reportaient aussi significativement moins de symptômes d'engagement problématique envers les jeux vidéo. De plus, les résultats d'une régression multiple hiérarchique dans le premier manuscrit ont souligné la contribution unique de la disposition à la pleine conscience à négativement et significativement prédire les symptômes d'engagement problématique envers les jeux vidéo même en contrôlant pour les expériences de « flow » et le temps passé à jouer. Finalement, la modélisation par équation structurelle lors de la deuxième étude a révélé une médiation partielle

de la disposition à la pleine conscience sur la relation entre l'engagement problématique envers les jeux vidéo et la satisfaction de vie ainsi que l'affect négatif, tandis qu'une médiation complète a été trouvée pour l'affect positif. Ces résultats indiquent donc que des niveaux élevés de symptômes d'engagement problématique envers les jeux vidéo influencent la satisfaction de la vie, l'affect positif, et l'affect négatif à travers une disposition à la pleine conscience moins prononcée. En sommaire, les résultats obtenus de cette thèse indiquent l'importance de la disposition à la pleine conscience pour influencer les symptômes d'engagement problématique envers les jeux vidéo et pour atténuer son impact néfaste sur le bien-être. Puisque la disposition à la pleine conscience est un indicateur dynamique qui peut être modifier par des interventions fondées sur la pleine conscience, ces résultats suggèrent que l'entraînement à la pleine conscience pourrait être utile en termes de prévention et d'intervention pour l'engagement problématique envers les jeux vidéo.

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Statement of Authorship

Both manuscripts in this program of research were first-authored by me, and co-authored by my supervisor, Dr. Nancy L. Heath, and a senior graduate student, Devin J. Mills. As first-author, I conceived the area of study as well as the objectives and associated hypotheses in collaboration with Dr. Heath and Devin. I also cleaned and analysed all data, and wrote both manuscripts with advice and assistance from both Dr. Heath and Devin as needed. Both Dr. Heath and Devin organised the online data collection for these studies and also provided invaluable advice in editing both manuscripts. Both these studies have been submitted for publication.

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Chapter 1: Introduction

Playing video games is an increasingly popular activity. For example, a recent survey of Canadians found that 37% of Canadians define themselves as "gamers", and that, of those who do not consider themselves gamers, 79% had played a video game in the past 4 weeks (Entertainment Software Association of Canada, 2016). Interestingly, gaming can be beneficial across age groups (see reviews by Granic, Lobel, & Engels, 2014; Jones, Scholes, Johnson, Katsikitis, & Carras, 2014); however, for some individuals, playing video games can become problematic and have negative impacts in other domains of their life such as their academic or work responsibilities, social life, psychological functioning, or well-being (e.g., Griffiths et al., 2016; King, Haagsma, Delfabbro, Gradisar, & Griffiths, 2013; Mentzoni et al., 2011). Given the negative consequences that can result from problematic gaming, it is important to investigate dynamic individual factors that may help prevent or mitigate the effects of problematic gaming.

Mindfulness, which is commonly defined as being purposefully aware of the present moment with nonjudgmental acceptance (Kabat-Zinn, 1994, 2013), has been found to be useful in helping individuals prevent and regulate their problematic engagement in other activities such as pathological gambling, substance abuse, and problematic Internet use (Calvete, Gámez-Guadix, & Cortazar, 2017; deLisle, Dowling, & Allen, 2012; Gámez -Guadix & Calvete, 2016; Katz & Toner, 2013). Therefore, it is possible that mindfulness would also be effective in helping individuals either prevent or cope with problematic gaming. Interestingly, Gackenbach and Brown (2011) found that highly engaged gamers report higher levels of mindfulness than less engaged gamers; however, this study did not investigate problematic gaming specifically. Thus, the relation between mindfulness and problematic gaming is still unclear.

Research in related areas suggests mindfulness may be beneficial in the prevention of problematic gaming and its adverse consequences. For example, the experience of flow while gaming has been associated with problematic gaming, especially in terms of the immersiveness of the experience (Hull, Williams, & Griffiths 2013). Given that mindfulness been found to be helpful in improving self-regulation (Brown, Ryan, & Creswell, 2007), it may enable individuals to more easily disengage from an immersive experience in order to better regulate behaviour. Thus, it is likely that higher reports of mindfulness would be protective against engagement in problematic gaming. In further support of the potentially protective role of mindfulness, while problematic gaming has been associated with decreased well-being across a number of factors, dispositional mindfulness, which is an individual's general tendency to be mindful (Brown & Ryan, 2003), has been shown to promote well-being (e.g., Brown & Ryan, 2003; Brown, et al., 2007; Soysa & Wilcomb, 2015). However, further research is needed to clarify the role of dispositional mindfulness in problematic gaming.

Therefore, this thesis seeks to investigate the role of dispositional mindfulness in problematic gaming by examining whether dispositional mindfulness is a) related to problematic gaming, b) distinct from an experience of flow while gaming, and c) a protective factor against the negative consequences arising from problematic gaming. These objectives were explored in two large-scale cross-sectional online studies of adult frequent gamers. The main objective of Study 1 sought to assess the contribution of dispositional mindfulness in predicting problematic gaming beyond the experience of flow while gaming. Expanding on the findings from Study 1, the main objective of Study 2 was to investigate whether dispositional mindfulness would mediate the relation between problematic gaming symptoms and subjective well-being. These studies have implications for researchers, educators, and clinicians in providing evidence of a

potential protective factor that may be helpful in assisting individuals who have problematic engagement with video games.

In compliance with McGill University's thesis regulation guidelines, the following thesis is structured as a manuscript-based thesis. The first two chapters introduce the thesis and review the literature. Chapters 3 and 4 present Studies 1 and 2 respectively, each as a complete manuscript including its own introduction, literature review, method, results, and discussion sections. These two chapters will be linked by a connecting text. Because of the format of the thesis, there is some overlap in the literature reviews presented in Chapter 2 and those presented in each individual manuscript. Finally, Chapter 5 provides an overarching conclusion that integrates the findings from both manuscripts into one cohesive program of research and provides implications for future research.

Chapter 2: Review of the literature

The overarching purpose of this thesis was to clarify the role of dispositional mindfulness in problematic gaming as it relates to both the experience of flow while gaming and individuals' subjective well-being. Therefore, the following literature review will first provide a broad overview of problematic gaming. Specifically, problematic gaming will be operationally defined, followed by an overview of the conceptual issues around this definition encountered in the literature. Prevalence rates and gender differences will then be presented, followed by literature highlighting key determining factors of problematic gaming. Subsequently, definitions of mindfulness will be reviewed and the relation between mindfulness and problematic engagement in behaviours related to gaming will be discussed. Associations of mindfulness with flow and well-being will then be presented before summarising the current literature and identifying areas requiring further research. This chapter will conclude by presenting the specific aims and implications of this thesis.

Problematic gaming

Playing video games is an increasingly prevalent leisure activity that spans age groups and genders. For instance, a recent survey of Canadians revealed that 37% of Canadians define themselves as "gamers" and, of those who do not consider themselves as gamers, 79% report having played video games in the past 4 weeks. The average age of a Canadian gamer is 36, and Canadians spend an average of 11 hours per week playing video games (Entertainment Software Association of Canada, 2016). This is similar to results found in the United States, where the average age of gamers is 35, and 63% of US households include someone who plays video games at least 3 hours per week (Entertainment Software Association, 2016). Similarly high prevalence rates of video gaming have also been found in other countries including the

Netherlands (Lemmens, Valkenburg, & Gentile, 2015), Taiwan (Ko, Yen, Chen, Chen, & Yen, 2005), and Germany (Kowert, Vogelgesang, Festl, & Quandt, 2015).

Furthermore, playing video games is not inherently problematic; in fact, it has been associated with a variety of benefits, both in adolescence and adulthood. Recent reviews have demonstrated that gaming can have cognitive, emotional, social, and motivational benefits including enhancing cognitive functions (e.g., selective attention, spatial skills, problem-solving skills), improving emotion regulation, forming new friendships, obtaining emotional support online, and increasing positive affect and life satisfaction (Granic et al., 2014; Jones et al., 2014; Uttal et al., 2013). For instance, a survey of over 4000 individuals playing a massively multiplayer online (MMO) game (i.e., *World of Warcraft*) found that online gameplay enhanced real-life social interactions; over three quarters of the sample reported playing with people they knew in real life, and approximately half the sample reported making friends through the game who eventually became real-life friends (Schiano, Nardi, Debeauvais, Ducheneaut, & Yee, 2014). Similarly, a survey of 1304 Grade 10 students revealed that participants who reported low or high frequency of gaming also had significantly higher levels of family closeness, less risky friendship networks, and higher school attachment than participants who reported never engaging in gaming (Durkin & Barber, 2002). Research has also shown that the extent to which individuals play video games will predict their persistence in solving difficult anagram-riddle tasks (Ventura, Schutte, & Zhao, 2013) and that participants who were assigned to play a video game show greater persistence on other tasks compared to individuals who were not assigned to play a game (Schutte, Ventura, & Ke, 2015).

Unfortunately, for some individuals, playing video games can become problematic and have adverse consequences in other domains of their life. However, over the past few decades,

one of the main problems in the literature investigating problematic gaming has been a lack of agreement in the operational definition used, making generalisation across studies difficult (Kuss, Griffiths, Karila, & Billieux, 2014). Problematic gaming has been variously referred to as Internet gaming disorder, problematic video game use, pathological gaming, problematic Internet use, Internet addiction and gaming addiction amongst others. Furthermore, these terms are often assessed using different measures; in fact, a recent systematic review of the literature revealed there were 18 measures created to assess problematic gaming internationally, and that, overall, these measures were inconsistent in their conceptualisation of the construct (King et al., 2013).

Partly in response to the methodological challenges in the field, the fifth edition of the *Diagnostic and Statistical Manual for Mental Disorders* (DSM-5; American Psychiatric Association, 2013) recently included *Internet gaming disorder* as a condition requiring further investigation before being included as a clinical disorder. The nine DSM-5 diagnostic criteria for Internet gaming disorder consist of: (1) pre-occupation with gaming, (2) experiencing withdrawal symptoms when unable to play video games, (3) needing to spend an increasing number of hours playing video games in order to feel similar levels of excitement (i.e., tolerance), (4) attempting to reduce or stop playing video games, (5) losing interest in other activities, (6) continuing to play video games despite being aware of significant and persistent negative consequences in other domains of life (i.e., neglecting responsibilities), (7) putting at risk either a relationship, education, or career opportunity due to gaming, (8) engaging in deception to dissimulate the extent to which one engages in video game use, and finally, (9) using video games as a means of escaping from negative moods such as helplessness, guilt, anxiety or depression. Of these nine criteria, endorsement of five or more has been proposed as necessary for a clinical diagnosis of Internet gaming disorder.

The creation of these 9 diagnostic criteria is an important step in helping create a uniform conceptualisation of problematic gaming and permit greater generalisation across research studies. Therefore, the present thesis sought to assess problematic gaming using a measure of gaming specifically tapping into each of the diagnostic criteria.

However, it is important to note that the current diagnostic criteria for problematic gaming are based on diagnostic criteria for pathological gambling or substance abuse and have therefore been criticised for not taking into account the unique context in which gaming occurs. For instance, as Kardefelt-Winther (2015) argues, some of the current criteria (i.e., preoccupation with gaming, tolerance, withdrawal, and a loss of interest in other activities) do not make sense as diagnostic criteria for problematic gaming since they could easily be justified and endorsed by non-problematic yet highly engaged gamers. Interestingly, in a qualitative study investigating the effects of abstinence from gaming for an 84-hour period over a weekend, King. Kaptsis, Delfabbro, and Gradisar (2016) found that both problematic and non-problematic gamers mainly reported feeling bored without the opportunity to game and frustrated in their need to find other leisure activities providing as much mental stimulation. As the authors noted, this does not seem very consistent with the DSM-5 diagnostic criteria of symptoms of withdrawal, which refer to experiencing sadness, irritability, or anxiety.

As Kadefelt-Winther (2015) suggests, there may be a need to step away from an addiction framework in order to attempt to understand problematic gaming in its own unique context. Instead, he has proposed a model of compensatory Internet use, whereby problematic gaming occurs as a compensatory behaviour in an attempt to cope with real-life problems or to deal with negative emotions (Kardefelt-Winther, 2014).

Similarly, Charlton and Danforth (2002, 2007, 2010) have argued for the need to distinguish between high engagement and problematic gaming. They distinguish between peripheral criteria of problematic gaming such as euphoria, tolerance and preoccupation with gaming versus core criteria such as neglecting responsibilities in order to play video games despite being aware of a negative impact in other domains of life. Furthermore, they argue that peripheral criteria should not be considered as important as core criteria in classifying technology-related addiction because these peripheral criteria also tend to be endorsed by highly engaged, yet non-problematic, gamers (Charlton & Danforth, 2007). Others have argued that this lack of distinction between high or passionate engagement and problematic gaming can be seen as part of a growing trend to pathologise everyday behaviours without taking into account the fact that these behaviours are multi-determined and occur in different contexts (Billieux et al., 2015).

Unsurprisingly, these disparities in how problematic gaming is defined and assessed may explain the range of prevalence estimates that have been found. For instance, a meta-analysis by Ferguson, Coulson, and Barnett (2011) of 33 studies suggests the way problematic gaming is conceptualised has an impact on reported prevalence rates: those who conceptualise problematic gaming based on pathological gambling criteria (e.g., endorsement of problematic gaming symptoms such as being pre-occupied with gaming and experiencing withdrawal symptoms) report higher prevalence rates (8.9%) than those who focus on how problematic gaming interferes with other domains (e.g., social, academic, professional) of an individual's life (3.1%).

In terms of gender differences, the research on non-problematic gaming is inconclusive, with studies finding that females play more (Williams, Consalvo, Caplan, & Yee, 2009; Williams, Yee, & Caplan, 2008), equally to (Yee, 2008) or less than males (Durkin & Barber,

2002; Ko et al., 2005). Possible explanations for these discrepancies are that women may be engaging more frequently over the years as video games become more and more mainstream (Sublette & Molan, 2012), or that women tend to underreport the number of hours they spend gaming since gaming is still culturally perceived as a predominantly masculine activity (Williams et al., 2009). However, when looking at *problematic* gaming specifically, research has shown that males tend to report higher levels of problematic gaming symptoms than females (e.g., Ko et al., 2005; Lemmens et al., 2015; Mentzoni et al., 2011).

Despite the differences in opinion on how to conceptualise problematic gaming, there seems to be international consensus that one of the required features of problematic gaming is the interference it has with other domains of an individual's life or on their well-being (Griffiths et al., 2016; Petry et al., 2014). This interference can occur in different ways, whether it be through continued engagement in gaming despite awareness of persistent and significant negative consequences that arise from excessive gaming or risking losing significant relationships or work/educational opportunities. Increasingly, it is recognised that it is the degree of interference in the individual's life and not merely the time spent gaming that is critical in identifying problematic gaming; thus, it is important to note that high frequency of play should not be a key determinant in the classification of problematic gaming (e.g., Charlton & Danforth, 2010; Majamäki & Hellman, 2016). For example, a study by Lemmens, Valkenburg, and Peter (2011) found that despite there being a significant modest positive correlation between problematic gaming and time spent gaming per week, the number of hours spent gaming per week was not significantly associated with any other psychosocial correlates assessed; however, problematic gaming was significantly associated with diminished social competence, increased loneliness, and lower self-esteem and life satisfaction.

Given that problematic gaming can interfere with other domains of an individual's life, it is important to investigate ways in which individuals can better self-regulate their behaviour. Increasingly, mindfulness, which is the ability to focus on present moment awareness with nonjudgmental acceptance (Kabat-Zinn, 1994, 2013), has been shown to promote adaptive functioning (e.g., Brown et al., 2007; Friese & Hofmann, 2016; Keng, Smoski, & Robins, 2011; Schutte & Malouff, 2011) and has been identified as a potential protective factor against problematic engagement in certain behaviours. For instance, although there is a lack of research investigating problematic gaming specifically, other studies have shown that higher reports of mindfulness are negatively associated with problematic engagement in behaviours such as gambling and Internet use (Calvete et al., 2017; deLisle et al., 2012; Gámez -Guadix & Calvete, 2016; Mazzoni, Cannata, & Baiocco, 2017). Additionally, mindfulness-based therapy has been proposed as a potentially beneficial intervention for problematic gaming (Dong & Potenza, 2014).

Mindfulness

Mindfulness is a complex construct originating from ancient Buddhist practices that has increasingly been used over the past few decades in secularised Western psychological and medical interventions and research (e.g., Kabat-Zinn, 2003; van Gordon, Shonin, Griffiths, & Singh, 2015; Williams, Teasdale, Segal, & Kabat-Zinn, 2007). As has been extensively discussed in previous reviews, there exist two main approaches to mindfulness, a Buddhist approach and a secularised Western approach, which in turn are comprised of several conceptualisations of mindfulness (for in-depth reviews of existing conceptualisations, see for example Bodhi, 2011; Dunne, 2015; Gethin, 2015; Hart, Ivtzan, & Hart, 2013; Khoury, et al., 2017). In 1881, Rhys Davids used the term *mindfulness*, which was already an existing English

word, to translate the Pali word *sati*, a Buddhist term encompassing remembering or holding in one's mind as well as having an awareness or understanding of the impermanence of present-moment experience (Bodhi, 2011; Gethin, 2015; Khoury et al., 2013). Although there are varying conceptualisations of mindfulness according to each Buddhist school of thought, a common goal in Buddhism is to alleviate suffering and it is believed this can be achieved through mindfulnesss practice (Bodhi, 2011).

In particular, Therevada Buddhism has had the greatest impact on Western conceptualisations of mindfulness (Cullen, 2011; Rosch, 2015). In the late 70s, in an attempt to make mindfulness more acceptable in mainstream culture, Jon Kabat-Zinn proposed a secularised version of the Buddhist conceptualisation of mindfulness and recontextualised mindfulness in a contemporary scientific context (Kabat-Zinn, 2011).

Arguably one of the most commonly used Western approaches to mindfulness both in research and practice, Kabat-Zinn's (1994) definition of mindfulness is the act of intentionally paying attention to the present moment with nonjudgmental acceptance of thoughts, feelings, and sensations. Using this definition, mindfulness has been characterised both as a state, whereby individuals experience moment-by-moment mindfulness, or as a disposition, which taps into individuals' general tendency to be mindful (e.g., Brown & Ryan, 2003). Additionally, it has been shown that dispositional mindfulness is dynamic and can be increased through mindfulness training (e.g., Shapiro, Brown, Thoresen, & Plante, 2011).

Meanwhile, a second school of thought in the Western conceptualisation of mindfulness was also initiated by Ellen Langer in the 70s. According to Langer, mindfulness can be conceptualised as a conscious and open-minded awareness of external stimuli in the present-moment experience along with an active and creative engagement with this experience (e.g.,

Langer, 2005). Although this view of mindfulness is similar to Kabat-Zinn's approach in that both involve the self-regulation of attention, a key distinction is that while Kabat-Zinn's definition stresses the importance of being aware of both external and internal stimuli, Langer's definition focuses exclusively on awareness of and engagement with external stimuli (Hart et al., 2013).

Given these varied conceptualisations of mindfulness, it is unsurprising that there exists a broad variety of different operational definitions, and thus assessments, of mindfulness as a construct. As mentioned above, Kabat-Zinn's conceptualisation of mindfulness has been most commonly used in research and practice on the therapeutic benefits of mindfulness in various populations; however, even within conceptualisations related to this approach, as opposed to Langer's definition of mindfulness, the operational definitions differ.

A recent review by Quaglia, Brown, Lindsay, Creswell, and Goodman (2015) found a total of eight measures of dispositional mindfulness for adults, two measures of dispositional mindfulness for children, and two measures of state mindfulness for adults. Although all these measures share a focus on the quality of attention and awareness in the present moment, this common factor is either the principal factor of the measure or one factor among several others which vary depending on the underlying conceptualisation of mindfulness (Quaglia et al., 2015). For example, Brown and Ryan (2003) developed the 15-item *Mindful Attention and Awareness Scale* (MAAS) to assess a one-dimensional structure of dispositional mindfulness that can be defined as a lack of mindful awareness in daily life. On the other hand, Baer, Smith, Hopkins, Krietemeyer, and Toney (2006) analysed results from five existing dispositional mindfulness measures and, based on their analyses, proposed a multi-dimensional model for mindfulness composed of five interacting facets: acting with awareness, non-judgment of inner thoughts and

feelings, non-reactivity to inner experience, describing experiences, and observing. Baer and colleagues (2006) selected relevant items from each of the five measures examined and thus created the 39-item *Five Facets of Mindfulness Questionnaire* (FFMQ). It is important to note that these five facets of mindfulness are differentially related to a unidimensional mindfulness construct based on the respondents' previous experience with meditation (e.g., Baer et al., 2006, 2008); thus, it has been suggested that calculating an overall score for the FFMQ may not be appropriate (Park, Reilly-Spong, & Gross, 2013).

Lau and colleagues (2006) also developed a 13-item *Toronto Mindfulness Scale (TMS)* in an attempt to reflect their 2-factor conceptualisation of mindfulness as being comprised of (a) both self-regulation of present moment attention and (b) open-minded acceptance of internal stimuli (Bishop et al., 2004). However, although the TMS did have a 2-factor structure, these factors (curiosity and decentering) were both related to the second factor of their conceptual model (open-minded acceptance). Lau and colleagues (2006) interpreted these results as suggesting an overlap between open-minded acceptance and self-regulation of attention in that the latter was a mandatory prerequisite of open-minded acceptance. Interestingly, Brown and Ryan (2003, 2004) proposed a similar argument to justify their 1-factor model for the MAAS; however, they argued that acceptance is inherent to being aware of and paying attention to present moment experience and thus chose to focus on the attention and awareness factor rather than acceptance.

Increasingly, given the diversity in existing mindfulness measures, studies are focusing on evaluating the psychometric properties of these measures. Specifically, a systematic review by Park and colleagues of 79 studies revealed that the MAAS was the most commonly evaluated mindfulness measure and revealed good overall psychometric properties (internal consistency,

reliability, construct validity, and responsiveness). Furthermore, the MAAS was developed to target general adult populations; however, it still reliably reveals differences between groups with different experience with mindfulness (Brown & Ryan, 2003). Given its generalisability and well-established psychometric properties, the MAAS was used in the present thesis to assess dispositional mindfulness.

Despite these many conceptualisations and definitions, several mindfulness interventions have been created to help either start or enhance mindfulness practice. In 1979, Kabat-Zinn started integrating mindfulness in contemporary medicine by developing the Mindfulness Based Stress Reduction (MBSR) program at Harvard University's Stress Reduction Clinic. Using a combination of weekly group discussion and daily personal practice, this 8-week program attempts to provide intensive mindfulness training primarily by both educating participants about the conceptualisation of mindfulness and its evidence-based benefits as well as by facilitating 45-minutes' daily practice of one of three mindfulness activities: sitting meditation (the cultivation of awareness of the breath, physical sensations, thoughts, and emotions), body scan (the cultivation of awareness of physical sensations in the body), or yoga (Kabat-Zinn, 2013).

In the decades since, several types of interventions were subsequently created targeting specific clinical populations (for a more in-depth review, see for example Baer, 2003, Cullen, 2011, Hart 2013). For example, Segal, Williams, and Teasdale (2002) created Mindfulness-based Cognitive Therapy (MBCT) using the MBSR model modified to specifically facilitate recovery from depression as well as relapse prevention. Linehan (1993) also incorporated mindfulness in dialectical behavior therapy (DBT), which was designed as an intervention for individuals with borderline personality disorder.

Importantly, the outcomes associated with mindfulness-based interventions have been extensively researched and reviewed in depth in numerous systematic reviews and meta-analyses (e.g., Baer, 2003; Fjorback, Arendt, Ørnbøl, Fink, & Walach, 2011; Khoury et al., 2013). For instance, a meta-analysis of 209 studies demonstrated that mindfulness-based interventions were overall moderately effective (Khoury et al., 2013). Specifically, although mindfulness-based interventions were markedly superior to active treatments such as psychoeducation, relation-therapy or art therapy, they were not more effective than cognitive-behavioral therapy. Mindfulness-based interventions were also more effective in assisting individuals cope with psychological disorders such as depression and anxiety rather than physical or medical conditions. A systematic review of MBSR and MBCT by Fjorback and colleagues (2011) also found similar results in that mindfulness-based interventions were beneficial in improving mental health and reducing psychological distress associated with medical disorders. Importantly, however, mindfulness-based interventions have been shown to increase both state and dispositional mindfulness in participants, and gains are maintained over time (e.g., Carmody & Baer, 2008; Khoury et al., 2013; Shapiro et al., 2011).

Furthermore, over the past few decades, research has demonstrated that mindfulness is associated with greater well-being and more adaptive functioning. For example, higher dispositional mindfulness has been associated with lower anxiety, depression, emotional reactivity, rumination and catastrophizing, as well as enhanced ability to cope with stressful or distressing situations and greater subjective well-being (e.g., Bergin & Pakenham, 2016; Bergomi, Ströhle, Michalak, Funke, & Berking, 2013; Brown et al., 2007; Cash & Whittingham, 2010; Feldman, Lavallee, Gildawie, & Greeson, 2016; Hanley, Warner, & Garland, 2015; Kadziolka, Di Pierdomenico, & Miller, 2016; Keng et al., 2011).

Mindfulness and Problematic Gaming

It has been proposed that mindfulness may be useful in promoting behavioural regulation in that it has been shown to reduce automatized responding, enhance behavioural self-control, promote autonomous self-regulation, and facilitate goal attainment (Brown et al., 2007; Keng et al., 2011). Research on pathological gambling shows that gamblers who report high dispositional mindfulness tend to report less severe gambling outcomes (Lakey, Campbell, Brown, & Goodie, 2007). Furthermore, a study by deLisle, Dowling, and Allen (2014) also demonstrated both an inverse relation between pathological gambling severity and dispositional mindfulness, as well as lower reports of dispositional mindfulness in pathological gamblers compared to normative samples. Similarly, research on problematic Internet use revealed an inverse relation between dispositional mindfulness and self-regulation of Internet use (Calvete et al., 2017; Gámez-Guadix & Calvete, 2016; Mazzoni et al., 2017).

Interestingly, in contrast to the findings regarding the association between mindfulness and better outcomes in pathological gambling and problematic Internet use, Gackenbach and Brown (2011) have shown that highly engaged gamers reported higher levels of mindfulness than less engaged gamers. Specifically, in a primarily undergraduate sample (N = 384, 53% female), the authors identified highly engaged gamers as individuals reporting high frequency of play, duration of usual gaming periods, and number of games played over their lifetime, as well as having started playing games at a young age. Differences were then assessed between high and low engagement gamers on measures of dispositional mindfulness while gaming, using the MAAS, and dispositional mindfulness in everyday life, using the *Kentucky Inventory of Mindfulness Skills* (KIMS, Baer, Smith, & Allen, 2004) which is a 39-item measure consisting of four subscales (observe, describe, act with awareness, and acceptance without judgment).

Results revealed that highly engaged gamers reported more dispositional mindfulness while gaming, as well as greater scores on the acceptance without judgment subscale of the KIMS but no group differences were found for the other three subscales of the KIMS. Unfortunately, the authors do not discuss the discrepancy between the dispositional mindfulness measures, simply concluding that the study provides preliminary evidence of a tentative association between some forms of mindfulness and gaming.

However, a number of methodological issues need to be taken into account when interpreting these results. For instance, participants were not screened to assess whether they actually play video games. Thus, the low engagement group may be comprised of both low engagement gamers and non-gamers, which is particularly important considering that the data were collected from two sources that may not be compatible (in-person undergraduate students for course credit and gamers from a local annual video game festival). In other words, the low engagement gaming group may be comprised of two types of individuals whose experience of gaming may be inherently different. For example, presumably, individuals who participated for course credit with little or no engagement in video games and no interest in video games (i.e., non-gamers) would be different than someone who does have an interest in video games but has recently started playing video games or can only infrequently play video games (i.e., a low engagement gamer).

Most importantly, however, no distinction was made between problematic and non-problematic gaming. Previous research has revealed positive associations between gaming in general and a variety of benefits such as increased positive affect and life satisfaction (e.g., Granic et al., 2014; Jones et al., 2014; Uttal et al., 2013), and mindfulness has similarly been associated with greater well-being and adaptive functioning (e.g., Brown et al., 2007, Hanley et

al., 2015); therefore, it is not surprising that high engagement gamers also report greater dispositional mindfulness.

Unfortunately, there is a lack of research investigating the role of mindfulness in problematic gaming specifically. However, given the evidence of an inverse relation between mindfulness and pathological gambling or problematic Internet use and the conceptual similarity between the DSM-V diagnostic criteria for problematic gaming and pathological gambling, it would seem likely that a similar relation would be found for problematic gaming.

Mindfulness, Flow and Problematic Gaming

One of the ways dispositional mindfulness may be related to video gaming in general is in comparison to the experience of flow, which is a state of consciousness attained in an optimally challenging activity when experiencing a deep sense of enjoyment, immersion, and a loss of awareness of time (e.g., Csikszentmihalyi, 2008). Research has suggested that the structure of video games, with their specific goals, immersiveness, and optimal challenge scaling, make gaming an activity that is particularly conducive to experiencing flow (Sherry, 2004; Sweetser & Wyeth, 2005).

Research has also shown that the experience of flow while gaming may contribute to problematic engagement in gaming (e.g., Chou & Ting, 2003; Hull, et al., 2013; Wu, Scott, & Yang, 2013). Specifically, Wu and colleagues (2013) conducted a study involving 375 players (30% female) of online Massively Multiplayer Role-Playing Games (MMORGs) and found that flow experience significantly predicted increased reports of problematic gaming symptoms. Similarly, in a study of 110 video game players (29.09% female; *Mage* = 24.7 years, *SD* = 9.04), Hull and colleagues (2013) demonstrated that, of 9 aspects of flow measured, it was the loss of sense of time that occurs when experiencing flow states that significantly predicted problematic

gaming, and the authors concluded that helping players be more aware of time passing while gaming could be beneficial in the prevention of problematic gaming. Additionally, a study by Khang, Kim, and Kim (2013) of 290 college students (67% female; *M*age = 21 years, *SD* = 3.72) found that not only does the experience of flow positively predict problematic gaming, but low self-control also significantly separately predicted both greater experience of flow and greater problematic gaming. Therefore, given that mindful attention and awareness has been shown to promote self-regulation of behaviour (e.g., Brown et al., 2007; Friese & Hofmann, 2016; Keng et al., 2011), it would seem probable that individuals with higher mindfulness would be better able to self-regulate and keep track of time while gaming, even when experiencing flow.

Unfortunately, research on the relation between mindfulness and flow seems to be inconclusive. It has been proposed that, given both constructs are positive states of mind associated with adaptive functioning and well-being, mindfulness and flow share some core aspects such as self-regulation of attention and are thus positively associated with one another (Jackson, 2016; Moore, 2013). In support of this, research on college students (*N* = 105; 60.95% female; *M*age = 20 years) has shown that levels of dispositional mindfulness positively predicted individuals' propensity to experience flow (Moore, 2013). A study by Kee and Wang (2008) also found that college athletes (*N* = 182; 43.96% female; *M*age = 22.3 years, *SD* = 1.98) with high dispositional mindfulness tended to report experiencing more flow. Furthermore, another study on college athletes (*N* = 13; *M*age = 21 years, *SD* = 1.68) demonstrated that those who had participated in a six-week mindfulness intervention (*n* = 6), based on the MBSR model, reported increased flow experiences in subsequent training sessions and dispositional mindfulness, while no significant differences emerged for the control group (*n* = 7) in either flow or mindfulness (Aherne, Moran, & Lonsdale, 2011). Finally, in a study using a sample of 59 undergraduate

students (49% female; *M*age = 20.23 years, *SD* = 2.19) dispositional mindfulness was positively associated with flow experience immediately following a 30-minute period playing serious educational mini-games (Kreutzer & Bowers, 2016).

In contrast, other studies have found an inverse relation between mindfulness and flow. For instance, Sheldon, Prentice, and Halusic (2015) conducted a series of three studies investigating the role of daily experiences of mindfulness and flow across different contexts in college students: (1) at a single time point, (2) using experience sampling, and (3) using an experimental design with three conditions (brief mindfulness activity, brief relaxation activity, control) immediately prior to playing a puzzle game, *Tetris*, for 30 minutes. Across all three studies, flow was assessed as being comprised of two components: sense of absorption in the activity or sense of control during the activity. Results across the three studies indicated that individuals who reported greater mindfulness also reported a lower sense of absorption or immersion in the activity they were engaged in; however, mindfulness was either not associated or positively associated with the sense of control aspect of flow.

Importantly, one of the key differences between Sheldon and colleagues' (2015) research and other studies on mindfulness and flow is in the assessment of flow. Sheldon and colleagues chose to assess flow as a two-dimensional construct comprised of sense of absorption in an activity as well as sense of control over the activity; however, other studies investigating mindfulness and flow together assessed flow as a uni-dimensional construct. This is important considering that in Sheldon and colleagues' (2015) first study, when assessing the relationship between mindfulness and flow at a single time point, although mindfulness was significantly negatively associated with the absorption subscale of flow and positively associated with the sense of control subscale of flow, it was also positively associated with flow as a global score.

Another key distinction is that, whereas the other studies discussed assessed dispositional mindfulness using measures specifically created to assess dispositional mindfulness, Sheldon and colleagues (2015) assessed mindfulness in different ways in each study. Specifically, in the first study, dispositional mindfulness was assessed using only the *Act with awareness* subscale of the FFMQ while in the second study, mindfulness was assessed using the state version of the MAAS. Finally, in the third study, although participants either participated in a guided mindfulness activity, a guided relaxation activity, or no activity before playing the video game, mindfulness was not directly assessed. Thus, the relation between dispositional mindfulness and flow may operate differently depending on whether flow is assessed as a global or multi-faceted construct. However, further research is required to clarify how dispositional mindfulness and flow are related, especially in the context of specific activity engagement that is meaningful for participants (i.e., gaming for frequent gamers). Therefore, in the present study, in an attempt to extend Sheldon and colleagues' (2015) findings pertaining to video game play (i.e., playing *Tetris*), the relationship between dispositional mindfulness, using the uni-dimensional MAAS, and two aspects of flow, sense of absorption and sense of control, was examined in Study 1 in a sample of frequent video game players.

Mindfulness, Subjective Well-being, and Problematic Gaming

Another way that mindfulness could be associated with problematic gaming is through its influence on subjective well-being. Although well-being is a broad construct, one of the widely recognised models of subjective well-being described by Diener (e.g., 2000) as being comprised of high life satisfaction, high frequency of experiencing positive affect, and low frequency of experiencing negative affect.

As mentioned earlier, the occurrence of adverse consequences in other domains of an individual's life is one of the key determining factors of problematic gaming; therefore, it is unsurprising that individuals who report problematic gaming symptoms also report lower subjective well-being, including the experience of higher depression and anxiety symptoms as well as lower life satisfaction (e.g., Hagström & Kaldo, 2014; Mentzoni et al., 2011; Scott & Porter-Armstrong, 2012; van Rooij, Schoenmakers, Vermulst, van den Eijnden, & van de Mheen, 2010; Wartberg, Kriston, Kammerl, Petersen, & Thomasius, 2015). However, research is still unclear on what underlies the relation between problematic gaming and well-being.

For example, in a sample of Norwegian young adults, Mentzoni and colleagues (2011) found problematic gamers reported lower life satisfaction, and higher anxiety and depression than both non-problematic gamers and non-gamers. Furthermore, German adolescents at high-risk of pathological Internet use (42.9% female) reported lower levels of life satisfaction and family functioning (Wartberg et al., 2015). A study of Dutch adolescent online gamers by van Rooij and colleagues (2010) also revealed problematic gamers reported more depressive mood, loneliness, and negative self-esteem compared to all other classifications of gamers identified through latent class analysis. Similarly, in an online study of adult gamers, Kirby, Jones, and Copello (2014) found problematic gaming predicted significantly lower psychological well-being (i.e., anxiety, insomnia, depression, social functioning, and somatic problems).

On the other hand, a study by Lemmens and colleagues (2011) found that one aspect of lower psychosocial well-being, increased loneliness, both predicted and was predicted by problematic gaming after 6 months while other aspects (low self-esteem and social competence) only predicted greater problematic gaming symptoms after 6 months. Similarly, a study by Ko

and colleagues (2005) revealed that lower life satisfaction predicted greater problematic gaming only for male adolescents; for females, life satisfaction was not a significant predictor.

In another longitudinal study, Scharkow, Festl, and Quandt (2014) found no consistent patterns between problematic gaming and psychosocial well-being (as defined by life satisfaction, personal success, and perceived social support) for adolescents, young adults and adults over a 2-year period. Although problematic gaming was negatively correlated with life satisfaction at baseline, higher problematic gaming significantly predicted lower life satisfaction one and two years later only for adults 40 and older. However, across all age groups, life satisfaction did not predict problematic gaming one or two years later. Thus, given that research is still unclear on whether problematic gaming is a cause or consequence of low well-being, it would seem the relation between problematic gaming and well-being is complex and likely influenced by other factors.

It could be argued that the relation between problematic gaming and low well-being may be a recursive negative cycle in which both factors influence one another. For instance, a study by Hagström and Kaldo (2014) has shown that, of three gaming motivations assessed, the desire to escape from and avoid negative situations and real-life problems was the strongest predictor of problematic gaming. In turn, problematic gaming has been shown to have a detrimental impact on other domains of an individual's life, thus potentially contributing to enhanced avoidance tendencies and further fueling this recursive negative cycle. Mindfulness, on the other hand, has been shown to help individuals learn to cope or face adverse life events without resorting to avoidance tendencies (Bergomi et al., 2013). Additionally, as mentioned earlier, mindfulness has been found to not only buffer the effects of stress but also to promote well-being as well as adaptive functioning and self-regulation (e.g., Bergin & Pakenham, 2016; Brown et al., 2007;

Friese & Hofmann, 2016; Soysa & Wilcomb, 2015). Specifically, in terms of subjective well-being, mindfulness has been associated with increased positive affect and life satisfaction, as well as decreased negative affect (e.g., Bajaj & Pande, 2016; Brown & Ryan, 2003; Schutte & Malouff, 2011). If this is the case, then mindfulness could potentially be helpful in mitigating the impact of problematic gaming on subjective well-being.

Summary and Research Objectives

In summary, although research in related areas such as pathological gambling and problematic Internet use suggests dispositional mindfulness may influence problematic gaming, there has been a lack of research on the role of dispositional mindfulness specifically as it pertains to problematic gaming. Moreover, the individual influence of flow and well-being on either problematic gaming or dispositional mindfulness has been studied separately; however, research has not yet investigated the influence of flow and well-being on both problematic gaming and dispositional mindfulness together.

Therefore, the goal of this thesis is to build on existing literature to further investigate the relation between dispositional mindfulness and problematic gaming. Specifically, the first objective is to explore the potential relation between dispositional mindfulness and problematic gaming. A second objective is to investigate whether dispositional mindfulness predicts symptoms of problematic gaming, over and above an experience of flow while gaming. Finally, the third main objective is to assess whether the experience of dispositional mindfulness could be protective against engagement in problematic levels of gaming.

In order to investigate these objectives, the current thesis is comprised of two studies. Study 1 sought to explore the unique contribution of dispositional mindfulness in predicting problematic gaming over and above the experience of flow while gaming. Subsequently, Study 2

sought to assess the possible mediating role of mindfulness as a mechanism influencing the relation between problematic gaming and subjective well-being.

Chapter 3: Study 1

The Role of Mindfulness and Flow in Predicting Problematic Video Game Use

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Abstract

Previous studies have explored flow within the context of activity engagement, whereas mindfulness (present moment awareness) is often conceptualized as protective against maladaptive functioning. Research on the relationship between mindfulness and flow seems to be inconclusive, with some studies finding the two constructs function in opposition while others report mindfulness may predict greater flow. Problematic gaming, defined as the experience of negative life consequences resulting from video game use, has been positively associated with flow. Although the relationship between problematic gaming and mindfulness remains unclear, research in a related area suggests mindfulness is negatively associated with problematic gambling. Thus, the present study sought to examine (i) the association between problematic gaming, dispositional mindfulness, aspects of flow (sense of control and absorption), hours spent gaming per week and gender, and (ii) whether mindfulness would predict problematic gaming. A sample of 1015 adults who frequently game (29.7% female; *M*age = 23.29 years, *SD* = 4.58 years) completed an online survey. Problematic gaming was positively associated with flow, hours spent gaming, being male, while negatively associated with mindfulness. Mindfulness was negatively associated with the absorption aspect of flow but not significantly related to the sense of control aspect. Results from a hierarchical multiple regression revealed lower dispositional mindfulness significantly predicted greater problematic gaming when controlling for flow and hours spent gaming. These results demonstrate the importance of mindfulness and flow on reports of problematic gaming. Implications are discussed in light of research suggesting mindfulness may be useful in the prevention of problematic behaviours.

The Role of Mindfulness and Flow in Predicting Problematic Video Game Use

Mindfulness and flow have both been identified as having a positive impact on well-being (e.g., Csikszentmihalyi & Mei-Ha Wong, 2014; Hanley, Warner, & Garland, 2015); however, these constructs seem to diverge when it comes to their influence on problematic behaviours. For instance, experiencing greater levels of flow, especially in terms of immersion, while gaming has been found to predict greater problematic gaming (Hull, Williams, & Griffiths, 2013). Meanwhile, greater mindfulness has been associated with more gaming engagement without taking into account problematic gaming specifically (Gackenbach & Brown, 2011); however, research in areas related to problematic gaming have indicated that lower mindfulness is associated with more problematic engagement in either gambling or Internet use (Gámez-Guadix & Calvete, 2016; Lakey, Campbell, Brown, & Goodie, 2007). Additionally, although research on both mindfulness and flow has individually been focused on problematic behaviours, the simultaneous study of mindfulness and flow with respect to problematic behaviours is less common. Given the growing popularity of video gaming in general and the important adverse consequences that problematic gaming may have in individuals' lives, it is important to investigate factors that may potentially contribute to or help prevent problematic engagement in gaming. Thus, the present study seeks to explore the simultaneous contribution of dispositional mindfulness and flow to symptoms of problematic gaming.

Video games are a very popular recreational activity. According to the Entertainment Software Association of Canada (ESAC; 2015), 54% of Canadians play video games and similar prevalence rates have been found in other countries including the Netherlands (Lemmens, Valkenburg, & Gentile, 2015), and Taiwan (Ko, Yen, Chen, Chen, and Yen, 2005). Over the past few decades, a focus of research has been to explore the factors influencing and

consequences resulting from playing video games. Although researchers have identified cognitive, emotional, social, and motivational benefits from playing video games (see review by Granic, Lobel, & Engels, 2014), more recently research has focused on problematic patterns of video game use, which may result in a variety of negative psychosocial consequences including the disruption of an individual's ability to fulfill social and personal responsibilities (King, Haagsma, Delfabbro, Gradisar, & Griffiths, 2013).

Problematic gaming has been found to affect 3 to 9.6% of individuals (Ferguson, Coulson, & Barnett, 2011) and seems to be more prevalent amongst males (e.g., Lemmens et al., 2015); however, the gender distribution of video game players is close to being equal (ESAC, 2015). Although research on problematic gaming has been conducted for several decades, official diagnostic criteria were only recently added to the fifth edition of the *Diagnostic and Statistical Manual for Mental Disorders* (DSM-5; American Psychiatric Association, 2013). Prior to that, criteria for problematic gaming was often adapted from the DSM criteria for pathological gambling, which varied across screening measures (e.g., Young, 1998, Lemmens, Valkenburg, & Peter, 2009). According to the DSM-5, there are now nine diagnostic criteria for problematic video game use, also known as Internet gaming disorder: (1) pre-occupation with gaming, (2) experiencing withdrawal symptoms when unable to play video games, (3) needing to spend more time playing video games in order to feel similar levels of excitement, (4) attempting to reduce or reduce stop the quantity of video game use, (5) loss of interest in other hobbies or activities (i.e., meeting with friends), (6) continuation of gaming despite being aware of significant and persistent negative consequences in other domains of life (i.e., neglecting responsibilities), (7) being late to school or work, losing sleep, (8) engaging in deception to dissimulate the extent to which one engages in video game use, and, finally, (9) using video games as a means of escaping

from negative moods such as helplessness, guilt, anxiety or depression. It is important to note that problematic gaming is not to be confused with either a high frequency of play or a high enthusiasm towards gaming (Charlton & Danforth, 2010).

Increasingly, as noted earlier, it is becoming apparent that individual factors such as dispositional mindfulness can have an influence on overall reports of well-being and adaptive functioning (e.g., Brown et al., 2007). Mindfulness has been defined as the act of paying attention to the present moment, purposefully and with non-judgmental acceptance of thoughts and feelings (Kabat-Zinn, 1994). It can be assessed as state mindfulness, conceptualised as a temporary experience of mindfulness, or dispositional mindfulness, defined as individuals' general tendency to experience mindfulness (e.g., Brown & Ryan, 2003). Although it has been suggested that males may experience lower levels of dispositional mindfulness (Marks, Sobanski, & Hine, 2010), the research on gender differences in mindfulness is still inconclusive (e.g., Weinstein, Brown, & Ryan, 2009). However, research suggests that individuals with greater levels of dispositional mindfulness report less emotional reactivity, rumination and catastrophizing, as well as an increased ability to self-regulate behavioural and physiological responses to stressful situations (Feldman, Lavallee, Gildawie, & Greeson, 2016; Kadziolka, Di Pierdomenico, & Miller, 2016; Keng, Smoski, & Robins, 2011). Additionally, it has been shown that mindfulness training, which largely seeks to elicit more frequent state mindfulness, can, in turn, significantly increase dispositional mindfulness and thus result in associated benefits (Shapiro, Brown, Thoresen, & Plante, 2011).

Given the benefits associated with dispositional mindfulness, it has been identified as being potentially protective against problematic engagement in certain behaviours. For instance, dispositional mindfulness has been associated with less severe gambling outcomes in a sample of

university students who gamble weekly (Lakey et al., 2007). Similarly, deLisle, Dowling, and Allen (2014) investigated the role of mindfulness in problem gambling in a sample of treatment-seeking problematic gamblers and found a negative association between dispositional mindfulness and problematic gambling severity as well as overall lower reports of mindfulness compared to a normative sample. In a related area of research examining factors associated with problematic Internet use, Gámez-Guadix and Calvete (2016) found that dispositional mindfulness was associated with a better capacity for self-regulation of Internet use.

Despite evidence suggesting that mindfulness could serve as a protective factor against other forms of problematic behaviours, there has not yet been a direct examination of the role of mindfulness in problematic gaming. However, mindfulness-based therapy has been proposed as a possible treatment for the problematic use of gaming (Dong & Potenza, 2014). Additionally, some studies have explored the association between dispositional mindfulness and video gaming. Recent research by Gackenbach and Brown (2011) revealed that video game players with high gaming engagement reported greater dispositional mindfulness than those with low engagement; however, since mindfulness is negatively associated with other forms of problematic behavioural engagement, it may also be negatively associated with problematic gaming.

One of the ways dispositional mindfulness has been linked to video gaming in previous research has been in comparison to flow, which is a form of optimal experience often explored within the context of activity engagement. Flow is a feeling of deep enjoyment and involvement in an activity that is intrinsically motivating, and this state of consciousness can be experienced when a number of conditions are met including absorption in the activity, a sense of control in the activity, time transformation (i.e., loss of sense of time), loss of self-consciousness, and optimal challenge (e.g., Csikszentmihalyi, 2008).

There has been substantive research focusing on the experience of flow while playing video games, both in terms of normative and problematic engagement. Video games have been suggested as being particularly conducive for experiencing flow for a variety of reasons including the fact that they have specific rules and goals, are immersive, and are often designed in such a way as to offer degrees of challenge that scale to player's abilities, thus offering an optimal level of challenge (Sherry, 2004; Sweetser & Wyeth, 2005). In fact, experiencing flow while gaming has been identified as a potential risk factor for problematic video game use. A study by Chou and Ting (2003) concluded that the experience of flow states during gaming engagement was predictive of addictive tendencies towards gaming and accounted for most of the relationship between repetition of gaming (i.e., frequency of gaming) and problematic gaming. Furthermore, Hull and colleagues (2013) demonstrated that it was specifically the loss of sense of time that occurs while experiencing flow during gaming engagement that was predictive of problematic gaming. Finally, although the findings on gender differences on the experience of flow while gaming are still unclear, research in a related area suggests that males report higher experiences of flow during Internet use (Stavropoulos, Alexandraki, & Motti-Stefanidi, 2013). As such, gender difference in reports of flow while gaming may also be observed.

Given that dispositional mindfulness and flow are both positive states of mind that are associated with adaptive functioning and well-being, it has been suggested that mindfulness and flow may be related constructs (Jackson, 2016). However, there has been limited research examining the relation between mindfulness and flow. Moreover, the available findings are inconclusive. For instance, Moore (2013) proposed that self-regulation of attention is an aspect of both mindfulness and flow, and found that college students' reports of dispositional

mindfulness predicted their flow disposition. Additionally, in a study examining mindfulness and the experience of flow for athletes, Kee and Wang (2008) demonstrated that athletes with high levels of dispositional mindfulness also reported a high propensity for experiencing flow. Similarly, Aherne, Moran and Lonsdale (2011) revealed that a one-week mindfulness training intervention increased flow scores for college athletes following a training session. When looking at video game engagement specifically, Kreutzer and Bowers (2016) found a positive association between individuals' dispositional mindfulness and reports of flow experience immediately following a 30-minute session playing three serious educational mini-games. Therefore, this stream of research indicates a positive association between reports of mindfulness and experiences of flow.

However, results from Sheldon, Prentice and Halusic (2015) conflict with the positive association between mindfulness and flow observed in previous studies. They investigated college students' daily experiences of mindfulness and flow across three different contexts: while working on goals (Study 1), engaged in various activities over the course of a day (Study 2), and immediately following a brief gaming session after a mindfulness induction (Study 3). Importantly, they conceptualized flow as consisting of two broad factors: the degree of absorption in an activity, and the sense of control being exerted through the activity. Overall, they found that mindfulness was negatively associated with the absorption aspect of flow, but positively or non-associated with the sense of control aspect of flow. As a result, the actual association between mindfulness and flow may be either positive or negative, indicating a need for further research in this area.

In summary, video game users' dispositional mindfulness and experiences of flow while gaming are believed to each play a meaningful role in explaining the presence of problematic gaming. Presently, research has only explored the positive association between flow while gaming and problematic gaming. Moreover, although research shows highly engaged gamers report higher levels of dispositional mindfulness than those with low engagement, it is still not clear what relationship exists between mindfulness and problematic gaming. Given that mindfulness is generally associated with higher levels of well-being, while problematic gaming tends to be negatively associated with well-being, it is likely that individuals reporting problematic levels of gaming would also report lower mindfulness despite their high engagement in gaming. Additionally, research on the relation between mindfulness and flow seems to be inconclusive and, although the influence of flow on problematic gaming has been established, the relation of dispositional mindfulness with problematic gaming symptoms has yet to be investigated. However, since losing track of time while gaming is an aspect of flow predictive of problematic gaming (Hull et al., 2013), individuals experiencing higher levels of mindfulness may be less likely to develop problematic gaming symptoms.

Therefore, the first objective of the current study was to explore the relations between gender, hours spent gaming per week, dispositional mindfulness, aspects of flow (absorption and sense of control) experienced while playing their favorite game, and symptoms of problematic gaming in a sample of participants who regularly play video games during their free time. Based on previous literature (e.g., Hull et al., 2013; Lemmens et al., 2015), it was hypothesized that symptoms of problematic gaming would be positively associated with aspects of flow, hours spent gaming, and being male, while being negatively associated with dispositional mindfulness (H1). In turn, based on the findings by Sheldon et al. (2015), dispositional mindfulness was

hypothesized to be negatively associated with absorption (H2a); however, no significant association with sense of control (H2b) while gaming was expected. In light of the fact that the relation between flow and problematic gaming has already been established, the second objective was to investigate whether dispositional mindfulness adds explanatory value in predicting symptoms of problematic gaming while controlling for gender, aspects of flow while gaming, and hours spent gaming per week. It was hypothesized that greater dispositional mindfulness would significantly predict fewer reports of symptoms of problematic gaming when controlling for all other variables (H3).

Method

Participants

A total of 1959 responses were collected; however, individuals with duplicate IP addresses (n = 96) or who reported being younger than 18 years of age (n = 43) were excluded from the current study. Responses were also excluded when participants did not report their age (n = 219) or gender (n = 8), failed to complete at least half of the survey (n = 346), or wrongfully answered an attention item (n = 8). Of the remaining 1239 participants (32.3% female; *M*age = 23.69 years, *SD* = 5.85 years), 224 individuals were excluded following a missing values analysis; a detailed description of the exclusion criteria is provided in the Results section. Therefore, the final sample consisted of 1015 adult participants (29.7% female; *M*age = 23.29 years, *SD* = 4.58 years) who reported playing video games during their free time.

The number of hours participants reported playing video games per week ranged from 0.5 hours to 63.5 hours (M = 18.13, SD = 13.85). Most participants reported residing in the USA (44.8%) and Canada (36.1%), with a minority reporting European (11.3%) or Asian (3.2%) countries of residence.

Measures

Problematic video game use. The short version of the *Internet Gaming Disorder* (IGD) scale (Lemmens et al., 2015) was used to assess symptoms of problematic gaming. The short IGD scale consists of 9 items each evaluating the frequency of occurrence of one of the DSM-5 diagnostic criteria for Internet gaming disorder over the past year. The items are rated on a 6-point Likert scale ranging from *almost always* (1) to *almost never* (6). Sample items include: "During the last year, how often have there been periods when all you could think of was the moment that you could play a game?" or "During the last year, how often have you experienced serious conflicts with family, friends or partner because of gaming?" In the present study, the short IGD scale had good reliability, with a Cronbach's α of .85.

Dispositional Mindfulness. The *Mindful Awareness and Attention Scales* (MAAS; Brown & Ryan, 2003) was used to assess dispositional mindfulness. This self-report questionnaire has 15 items rated on a 6-point Likert scale ranging from *almost always* (1) to *almost never* (6), with higher scores reflecting greater levels of dispositional mindfulness. The MAAS assesses a lack of mindful attention and awareness using items such as "I could be experiencing some emotion and not be conscious of it until some time later" or "I tend to walk quickly to get where I'm going without paying attention to what I experience along the way." The MAAS had excellent reliability in the present study (Cronbach's α = .90) and has been shown to have good convergent and discriminant validity in samples of university students or in the general adult population (Brown & Ryan, 2003).

Flow. The *Flow Short Scale* (FSS; Rheinberg, Vollmeyer, & Engeser, 2003; c.f., Engeser & Rheinberg, 2008) was used to assess states of flow and adapted to specifically target flow experienced while playing participants' currently preferred video games. The scale consists of 10

items, each rated on 7-point scale from *Not at All Agree* to *Very Strongly Agree.* The FSS can also be subdivided in two subscales assessing sense of control (6 items; i.e., "When I play this video game, I know what I have to do each step of the way") and absorption (4 items; i.e., "When I play this video game, my thoughts/activities run fluidly and smoothly"). In the present study, good reliability was found overall and for each subscale (Cronbach's α: Overall = .88; Control = .87; Absorption = .75).

Procedure

Following approval from the university Research Ethics Board, participants were recruited using a variety of methods including advertisements on social media websites (e.g., Reddit, Facebook), flyers throughout a university campus, and email invitations to an existing pool of undergraduate students interested in participating in research studies. Questionnaires were completed entirely online, with entry into a raffle for one of ten 50$ gift cards to Amazon as incentive. Informed consent was obtained from all participants in the first part of the survey, prior to allowing them to proceed to the sections with questionnaires.

Data Analysis

All data were checked for patterns of missingness, univariate and multivariate outliers, and for violations of assumptions prior to running the main analyses. Pearson's correlations were used to test the first objective, which was to assess the relations between gender, hours spent gaming per week, dispositional mindfulness, aspects of flow (absorption and sense of control) experienced while gaming, and symptoms of problematic gaming. A hierarchical multiple regression was then used to test the second objective, which was to investigate the role of dispositional mindfulness and aspects of flow while gaming in predicting symptoms of problematic gaming while controlling for gender, and hours spent gaming per week. However,

the predictor variables entered in the regression analysis were selected based on the significance of the correlations.

Results

Data cleaning

All data were analysed using SPSS version 23. Prior to running primary analyses, the data (N = 1239) were first screened for missing values using the Missing Values Analysis function of SPSS version 23. Less than 5% of missing values were found within each variable; therefore, the data were assumed to be missing completely at random. Subsequently, further sample restrictions were applied and individuals who reported *Never* or *Rarely* playing video games in their free time were excluded (n =116). Since imputation with Expectation Maximisation produced no differences in the results, it was decided to use listwise deletion to deal with missing values to retain a sample as representative of the population as possible. As a result, 91 participants were excluded.

Since it was also used as a sample screening variable, age was examined for outliers. Cases three standard deviations above or below the mean were identified as potential outliers; therefore, all participants who were 40 and over (n = 16) were excluded from analyses. A total of 26 potential univariate outliers were then identified within the rest of the variables and transformed to a score with a one-unit difference from the next most extreme score within each variable to maintain rank order.

All assumptions for hierarchical multiple regression were met satisfactorily. The data were then screened for multivariate outliers and one potential outlier was found and removed. Therefore, the final sample used for all primary analyses consisted of 1015 adult participants (29.7% female; Mage = 23.29 years, SD = 4.58 years).

Main analyses

The first objective of the current study was to explore the relations between gender, hours spent gaming per week, dispositional mindfulness, aspects of flow (absorption and sense of control) experienced while gaming, and symptoms of problematic gaming. Table 1 presents means and standard deviations across all of the variables while Table 2 presents results for Pearson's correlations. Given that 15 comparisons were made, a Bonferroni-corrected alpha was used to test for significance (i.e., .05/15 = .003). As hypothesized, problematic gaming was significantly positively associated with hours spent gaming, aspects of flow experienced while gaming, and negatively associated with dispositional mindfulness; however, contrary to H1, it was not significantly correlated with gender. Additionally, as hypothesized, dispositional mindfulness was significantly negatively associated with the absorption aspect of flow (H2a) but no significant relation was found with the sense of control aspect (H2b). Interestingly, there was a significant correlation between gender and mindfulness, $r_{pb} = -.14$, $p < .001$, with females reporting lower mindfulness than males, $M = 3.96$ ($SD = 0.94$) vs. $M = 4.23$ ($SD = 0.89$). Similarly, gender was significantly correlated with the sense of control aspect of flow, $r_{pb} = -.15$, $p < .001$, with females reporting lower sense of control while gaming than males, $M = 4.28$ ($SD = 1.29$) vs. $M = 4.70$ ($SD = 1.26$).

A hierarchical multiple regression was then used to investigate the role of dispositional mindfulness and aspects of flow while gaming in predicting symptoms of problematic gaming while controlling for gender, and hours spent gaming per week. Since gender was not significantly correlated with problematic gaming, the third hypothesis was modified and gender was not included as a predictor in the analysis. The number of hours spent gaming per week was

entered as Block 1 of the regression, aspects of flow while gaming were entered in Block 2, and dispositional mindfulness was subsequently added in Block 3.

Results revealed that the number of hours spent gaming per week explained 7.1% of the variance in problematic gaming symptoms, $F(1, 1013) = 77.15$, $p < .001$. Adding the aspects of flow to the model in Block 2 explained an additional 10% of the variance, $F(2, 1011) = 61.06$, $p < .001$. Finally, dispositional mindfulness explained an additional 10.9% of the variance in problematic gaming symptoms, $F(1, 1010) = 153.35$, $p < .001$, for a total of 28% of the variance explained, $F(4, 1010) = 98.29$, $p < .001$.

As hypothesised (H3), greater dispositional mindfulness significantly predicted lower reports of problematic gaming symptoms when controlling for the number of hours spent gaming per week and both aspects of flow. Table 3 presents the raw and standardised coefficients of the predictors as well as results of significance tests. Although both the number of hours spent gaming per week and the absorption aspect of flow were consistently significant predictors of problematic gaming symptoms, the sense of control aspect of flow was not a significant predictor either in Block 2 or 3. Finally, inspection of the standardised coefficients suggests that symptoms of problematic gaming were best predicted by lower dispositional mindfulness, followed by greater reports of the absorption aspect of flow and a higher number of hours spent gaming per week.

Discussion

The overall purpose of the current study was to investigate how dispositional mindfulness and aspects of flow (sense of control and sense of absorption) experienced while gaming influence and contribute to problematic gaming symptoms. Specifically, there were two objectives: a) to explore the relations between gender, hours spent gaming per week,

dispositional mindfulness, aspects of flow (absorption and sense of control) experienced while gaming, and symptoms of problematic gaming, and b) to investigate the role of dispositional mindfulness in predicting symptoms of problematic gaming while controlling for aspects of flow while gaming, gender, and hours spent gaming per week.

As hypothesised (H1) and consistent with previous literature (e.g., Lemmens et al., 2015; Padilla-Walker, Nelson, Carroll, & Jensen, 2010; Hull et al., 2013), individuals who reported greater levels of problematic gaming symptoms were also more likely to play video games for a greater number of hours per week and to report experiencing more flow while playing video games than individuals reporting lower levels of problematic gaming symptoms. However, although males were more likely to report a greater number of hours spent gaming per week, reports of problematic gaming symptoms were not associated with gender. Although other studies have found that males tend to report higher levels of problematic gaming and video game use (e.g., Lemmens, Valkenburg, & Peter, 2011), this discrepancy could be due to methodological considerations. Previous studies have used mainly either large community samples or convenience samples (i.e., university students), whereas the current study recruited participants online who likely already had a personal interest in gaming, but further restricted the sample to individuals who actively play video games during their free time. Additionally, a study by Williams, Consalvo, Caplan and Yee (2009) demonstrated that not only do females tend to underreport the number of hours they spend gaming by over three hours, there were also proportionally more high-intensity female gamers than males when looking at average number of hours played per week. Thus, the lack of gender differences in the current study could be due to the fact that, unlike previous community samples, this sample only included women who play video games frequently in their free time.

The results also revealed that females reported experiencing significantly lower levels of mindfulness and of the sense of control aspect of flow than males. However, since the correlations are weak at best, the significance is likely due to the large sample size used in this study; therefore, these results should be interpreted with caution. Mixed findings regarding gender differences in terms of dispositional mindfulness have been reported in previous studies, with some reporting higher mindfulness for males (e.g., Marks, et al., 2010) or no gender differences (e.g., Palmer & Rodger, 2009). The gender difference found in the current study may be specific to a sample of gamers. For instance, previous research has found that female gamers report worse mental health, specifically greater levels of depression, than male gamers and the general female population (Williams, Yee, & Caplan, 2008). This points to the need for further research to both better understand female gamers specifically as well as address possible gender differences within the mindfulness literature more broadly. Furthermore, the lower sense of control aspect of flow reported by females may be attributable to the gender stereotypes inherent within the gamer population. Despite evidence to the contrary, gaming is perceived as being primarily a masculine activity (e.g., Kowert, Griffiths, & Oldmeadow, 2012; Shaw, 2011; Williams et al., 2008); therefore, female gamers may feel pressure to perform as well as their male counterparts and this may influence their perception of exercising control while gaming.

Moreover, as hypothesised, dispositional mindfulness was negatively associated with the sense of absorption aspect of flow while gaming; however, no association was found for the sense of control aspect of flow. These findings are consistent with research by Sheldon and colleagues (2015) and the current study builds upon previous research suggesting that mindfulness seems to be negatively related to the absorption factor of flow. A possible explanation of the discrepancy with other research, which has found a positive relation between

mindfulness and flow (Aherne et al., 2011; Kee & Wang, 2008; Kreutzer & Bowers, 2016; Moore, 2013), is the specific focus in the present study on two factors of flow (absorption and sense of control). These findings highlight the unique negative association between mindfulness and the absorption aspect of flow as well as the need to better standardize the field's conceptualization of flow more broadly. Importantly, absorption is clearly a unique and critical element of flow, and that while future research should seek to more uniformly conceptualize this construct, absorption should remain a key aspect of the construct.

Furthermore, Sheldon and colleagues (2015) proposed that mindfulness and flow are conceptually dissimilar given the former focuses on maintaining awareness of the present moment while the latter consists of losing one's self-awareness while engaging in an activity. However, Csikszentmihalyi (2008; 2014) has suggested that the loss of self-awareness in flow is better defined as a loss of preoccupation with the self which does not mean that one is unaware of the body or the self while engaging in a flow-inducing activity, rather, it suggests an ability to see the self as fully integrated with one's actions. Similarly, scholars suggest the awareness aspect of mindfulness should not be confused with a focus on the self as an object (Ryan & Rigby, 2015). Therefore, the association between mindfulness and flow may be more complex, especially as it pertains to other aspects of flow, and further research is needed in order to clarify whether these constructs converge, diverge, or do not relate at all.

Additionally, dispositional mindfulness was negatively associated with reports of problematic gaming symptoms. This is consistent with previous research on mindfulness and problematic engagement in other behaviours such as pathological gambling or problematic Internet use (e.g., DeLisle et al., 2014; Gámez -Guadix et al., 2016); however, it is interesting to note that Gackenbach and Brown (2011), who did not assess for levels of problematic gaming,

found that highly engaged gamers reported experiencing higher dispositional mindfulness than gamers who were less engaged. This discrepancy supports the distinction between high engagement and problematic (i.e., addictive) gaming proposed by Charlton and Danforth (2002; 2007), whereby there may be overlap between highly engaged and problematic gamers (i.e., high frequency of gaming, experience of euphoria while gaming) but the key distinction is in the experience of adverse consequences associated with problematic gaming. This distinction is also important with regard to the finding in the current study that greater reports of the sense of absorption aspect of flow during video game engagement significantly predicted greater problematic gaming symptoms; thus, repeated engagement in such a flow-inducing activity may become problematic once other domains of an individual's life are negatively impacted.

Most interestingly, the current study set out to highlight the unique relation between dispositional mindfulness, aspects of flow and problematic gaming and results indicated that dispositional mindfulness significantly predicted less problematic gaming symptoms even when controlling for the number of hours spent gaming per week and the experience of flow while gaming. Additionally, although the number of hours spent gaming per week and the sense of absorption aspect of flow were both significant predictors of problematic gaming, dispositional mindfulness was still the greatest contributor and nearly doubled the explanatory value. These findings indicate that individuals reporting high levels of dispositional mindfulness would be less likely to report experiencing high levels of problematic gaming symptoms. This is consistent with research on the use of mindfulness in treating addictions and behaviours that could be classified as addictive or problematic, which suggests one of the key benefits of mindfulness in treatment is its increase of metacognitive awareness. This, in turn, facilitates recognition of

situations that threaten relapse as well as problematic cognitions or environmental cues that trigger the behaviours (Bowen, Vieten, Witkiewitz, & Carroll, 2015).

Furthermore, Hull and colleagues (2013) proposed that since losing track of time spent playing was the only aspect of flow to significantly predict problematic gaming in their study, helping individuals maintain awareness of the duration of their gaming sessions could be beneficial in preventing problematic gaming. Similarly, in the present study, dispositional mindfulness was significantly negatively associated with experiencing a sense of absorption in the virtual world while gaming. This would suggest that mindfulness training, in which individuals are taught to maintain a nonjudgmental awareness of their self in the present moment, could be particularly useful in helping individuals monitor their gaming patterns to avoid experiencing adverse consequences in other areas of their life.

One of the main limitations of the current study was the unidimensional assessment of dispositional mindfulness. The MAAS specifically assesses a lack of mindfulness, or the presence of automaticity, experienced in general (Brown & Ryan, 2003). However, other models of mindfulness have proposed, for instance, that mindfulness can be conceptualised as consisting of five interacting facets: acting with awareness, non-judgment of inner thoughts and feelings, non-reactivity to inner experience, describing experiences, and observing (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). Similarly, the model of flow as proposed by Csikszentmihalyi (e.g., 2008) consists of 9 aspects that make up the flow experience. Therefore, a potential direction for future research could be to tease apart which aspects of dispositional mindfulness and flow specifically contribute to problematic gaming. Additionally, the current study consisted of retrospective self-report measures; however, future research would benefit from using an experimental design or an experience sampling method in order to investigate the

experience of flow and mindfulness immediately after a gaming session. Finally, the sample selection bias limits the generalisation of these results to adults who report frequently playing video games in their spare time.

Despite these limitations, the present study is the first to simultaneously examine mindfulness and flow as these constructs pertain to problematic gaming. These findings reveal that dispositional mindfulness is an important contributor in predicting problematic gaming even when taking into account the number of hours spent gaming per week and the experience of flow while gaming. Since mindfulness is a dynamic cognitive skill that can be improved through training and practice, this supports the clinical importance of using mindfulness training to aid in preventing the development of problematic gaming.

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Table 1.
Means and Standard Deviations for Males (n = 714) and Females (n = 301) Across all Predictor and Outcome Variables

	Males		Females	
	M	***SD***	***M***	***SD***
Hours spent gaming per week	20.69	14.08	11.93	11.11
Flow – sense of control	4.70	1.26	4.28	1.29
Flow – sense of absorption	4.52	1.29	4.32	1.32
Dispositional mindfulness	4.23	0.89	3.96	.94
Problematic Gaming	2.18	0.82	2.07	.81

Table 2.
Correlations Between Study Variables (N = 1015)

	1	**2**	**3**	**4**	**5**	**6**
1. Gender	1					
2. Weekly hours spent gaming	-.29*	1				
3. Flow – sense of control	-.15*	.25*	1			
4. Flow – sense of absorption	-.07	.23*	.63*	1		
5. Dispositional mindfulness	-.14*	.003	-.04	-.22*	1	
6. Problematic Gaming	-.06	.27*	.22*	.37*	-.40*	1

Notes. Given the multiple comparisons being made, the Bonferroni correction was used to obtain an alpha level of .003 to test for significance (.05 / 15).
* $p < .003$

Table 3.
Summary of Hierarchical Multiple Regression Analysis (N = 1015)

	B	***SE B***	β	**95% Confidence Intervals**	
				Lower bound	**Upper bound**
Step 1					
Constant	1.86	0.04		1.78	1.94
Hours spent gaming per week	0.016	0.00	.27*	0.01	0.02
Step 2					
Constant	1.10	0.09		0.92	1.29
Hours spent gaming per week	0.01	0.002	.20*	0.01	0.02
Flow – sense of control	-0.04	0.02	-.06	-0.08	0.01
Flow – sense of absorption	0.22	0.02	.36*	0.18	0.27
Step 3					
Constant	2.52	0.14		2.23	2.80
Hours spent gaming per week	0.01	0.002	.21*	0.01	0.02
Flow – sense of control	-0.001	0.02	-.001	-0.04	0.04
Flow – sense of absorption	0.15	0.02	.24*	0.11	0.20
Dispositional mindfulness	-0.31	0.03	-.34*	-0.35	-0.26

* $p < .001$

Connecting text

As discussed in Chapter 2, research in related areas (i.e., pathological gambling, problematic gaming and flow, mindfulness and well-being) suggests that dispositional mindfulness may influence problematic gaming; however, there is a lack of research investigating this relation. This line of inquiry requires more attention as it may have important implications in terms of prevention and intervention for individuals who engage in problematic gaming.

In order to build on the existing literature, the first study in this thesis sought to investigate the relation between dispositional mindfulness and problematic gaming especially in terms of whether dispositional mindfulness could be distinct from an experience of flow while gaming. Results from Study 1 provided preliminary evidence that the dispositional mindfulness of individuals who frequently play video games could significantly influence their problematic gaming symptoms; specifically, high levels of dispositional mindfulness significantly predicted lower reports of problematic gaming. Furthermore, the findings suggested that dispositional mindfulness had a unique contribution to problematic gaming even when taking into account the influence of the experience of flow while gaming as well as the number of hours spent gaming per week. Therefore, this study provided preliminary evidence that dispositional mindfulness may be useful in helping prevent problematic gaming.

However, a main factor known to be related to problematic gaming beyond the experience of playing is well-being in general. Therefore, the next step in this thesis was both (a) to replicate the inverse association between mindfulness and problematic gaming found in Study 1 and (b) to investigate whether mindfulness maintained its importance with regards to problematic gaming when taking into account factors external to the experience of playing –

namely individuals' reports of subjective well-being. The following study seeks to deepen our understanding by first examining the relations between dispositional mindfulness, problematic gaming and three aspects of subjective well-being (life satisfaction, positive and negative affect). A second objective is then to assess whether a lack of dispositional mindfulness may help explain the negative outcomes on subjective well-being that occur due to problematic gaming.

Chapter 4: Study 2

Problematic gaming and subjective well-being: How does mindfulness play a role?

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Abstract

Problematic gaming, a pattern of video game use that disrupts an individual's ability to fulfill social and personal responsibilities, affects 3 to 9.6% of individuals and has been associated with decreased subjective well-being (i.e., life satisfaction, positive and negative affect). Mindfulness research suggests an increased tendency towards experiencing mindfulness (i.e., focused awareness on the present moment, with acceptance) is associated with greater subjective well-being. Although the association between video gaming and mindfulness is beginning to be better understood, the role of mindfulness as a potential protective factor for problematic gaming is still unclear. Therefore, the present study sought to assess the influence of mindfulness on the relation between problematic gaming and wellbeing. The sample consisted of 514 frequent gamers (37.9% female; *M* age = 22.56 years, *SD* = 4.3) who completed an online survey. Results from structural equation modeling revealed that mindfulness partially mediated the relation between problematic gaming and both life satisfaction (β = -.05, *SE* = .02, p = .014) and negative affect (β = .14, *SE* = .03, $p < .001$) while fully mediating the relation between problematic gaming and positive affect, β = -.09, *SE* = .03, $p < .001$. Recent research on mindfulness has explored ways in which mindfulness training can be used to enhance positive psychological functioning and act as a protective factor against mental health problems. The present results build on this growing body of knowledge and suggest mindfulness may be clinically useful in the prevention of and intervention in problematic gaming.

Problematic gaming and subjective well-being: How does mindfulness play a role?

Playing video games is a leisure activity that can benefit well-being and mental health in many ways, including reduced emotional disturbance, better emotion regulation, stress reduction, and greater life satisfaction (Granic, Lobel, & Engels, 2014). It has mass appeal because of the wide variety of genres (e.g., role playing, action adventure, puzzle games), levels of complexity (from simple puzzle games to open-world story-driven role playing games), and type of play (e.g., single-player, multiplayer online, multiplayer offline) that video games offer. Given this range of diversity, it is not surprising that over half of Canadians report playing video games (Entertainment Software Association [ESA], 2015; Entertainment Software Association of Canada [ESAC], 2015). Also, contrary to popular belief, the majority of video game players are adults and the gender distribution of video game players is approximately equal between males and females (e.g., Elliott, Gollub, Ream, & Dunlap, 2012; ESA, 2015; ESAC, 2015; Williams, Yee, & Caplan, 2008).

However, when video game use becomes problematic, it can have negative impacts on individuals' social, academic/occupational, or psychological functioning (e.g., Griffiths et al., 2016; King, Haagsma, Delfabbro, Gradisar, & Griffiths, 2013) as well as their subjective well-being (e.g., Mentzoni et al., 2011). Moreover, research has shown that mindfulness, which is purposeful and nonjudgmental present moment awareness, can be protective against problematic engagement in behaviours related to gaming (e.g., pathological gambling, problematic Internet use). Thus, the present study seeks to further explore the relation between problematic gaming and subjective wellbeing while also investigating whether mindfulness is a mechanism through which problematic gaming may have an effect on subjective wellbeing.

A meta-analysis by Ferguson, Coulson and Barnett (2011) of 33 studies concluded that problematic gaming affects 3 to 9% of individuals in the general population. Moreover, although the gender distribution of individuals who play video games is nearly equal, gender differences in terms of problematic gaming are still unclear, with most studies finding that males report higher problematic gaming (e.g., Lemmens et al., 2015; Mentzoni et al., 2011) while others report no gender differences when controlling for game genre (Elliott et al., 2012).

One of the factors contributing to discrepancies of prevalence rates is the lack of a universally-accepted operational definition of what problematic gaming entails (Ferguson et al., 2011). Some of the terms used to refer to this construct reflect this, with terms such as problematic gaming, pathological gaming, Internet gaming disorder, and gaming addiction being used. Subsequently, one of the main issues with the current state of research is that, due to the lack of a uniform definition of the construct, there are several different screening measures each assessing problematic gaming in a slightly different way, thus making comparison across studies difficult.

In an attempt to uniformise a conceptual definition, the fifth edition of the *Diagnostic and Statistical Manual for Mental Disorders* (DSM-5; American Psychiatric Association, 2013) included a set of nine diagnostic criteria for Internet gaming disorder, including being pre-occupied with gaming, losing interest in other activities, and continuation of gaming despite being aware of significant and persistent negative consequences in other domains of life (i.e., neglecting work or academic responsibilities). However, these diagnostic criteria were based on those used to assess gambling disorder or substance use addiction and have been criticised for not accurately reflecting problematic gaming as a separate construct (e.g., Billieux et al., 2015; Kardefelt-Winther, 2015; Griffiths et al., 2016).

One of the key features of problematic gaming that seems to be uniformly recognised is the negative consequences and interference it may have in other domains of an individual's life or on their well-being (e.g., Griffiths et al., 2016). Furthermore, research has demonstrated that problematic gaming should not be confounded with a high number of hours spent on gaming or a high level of enthusiasm towards gaming; rather, it is best understood as gaming that is interfering with the individual's life (e.g., Charlton & Danforth, 2010).

Of specific interest to the present paper is the association between problematic gaming and subjective well-being. Well-being is a broad construct with a wide scope of interpretation; however, it can be examined through specific theoretical models. For instance, subjective well-being, which is individuals' subjective evaluation of their happiness and quality of life, has been conceptualised as the experience of high life satisfaction, frequent positive affect, and infrequent negative affect (Diener, 2000). Reports of subjective well-being tend to fluctuate around a set-point for each individual, which in turn can be affected by long-term life circumstances as adaptation occurs (Diener, 2000). Additionally, research has shown that infrequent experience of positive affect and frequent experience of negative affect have differential convergent validity; for instance, low frequency of positive affect is associated with symptoms of depression, whereas high frequency of negative affect is associated with both anxiety and depression and can therefore be considered a broader indicator of psychiatric disorders (Watson & Clark, 1988).

As previously mentioned, non-problematic gaming has been associated with a variety of positive outcomes including forming new friendships, obtaining emotional support online, enhancing cognitive functions, and increasing positive affect and life satisfaction (see review by Jones, Scholes, Johnson, Katsikitis, & Carras, 2014). Additionally, a 2-year longitudinal study by Kowert, Vogelgesang, Festl and Quandt (2015) of over 4500 video game players in Germany

found that non-problematic gaming for both adolescents and adults was not a risk factor for low self-esteem, low sociability, or increased loneliness.

However, when gaming becomes problematic, one of the key characteristics is the negative impact on an individual's life. In support of this, several studies have found problematic gamers report significantly lower well-being across different aspects including the experience of higher depression and anxiety, and lower life satisfaction (Kirby, Jones, & Copello, 2014; Hagström & Kaldo, 2014; Mentzoni et al., 2011; Scott & Porter-Armstrong, 2012; van Rooij, Schoenmakers, Vermulst, van den Eijnden, & van de Mheen, 2010; Wartberg, Kriston, Kammerl, Petersen, & Thomasius, 2015). For example, Kirby and colleagues (2014) conducted an online survey of adult gamers and demonstrated that, although initially greater time spent gaming predicted lower psychological well-being, problematic gaming fully mediated this relation such that greater problematic gaming predicted lower well-being, thus indicating that simply playing more is not directly contributing to lower well-being.

It has also been proposed that lower psychosocial well-being may in fact be a cause of problematic gaming. For instance, a study by Lemmens, Valkenburg and Peter (2011) found that some aspects of lower psychosocial well-being such as lower social competence and self-esteem predicted increased problematic gaming over a 6-month period, while increased loneliness was found to both predict and be predicted by problematic gaming. Similarly, a cross-sectional study by Hull, Williams and Griffiths (2013) revealed that experiencing low general happiness was associated with problematic gaming.

However, this may be specific to certain aspects of well-being. Results from a longitudinal study by Scharkow, Festl, and Quandt (2014) revealed that, across groups of adolescents, young adults, and adults above 40 years of age, problematic gaming scores

predicted lower life satisfaction over a 2-year period only for adults over 40. Additionally, they used cross-lagged structural equation modeling to investigate a reverse model whereby life satisfaction would predict engagement in problematic gaming and failed to find significant associations over time across any of the age groups.

Given the mixed findings in previous research, the relation between problematic gaming and well-being seems to be complex and potentially recursive, with both problematic gaming and well-being negatively influencing one another. In a related area, such a recursive relationship was investigated between problematic Internet use and well-being. Findings indicated that although greater problematic Internet use predicted lower happiness and greater depression, stress, and loneliness one year later, only happiness in turn predicted problematic Internet use (Muusses, Finkenauer, Kerkhof, & Billedo, 2014).

However, one of the recently proposed models of problematic gaming suggests that it is a compensatory behaviour used to cope with problems, worries, or emotions (Kardefelt-Winther, 2014). In support of this, a study investigating gaming motivations revealed that problematic gaming was most strongly predicted by negative escapism, or the desire to avoid everyday problems, worries, and situations (Hagstöm & Kaldo, 2014). Thus, the detrimental impact of problematic gaming on other domains of life such as work, school, or relationships as well as on well-being may fuel negative escapism and in turn lead to more problematic gaming.

It would therefore be important to identify factors, such as mindfulness, that may help disrupt this cycle. Increasingly, research is showing that well-being can be influenced by individual factors such as dispositional mindfulness (e.g., Brown, Ryan, & Creswell, 2007, 2015; Soysa & Wilcomb, 2015), which is a quality of consciousness defined as purposeful awareness of the present moment experience, with non-judgmental acceptance of thoughts, feelings, and

sensations (e.g., Kabat-Zinn, 1994, 2013). Mindfulness can be assessed as either a state, which reflects moment-by-moment experience of mindfulness, or a dispositional trait, which reflects individuals' tendency to be mindful in general (e.g., Brown & Ryan, 2003). Research suggests greater dispositional mindfulness is associated with a more flexible and adaptive self-regulation style, reduced anxiety and depression, as well as greater subjective well-being (Brown & Ryan, 2007; Cash & Whittingham, 2010; Friese, & Hofmann, 2016; Keng, Smoski, & Robins, 2011; Schutte & Malouff, 2011). Dispositional mindfulness has also been shown to be modifiable through mindfulness-based interventions (Khoury et al., 2013; Shapiro, Brown, Thoresen, & Plante, 2011), which have increasingly been used not only to promote greater well-being but also to help individuals deal with substance abuse as well as problematic engagement in behaviours.

In a study investigating the association between mindfulness and video gaming, Gackenbach and Brown (2011) demonstrated that highly engaged video game players (who report high frequency of play, duration of gaming periods, and number of games played over their lifetime as well as having started to play games at a young age) reported greater mindfulness than those with low engagement. Additionally, even though mindfulness-based therapy has been proposed as a possible treatment for problematic gaming (Dong & Potenza, 2014), there is a lack of research investigating the relation between dispositional mindfulness and problematic gaming. However, within a related area, research has demonstrated an inverse association between dispositional mindfulness and reports of problematic gambling or Internet use (Calvete et al., 2017; deLisle, Dowling, & Allen, 2012; Gámez -Guadix & Calvete, 2016; Mazzoni, Cannata, & Baiocco, 2017); thus, it is possible that mindfulness may present a similar inverse association with problematic gaming.

Furthermore, given that mindfulness has been associated with both a more flexible and adaptive self-regulation style as well as increased well-being (e.g., Brown et al., 2007; Friese & Hofmann, 2016; Soysa & Wilcomb, 2015), it is possible that the association between problematic gaming and subjective well-being is at least partially explained or mediated by individuals' reports of dispositional mindfulness.

Thus, the overall objectives of the current study were to assess the relations between problematic gaming, dispositional mindfulness, and subjective well-being (life satisfaction and frequency of positive and negative affect) as well as to evaluate the influence of mindfulness as a possible mediator between problematic gaming and subjective well-being. Specifically, it was hypothesised that higher reports of problematic gaming would predict lower dispositional mindfulness and overall subjective well-being (low life satisfaction and positive affect, high negative affect). Meanwhile, reports of higher dispositional mindfulness would predict better overall subjective well-being. Finally, it was also hypothesised that, when controlling for gender and hours spent gaming per week, dispositional mindfulness would mediate the relation between symptoms of problematic gaming and the three aspects of subjective well-being: life satisfaction, positive affect, and negative affect.

Method

Participants and procedure

A total of 1032 participants at least partially responded to the online survey. The data were initially screened to remove all participants who had failed to either complete at least half the survey (n = 228), properly answer one or both of the attention items (n = 93), or provide their age, gender or information regarding whether they game most days of the week (n = 15). Subsequently, participants who did not report frequent video game use (n = 135) or scored above

3 standard deviations over the mean age (n = 15) were excluded. Finally, 32 individuals were removed following data cleaning for either having missing values or being multivariate outliers. Therefore, the final sample size used for analyses consisted of 514 frequent gamers (37.9% female; *M* age = 22.56 years, *SD* = 4.3) who reported playing video games most days of the week and thus were classified as frequent gamers.

The average reported number of hours spent gaming per week was 14.98 (*SD* = 12.06; median = 12 hours). Most participants reported either residing in Canada (45.5%) or the United States (35%), with a minority reporting European (8.4%) or Asian (6.6%) countries of residence. Furthermore, while 75.5% reported currently being enrolled in university, 27.9% reported working up to 30 hours per week, and 22.5% reported working over 31 hours per week.

Measures

Problematic video game use. To assess levels of problematic video game use, a revised version of the *Addiction-Engagement Questionnaire* (Charlton & Danforth, 2002, 2007, 2010) was used. This revised questionnaire consists of 10 items on a 7-point Likert scale (*Completely agree* to *Completely disagree*), including items such as "I tend to want to spend increasing amounts of time playing video games" or "I continue to play games even though I am aware of negative consequences, such as not getting enough sleep, being late to school or work, spending too much money, having arguments with others, or neglecting important duties." Nine of the items correspond to the recently proposed *DSM 5* diagnostic criteria for Internet gaming disorder (see Petry et al, 2014), with a tenth item assessing the experience of euphoria during gaming. Higher scores were indicative of greater reports of PVGU symptoms. The internal consistency of this 10-item scale was found to be adequate for the present study (Cronbach's $\alpha = .77$).

Dispositional Mindfulness. The *Mindful Awareness and Attention Scales* (MAAS; Brown & Ryan, 2003), a 15-item self-report questionnaire, was used to assess dispositional mindfulness. Items are rated on a 6-point Likert scale ranging from *almost always* (1) to *almost never* (6), and include "I find it difficult to stay focused on what's happening in the present." or "I forget a person's name almost as soon as I've been told it for the first time." Higher total scores reflect greater reports of dispositional mindfulness. In the current study, the MAAS demonstrated excellent reliability with a Cronbach's alpha of .88.

Positive and negative affect. The *International Positive and Negative Affect Schedule - Short Form* (I-PANAS-SF; Thompson, 2007) was used in order to assess general affect. This scale consists of ten words (e.g., "Determined", "Inspired", "Upset", "Ashamed") with the instruction to rate how frequently each emotion is experienced using a 5-point scale ranging from *very slightly or not at all* to *extremely*. The ten words correspond to two 5-item subscales assessing positive and negative emotions, with higher scores reflecting higher frequency of experiencing each emotion. In the present study, the I-PANAS-SF had a Cronbach's alpha of .79 for negative affect and .73 for positive affect, therefore demonstrating acceptable reliability. Additionally, it has been found to have moderately good test-retest reliability after a period of 8 weeks, $r = .84$, $p < .01$ (Thompson, 2007).

Life satisfaction. *The Satisfaction With Life Scale* (SWLS; Diener, Emmons, Larsen, & Griffin, 1985) was used to measure individuals' reports of life satisfaction in general. This self-report scale consists of 5 items such as "In most ways, my life is close to my ideal" or "So far, I have gotten the important things I want in life". Each item is rated on a 7-point scale ranging from *not agree at all* to *very strongly agree*, with higher scores reflecting greater life satisfaction. The SWLS was found to have excellent reliability in the present study (Cronbach's $\alpha = .91$).

Procedure

Adult participants were recruited from a variety of sources including social media websites (e.g., Reddit, Facebook) and gaming websites, flyers distributed across the university campus, and email invitations to an existing pool of undergraduate students interested in participating in research studies. The survey was completed online and participants were offered entry into a raffle for one of ten Amazon gift cards (50$) if they fully completed it. Only individuals who indicated they were 18 or over were subsequently included in analyses.

Data analysis

All data were analysed using either SPSS 24 or MPlus 7.4. Pearson's biserial correlations were used to examine the associations between problematic gaming, dispositional mindfulness and subjective well-being. Structural equation modelling (SEM) was then used to test the mediation models in MPlus 7.4. The proposed conceptual model is presented in Figure 1. Given the chi-square test's sensitivity to large sample sizes, model fit was evaluated based on Comparative Fit Index (CFI) and Tucker-Lewis fit index (TLI) values and Root Mean Square Error of Approximation (RMSEA). Moderately good model fit was determined by CFI/TLI values over .90 and RMSEA below .08 while very good model fit was determined by CFI/TLI values over .95 and an RMSEA value below .06 (Hu & Bentler, 1999; Vandenberg & Lance, 2000).

Results

Prior to running the full latent model, all data were cleaned separately within gender groups in SPSS. Results from a Missing Values Analysis revealed that all variables had less than 5% of missing values; therefore, the data could be assumed to be missing completely at random. Descriptive statistics for dispositional mindfulness, problematic gaming, subjective well-being,

time spent gaming, and gender are reported in Table 1. Additionally, Table 2 presents the Pearson correlation coefficients for the study variables. As expected, problematic gaming was inversely correlated to dispositional mindfulness and overall subjective well-being (which can be defined as high life satisfaction and positive affect, low negative affect) while dispositional mindfulness and subjective well-being were positively associated with one another.

To evaluate the mediational role of dispositional mindfulness in the relation between problematic gaming and subjective well-being when controlling for gender and hours spent gaming per week, a full latent model was tested using Maximum Likelihood Estimation with robust standard errors (MLR) in MPlus 7.4. First, the measurement models were tested by running three separate CFAs to assess how well the items for each measure were predicted by their latent factors. The CFA model resulted in a moderately good fit for problematic gaming, χ^2 (35) = 99.56, $p < .001$, CFI = .93, TLI = .9, RMSEA = .06[0.05, 0.07]. However, the CFA model for dispositional mindfulness was initially a marginal fit, χ^2 (90) = 320.15, $p < .001$, CFI = .89, TLI = .88, RMSEA = .07[.06, .08]; therefore, modifications were made based on the modifications indices and two pairs of items were allowed to correlate with one another. This revised model was significantly better, as shown by the decrease in AIC value, and resulted in a good fit, χ^2 (88) = 241.23, $p < .001$, CFI = .93, TLI = .92, RMSEA = .06[0.05, 0.07]. Meanwhile, a good fit was observed for subjective well-being, χ^2 (87) = 210.96, $p < .001$, CFI = .96, TLI = .95, RMSEA = .05[.04, .06]. Figures 2a), 2b), and 2c) present the results of each CFA, with standardised estimates.

Following the assessment of the measurement models, the full structural equation model presented in Figure 1 was run. This hypothesised model resulted in a marginal fit, χ^2 (798) = 1550.65, CFI = .89, TLI = .88, RMSEA = .04[.04, .05]. However, in order to obtain a better fit,

a revised model was run. First, the theoretically-relevant modifications suggested based on the modification indices in Model 1 were incorporated. Secondly, in order to have a more parsimonious model, all nonsignificant paths in Model 1 were removed in the revised model (Byrne, 2012). The revised model was significantly improved, as determined by the decrease in AIC values, and these modifications resulted in a moderately good fit for Model 2, χ^2 (799) = 1463.16, CFI = .9, TLI = .9, RMSEA = .04[.037, .043]. Figure 3 is a graphical representation of Model 2 in which the standardised coefficients of each path are presented.

As hypothesised, while controlling for gender and hours spent gaming per week, problematic gaming significantly predicted lower dispositional mindfulness and life satisfaction while predicting greater frequency of negative affect. Surprisingly, there was no direct effect of problematic gaming on positive affect. Meanwhile, dispositional mindfulness significantly positively predicted life satisfaction and positive affect while negatively predicting negative affect. Finally, examination of the indirect effects revealed that, when covarying for gender and hours spent gaming per week, dispositional mindfulness was a significant mediator of the relation between problematic gaming and each aspect of subjective well-being: partial mediations were found for life satisfaction and negative affect while a full mediation occurred for positive affect. Specifically, results revealed a significant negative indirect effect of dispositional mindfulness on the relation between problematic gaming and life satisfaction, β = -.05, *SE* = .02, p = .014, as well as between problematic gaming and positive affect, β = -.09, *SE* = .03, $p < .001$. Additionally, a significant positive indirect effect of dispositional mindfulness on the relation between problematic gaming and negative affect was found, β = .14, *SE* = .03, $p <$ .001.

Discussion

The primary objective of the current study was to investigate the influence of dispositional mindfulness on the relation between problematic gaming and subjective well-being (high life satisfaction and positive affect, as well as low negative affect). Specifically, it was proposed that problematic gaming would be inversely related with both dispositional mindfulness and overall subjective well-being, that dispositional mindfulness would be positively associated with overall subjective well-being and that dispositional mindfulness would mediate the relation between problematic gaming and subjective well-being.

Consistent with previous research (e.g., Mentzoni et al., 2011), results supported the hypothesis that higher levels of problematic gaming would significantly predict lower positive affect and life satisfaction, as well as greater negative affect. Interestingly, the level of problematic gaming symptoms reported by frequent gamers negatively predicted mindfulness. This negative association is similar to findings from research in related areas showing that mindfulness inversely influences pathological gambling and problematic Internet use (Calvete, et al., 2017; deLisle et al., 2012; Gámez -Guadix & Calvete, 2016; Mazzoni et al., 2017). However, given that Gackenbach and Brown (2011) found that highly engaged gamers reported higher levels of mindfulness, these findings provide further support for the need to differentiate the mechanisms underlying high gaming engagement versus problematic gaming (Charlton & Danforth, 2007, 2010). This is especially important considering that high engagement with gaming (as opposed to problematic gaming) does not inherently negatively impact other domains of individuals' lives and that gamers who are passionate about gaming, and yet not problematically engaged with gaming, are flexible in their gaming engagement based on their life situation (e.g., Billieux et al., 2013; Majamäki & Hellman, 2016).

As hypothesised, results also revealed that low dispositional mindfulness helped explain the overall negative association between problematic gaming and overall subjective well-being. Interestingly, while a partial mediation was found for both life satisfaction and negative affect, dispositional mindfulness fully explained the relation between problematic gaming and positive affect. In other words, problematic gaming had a detrimental influence on life satisfaction and negative affect partially through individuals' low dispositional mindfulness. However, given that this is a partial mediation, even when mindfulness is being taken into account, problematic gaming still has a detrimental impact on life satisfaction and negative affect. Meanwhile, having low dispositional mindfulness fully explains the detrimental impact of problematic gaming on positive affect; therefore, once mindfulness is taken into account, problematic gaming no longer has a negative influence on positive affect.

A potential explanation for this could be that the some of the adverse life consequences that occur for individuals who engage in problematic gaming (e.g., missing school or work) are present in these individuals' lives regardless of their dispositional mindfulness and may have a negative impact on their life satisfaction and the frequency with which they report negative affect. Meanwhile, reporting a higher number of problematic gaming symptoms may not have an impact on the frequency of experiencing positive affect because individuals with problematic gaming engagement may experience positive affect through their gaming which may mitigate the impact of adverse life consequences on positive affect. For instance, a study by Reinecke (2009) demonstrated that gamers who reported experiencing stress, work-related strain, or daily hassles were more likely to play video games for recovery reasons, especially if they also had an emotion-focused coping style, in an attempt to self-regulate.

Recent research on mindfulness has explored ways in which mindfulness training can be used to enhance positive psychological functioning and act as a protective factor against mental health problems (e.g., Bajaj & Pande, 2016; Brown, Creswell, & Ryan, 2015; Grossman, Niemann, Schmidt, & Walach, 2004). One of the ways that mindfulness may be beneficial in terms of problematic gaming is through its ability to enable individuals to cope without engaging in avoidance tendencies. For instance, research by Bergomi, Ströhle, Mihalak, Funke, and Berking (2013) has shown that as mindfulness levels decrease, individuals experiencing adverse life situations are more likely to report experiencing frequent negative affect. This is particularly interesting given recent findings by Hagström and Kaldo (2014) that higher reports of negative escapism (i.e., a motivation to escape from or avoid real life problems or worries) emerged as the strongest predictor of greater problematic gaming and lower life satisfaction when taking into account gaming motivations for achievement or socialisation. If one of the principal gaming motivations of individuals who report problematic gaming symptoms is to avoid or escape from adverse life events, mindfulness training may enable them to become aware of these avoidance tendencies and learn to approach and respond to adverse situations with a more adaptive coping strategy. Thus, the present findings build on this growing body of knowledge and support the recently suggested notion that mindfulness may be clinically useful in assisting individuals engaging in problematic gaming (Dong & Potenza, 2014).

Unfortunately, due to the cross-sectional nature of this study, causation cannot be inferred. Longitudinal designs are required to clarify the role of dispositional mindfulness in problematic gaming and to determine, for instance, whether individuals with low dispositional mindfulness are more likely to develop problematic gaming habits or whether individuals who game problematically experience lower dispositional mindfulness over time.

Interestingly, a longitudinal study examining other aspects of psychosocial well-being (loneliness, self-esteem, social competence, and life satisfaction) revealed that loneliness, low self-esteem, and low self-competence were a cause rather than being a consequence of problematic gaming (Lemmens et al., 2011). Therefore, given these indications that some aspects of lower well-being could be a precursor to problematic gaming, future studies should employ a prospective design to assess factors associated with problematic gaming across its development over time.

Furthermore, although widely employed and well-validated, measure used to assess dispositional mindfulness in this study has a unidimensional structure tapping specifically in the lack of attention and awareness associated with mindlessness (Brown & Ryan, 2003). Other researchers have proposed a multi-factorial structure in which mindfulness is comprised of five inter-acting facets (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006); therefore, it could also be useful for future studies to investigate which aspects of mindfulness contribute most to the relation between problematic gaming and subjective well-being.

In conclusion, given that it has been found that dispositional mindfulness can be a dynamic factor modifiable through mindfulness practice (e.g., Khoury et al., 2013), findings from the present study could help clarify the potential utility of using mindfulness training to help individuals who report high levels of problematic gaming cope with associated dysfunctions in other domains of their life.

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Table 1.
Means and Standard Deviations for Problematic Gaming Symptoms, Dispositional Mindfulness, and Subjective Well-Being for Males and Females

	Males (*n* = 319)		**Females (*n* = 195)**	
	M	***SD***	***M***	***SD***
Problematic gaming	22.12	6.14	19.27	5.7
Dispositional mindfulness	3.92	.83	3.93	.82
Life satisfaction	19.94	7.35	20.10	7.80
Positive affect	16.38	3.48	15.38	3.78
Negative affect	10.77	3.99	10.97	3.90

Table 2.
Correlation Matrix Indicating the Associations Between Problematic Gaming, Dispositional Mindfulness, Subjective Well-Being, Time Spent Gaming and Gender

	1	***2***	***3***	***4***	***5***	***6***	***7***
1. Problematic gaming	1						
2. Dispositional mindfulness	-.28**	1					
3. Life satisfaction	-.28**	.21**	1				
4. Positive affect	-.16**	.27**	.47**	1			
5. Negative affect	.36**	-.46**	-.53**	-.22**	1		
6. Time spent gaming	.29**	.08	-.16**	-.07	-.01	1	
7. Gender	-.23**	.01	.01	-.13*	.03	-.23**	1

Note. * $p < .01$, ** $p < .001$

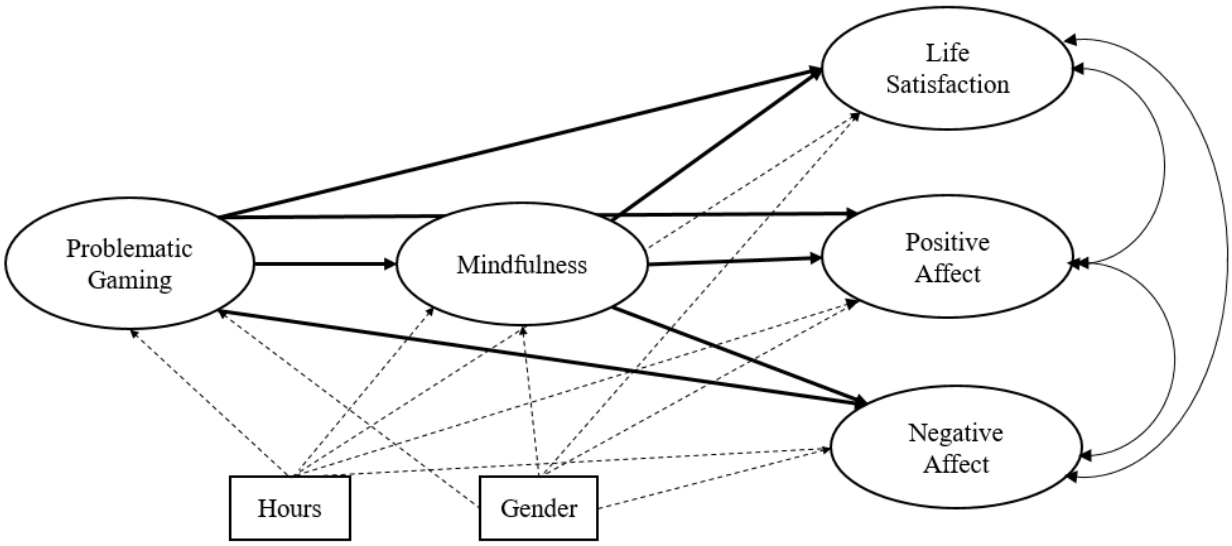

Figure 1. Conceptual model of the mediation of dispositional mindfulness on the relation between problematic gaming and subjective well-being when controlling for hours spent gaming and gender.

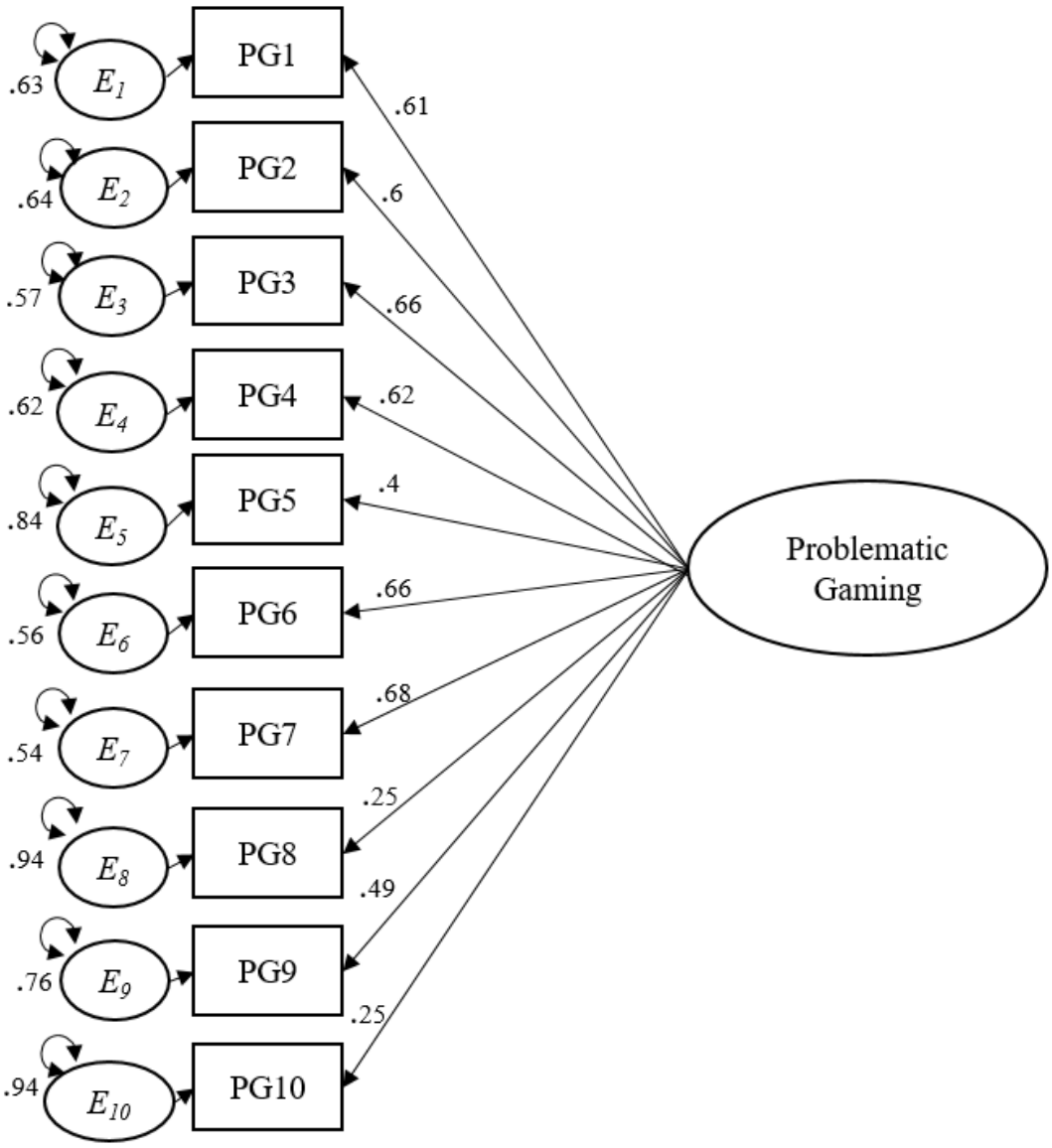

Figure 2a). Standardised estimates and residual variances for the CFA model of the latent factor for problematic gaming engagement.

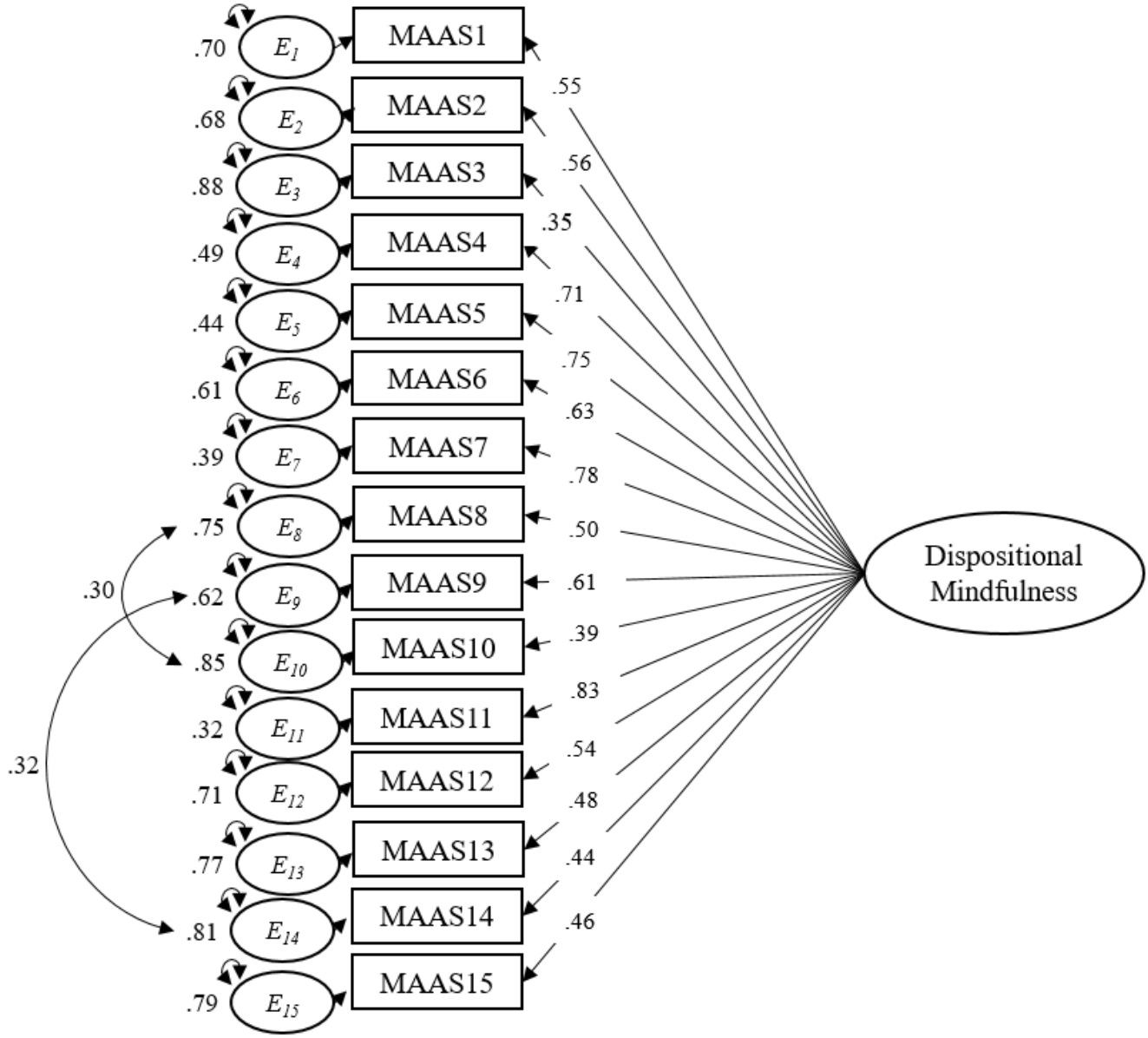

Figure 2b). Standardised estimates and residual variances for the CFA model of the latent factor for dispositional mindfulness.

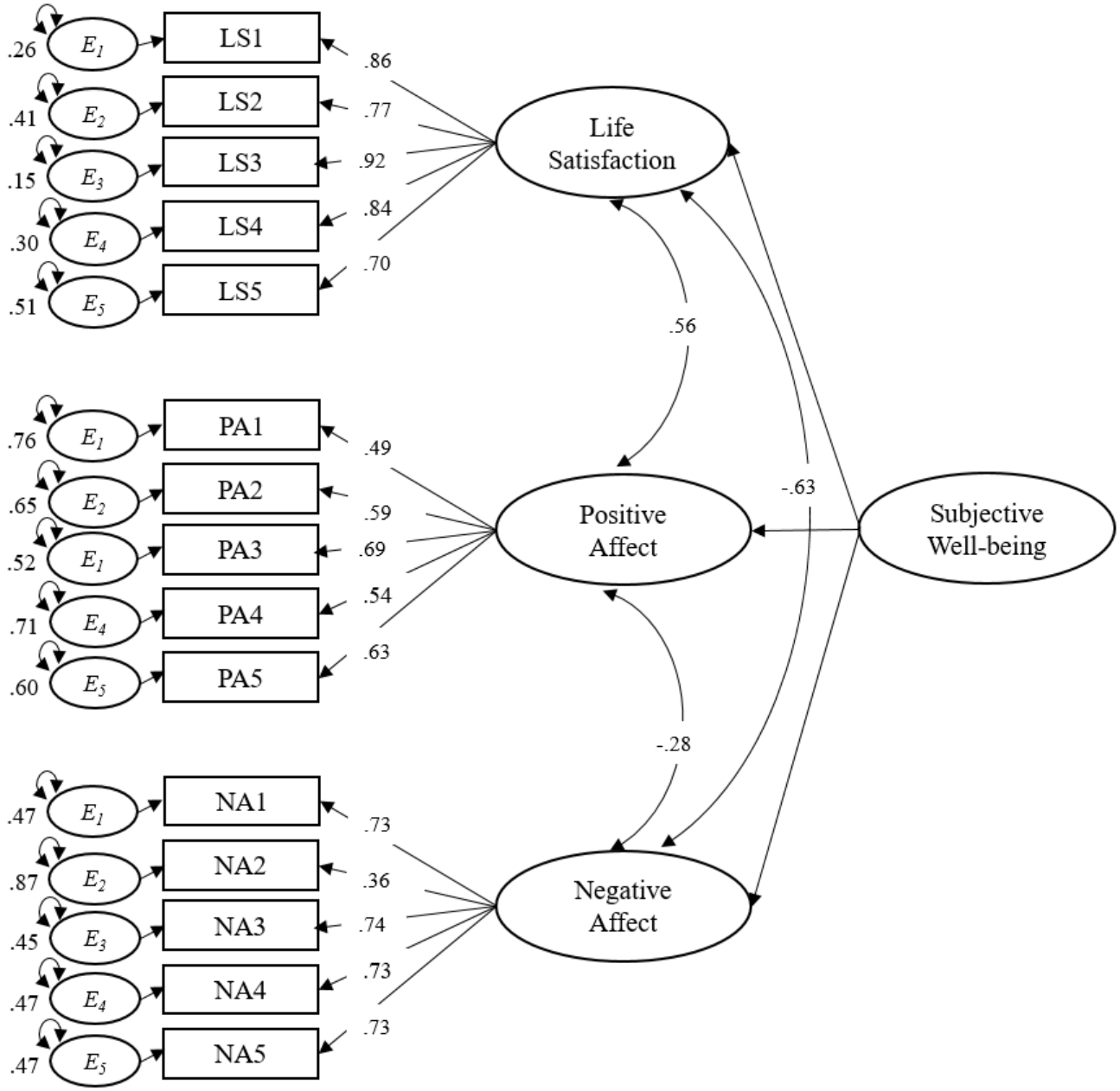

Figure 2c). Standardised estimates and residual variances for the CFA model of the latent factor for subjective well-being (life satisfaction, positive affect, and negative affect).

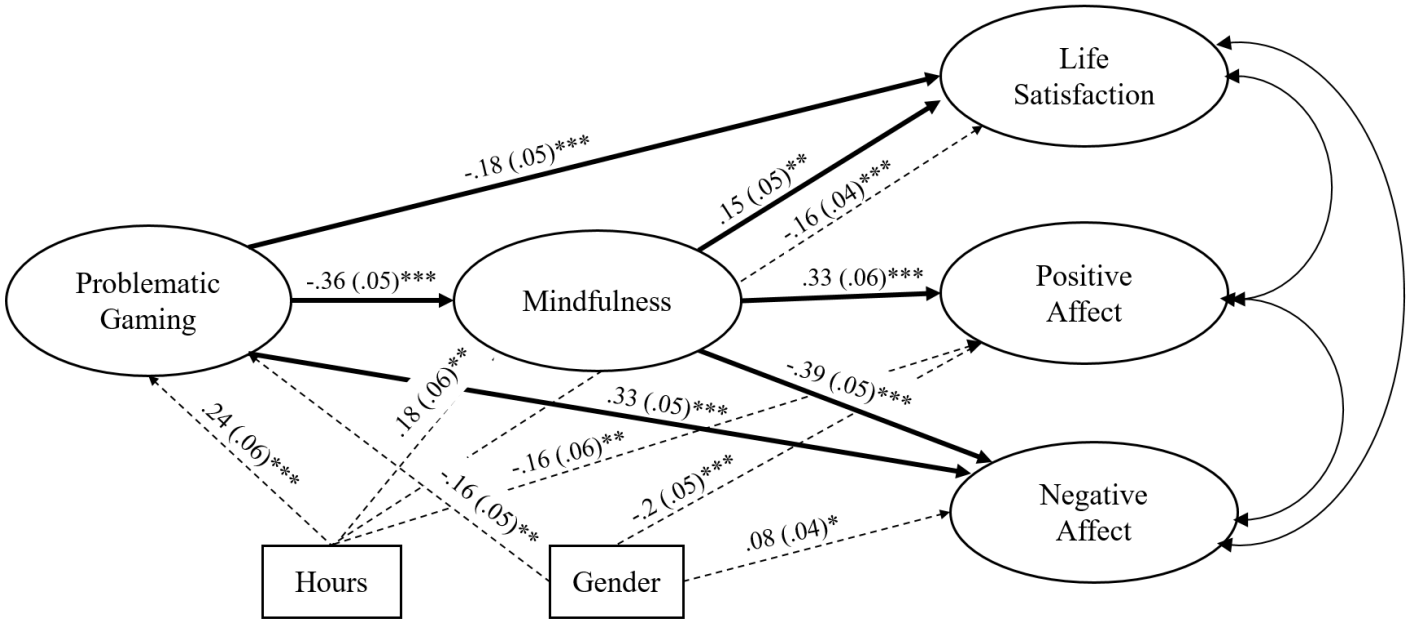

Figure 3. Final estimated model of the mediation of dispositional mindfulness on the relation between problematic gaming and subjective well-being. Standardised regression coefficients and standard errors are presented for each path (* $p < .05$, ** $p < .01$, *** $p < .001$).

Chapter 5: Conclusion

Summary of Objectives and Findings

The current thesis sought to clarify how dispositional mindfulness, which is individuals' general tendency to be purposefully and nonjudgmentally aware of their present-moment experience, can influence the degree to which individuals report problematic gaming symptoms, both in relation to their experience of flow while gaming and their subjective well-being. To this end, two studies of individuals who frequently play video games were conducted in order to investigate three main objectives: (a) to explore the potential relation between dispositional mindfulness and problematic gaming, (b) to investigate whether dispositional mindfulness could contribute to problematic gaming distinctly from an experience of flow while gaming, and (c) to determine whether dispositional mindfulness could be protective against problematic gaming.

In investigating the relation between dispositional mindfulness and problematic gaming, findings in both Study 1 and 2 revealed that gamers who reported higher levels of dispositional mindfulness also reported significantly fewer problematic gaming symptoms. As expected, these findings are consistent with previous research on mindfulness and behaviour problems such as pathological gambling and problematic Internet use. Specifically, research on individuals seeking treatment for pathological gambling suggests that higher mindfulness was associated with less severe pathological gambling outcomes (Lakey et al., 2007). Additionally, dispositional mindfulness has been found to predict less deficient self-regulation of Internet use as well as fewer negative outcomes associated with Internet use over a 6-month period (Calvete et al., 2017). Mindfulness training has also been recommended as a potential resource for individuals struggling with pathological gambling (e.g., deLisle et al., 2014; Shonin & van Gordon, 2016).

Importantly, mindfulness-based interventions have been effective in increasing mindfulness (e.g., Carmody & Baer, 2008; Khoury et al., 2013; Shapiro et al., 2011). In turn, mindfulness has been shown to promote a more adaptive and flexible self-regulation style (e.g., Friese & Hofmann, 2016) and, in support of this, inverse relationships have been found between mindfulness and different types of problematic behaviours (i.e., problematic gaming, pathological gambling, and problematic Internet use). Thus, increasing mindfulness may potentially be useful for individuals who are struggling with problematic gaming.

Given the relation found between mindfulness and problematic gaming, the next step in this thesis was to further explore this relation in order to clarify mindfulness' role as a potential protective factor. First, the contribution of dispositional mindfulness to problematic gaming distinct from an experience of flow while gaming was investigated. Results from Study 1 revealed that, when controlling for the influence of flow and time spent gaming, dispositional mindfulness not only uniquely contributed to the prediction of problematic gaming symptoms but was also the strongest predictor of problematic gaming in a sample of frequent gamers. In other words, even when taking into account the pleasurable experience of flow while gaming and the frequency with which games were played, frequent gamers who were less dispositionally mindful were more likely to report engaging in problematic gaming.

Having established the unique inverse contribution of mindfulness to problematic gaming, the role of mindfulness as a potential protective factor was further examined in relation to the impact of problematic gaming on subjective well-being. Findings from Study 2 suggested that, in a sample of frequent gamers, the negative influence of problematic gaming on overall subjective well-being could be explained through individuals' low dispositional mindfulness. Specifically, low reports of dispositional mindfulness partially explained the negative impact of

problematic gaming on life satisfaction and negative affect, while fully explaining the impact on positive affect.

Taken together, both these studies demonstrate that (a) frequent gamers who are low in dispositional mindfulness are more likely to report symptoms of problematic gaming, and (b) the detrimental impact of problematic gaming on overall subjective well-being is partially explained by low dispositional mindfulness. Given that dispositional mindfulness has been shown to be a dynamic factor which can be increased through mindfulness-based interventions (e.g., Khoury et al., 2013), these results highlight the influential importance of dispositional mindfulness in potentially helping prevent and mitigate the impact of problematic gaming on individual's lives.

Consistent with findings from a study by Calvete and colleagues (2017) which found that higher dispositional mindfulness predicted lower problematic Internet use after 6 months, intervening in problematic gaming by increasing problematic gamers' mindfulness levels may enable them to both better self-regulate their behaviour and avoid experiencing negative impacts from problematic gaming in other domains of their life. Overall, the findings from this thesis help advance research on problematic gaming by demonstrating the importance of mindfulness and its relationship to problematic gaming in multiple ways.

Limitations and Future Directions

Despite the intriguing possibilities these findings suggest, some limitations should be considered. First, the data for both studies in this thesis were collected online from individuals who saw the online invitation and chose to participate; therefore, a self-selection bias inherently limits the generalisability of these findings. Furthermore, generalisability was limited by both the age restriction of the samples used and the fact that these self-report data were obtained from single time points. Given that prevention is preferable to intervention, it would be useful to

investigate whether these findings can be replicated in earlier developmental periods. Furthermore, experimental or longitudinal designs are necessary to assess the effectiveness of dispositional mindfulness as a protective factor against problematic engagement in gaming. For instance, research using a prospective experimental design is needed to investigate whether mindfulness-based interventions can effectively prevent or diminish the detrimental impact of problematic gaming.

Finally, the *Mindful Attention and Awareness Scales* (Brown & Ryan, 2003), which was used to assess dispositional mindfulness in both studies of this program of research, assesses mindfulness as a one-dimensional construct. Given the preliminary nature of these studies, it was deemed best to assess mindfulness using this well-validated measure. However, others have proposed that mindfulness may be comprised of several interacting aspects which can differentially impact well-being and mental health outcomes. For instance, Calvete and colleagues (2017) used the *Five Facets of Mindfulness Questionnaire* (Baer et al., 2006) to predict problematic Internet use over a 6-month period and found that the observing and awareness facets significantly predicted both better self-regulation of Internet use and fewer negative outcomes associated with Internet use. To deepen our understanding of the mechanisms through which dispositional mindfulness influences problematic gaming, it would be important for future studies to assess mindfulness as a more nuanced construct.

Implications

Nevertheless, the findings of this thesis significantly contribute to our understanding of problematic gaming and may have important implications for individuals who struggle with problematic gaming and others involved in trying to provide interventions or prevent problematic gaming. Given the inverse relation between dispositional mindfulness and problematic gaming

found in both studies in this thesis, it seems likely that mindfulness training would be useful in terms of preventing or intervening in problematic gaming. Although these results require replication, the current thesis provides preliminary evidence for the use of mindfulness training in assisting problematic gamers to be more aware of and better self-regulate their engagement with gaming.

Unfortunately, there is a lack of research investigating the influence of mindfulness within both problematic and non-problematic gaming. Findings from Gackenbach and Brown (2011) suggest that high engagement in gaming in general is associated with high mindfulness, while findings from the current thesis suggest that when looking at problematic gaming specifically higher reports of problematic gaming are associated with lower dispositional mindfulness. Thus, while these findings provide further support for the protective role of experiencing high dispositional mindfulness, they also highlight the need to distinguish between individuals who frequently play videos games and may be highly engaged in and passionate about gaming while still fulfilling their day-to-day responsibilities compared to those who have a problematic engagement with gaming that negatively impacts other life domains (see Charlton & Danforth 2007, 2010).

The distinction between high gaming engagement and problematic gaming is particularly important given the unfounded stigma that is still attached to gaming (e.g., Kirby et al., 2014; Shaw, 2011), with players being stereotyped as unpopular, idle, and socially incompetent (Kowert, Griffiths, & Oldmeadow, 2012). Although these stereotypes are recognised by both gamers and non-gamers, they are much more strongly endorsed by non-gamers (Kowert et al., 2012). These stereotypes can not only potentially prevent gamers from seeking help when their

gaming becomes problematic (Kirby et al., 2014) but it can also have important implications in terms of the approach used to either prevent or intervene in problematic gaming.

For instance, given the results found in Study 1 where both the experience of flow and time spent gaming predicted problematic gaming, it could potentially be concluded that, to minimise the likelihood of problematic gaming, the experience of flow while gaming and the overall time spent gaming should be reduced or avoided. Thus, gaming stereotypes and findings like these may lead otherwise well-intentioned clinicians, therapists, or intervention programs to immediately impose time restrictions on video game use as an attempt to prevent or reduce problematic gaming.

However, these results need to be interpreted with caution. It is important to note that high gaming engagement and the experience of flow are not inherently detrimental and research has shown both have been associated with benefits. For instance, although time spent gaming is correlated with problematic gaming (e.g., Charlton, 2002), there is extensive research demonstrating both (a) benefits associated with non-problematic video game use (e.g., Granic et al., 2014; Jones et al., 2014) and (b) that high engagement with gaming, and thus high amount of time spent gaming, does not necessarily have adverse consequences on individuals' daily lives and varies depending on gamers' life situations (e.g., Billieux et al., 2013; Majamäki & Hellman, 2016; Sublette & Mullan, 2012). Similarly, the experience of flow is considered a core aspect of positive psychology and can in fact enhance well-being and enrich quality of life. Playing video games in general has been suggested as enhancing the experience of flow (e.g., Sherry, 2004; Sweetser & Wyeth, 2005); thus, the experience of greater flow while gaming is not specific to problematic gaming. Therefore, the fact that greater time spent gaming and experience of flow are associated with, and thus predictive of, more reports of problematic gaming symptoms

suggests the need for further research to differentiate and better understand the relation between problematic gaming and flow time spent gaming.

It is also important to keep in mind that the issue is when gaming becomes problematic, which suggests that the key to preventing problematic gaming may be to enable individuals to better learn how to regulate their gaming habits and thus avoid the harmful impact problematic gaming will have in other domains of life. Therefore, to prevent or rectify the adverse life consequences resulting from problematic gaming, it is important to go beyond gaming stereotypes and focus on the pattern of engagement in problematic gaming rather than merely trying to limit or stop gaming altogether. Results from the present thesis highlight that it may be more rewarding to focus on increasing a positive psychology factor (i.e., mindfulness) which in turn could not only enhance overall well-being but also potentially help self-regulate gaming behaviour in order to minimise detrimental consequences in other life domains.

Concluding Comments

Despite limitations and the need for replication, this thesis is a significant contribution to research on mindfulness and problematic gaming in providing preliminary evidence that dispositional mindfulness, which can be successfully increased using mindfulness-based interventions (e.g., Carmody & Baer, 2008; Khoury et al., 2013; Shapiro et al., 2011), may be useful in assisting problematic gamers to better self-regulate their engagement with gaming. Future research is needed to investigate whether mindfulness training can help prevent problematic gaming and whether mindfulness interventions can help problematic gamers better regulate their behaviour.

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Appendix A: Measures for Study 1

Study 1 – Questionnaire

DEMOGRAPHIC ITEMS

ID	Participant ID for Study 1
GENDER	Gender (Male = 1; Female = 2)
AGE	Enter in Years
COUNTRY	Please indicate country of residence
FRQGM2	How often do you play video games during your free time? 1. Never 2. Rarely 3. Sometimes 4. Often 5. Always
HOURS	Please estimate the amount of time (in hours) you play video games per week:
ATTN	1 = Insincere 2 = Sincere
ETHNICITY	Please indicate ethnicity (e.g., Caucasian, Hispanic):
COUNTRY OF RESIDENCE	Please indicate country of residence (please avoid using any acronyms):

FLOW SCALE (*ADAPTIVE FOR VIDEO GAMES*): The following items assess your experiences while playing your favorite video game. Please select the most accurate response to each item.

(Scale ranged from 1 [*not at all agree*] to 7 [*very strongly agree*])

FLOW1	When I play this video game, I feel just the right amount of challenge
FLOW2	When I play this video game, I do not notice time passing (FLOW3)
FLOW3	When I play this video game, my mind is completely clear (FLOW5)
FLOW4	When I play this video game, the right thoughts/movements occur of their own accord (FLOW7)
FLOW5	When I play this video game, I feel that I have everything under control (FLOW9)
FLOW6	When I play this video game, my thoughts/activities run fluidly and smoothly (FLOW2)
FLOW7	When I play this video game, I have no difficulty concentrating (FLOW4)
FLOW8	When I play this video game, I am totally absorbed in what I am doing (FLOW6)
FLOW9	When I play this video game, I know what I have to do each step of the way (FLOW8)
FLOW10	When I play this video game, I am completely lost in thought (FLOW10)

MINDFUL ATTENTION AWARENESS SCALE: The following items address your general state of mind. Please read each item carefully and indicate how frequently or infrequently you experience each one.

(Scale ranged from 1 [*almost always*] to 6 [*almost never*])

MAA1	I break or spill things because of carelessness, not paying attention, or thinking of something else
MAA2	I tend to walk quickly to get where I'm going without paying attention to what I experience along the way
MAA3	I forget a person's name almost as soon as I've been told it for the first time
MAA4	I rush through activities without being really attentive to them
MAA5	I do jobs or tasks automatically, without being aware of what I'm doing
MAA6	I drive places on 'automatic pilot' and then wonder why I went there
MAA7	I find myself doing things without paying attention
MAA8	I could be experiencing some emotion and not be conscious of it until sometime later
MAA9	I find it difficult to stay focused on what's happening in the present
MAA10	I tend not to notice feelings of physical tension or discomfort until they really grab my attention
MAA11	It seems I am "running on automatic," without much awareness of what I'm doing
MAA12	I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there
MAA13	I find myself listening to someone with one ear, while doing something else at the same time
MAA14	I find myself preoccupied with the future or the past
MAA15	I snack without being aware that I'm eating

GAMING DISORDER SCALE: The following items address specific tendencies with regard to your video game use. Please indicate the frequency you have experienced each specific tendency over the last year.

(Scale ranged from 1 [not agree at all] to 5 [very strongly agree])

GD1	During the last year, how often have there been periods when all you could think of was the moment that you could play a game?
GD2	During the last year, how often have you been feeling miserable when you were unable to play a game?
GD3	During the last year, how often have you played games so that you would not have to think about annoying things?
GD4	During the last year, how often have you hidden the time you spend on games from others?
GD5	During the last year, how often have you experienced serious conflicts with family, friends or partner because of gaming?
GD6	During the last year, how often have you felt unsatisfied because you wanted to play more?
GD7	During the last year, how often were you unable to reduce your time playing

	games, after others had repeatedly told you to play less?
GD8	During the last year, how often have you had arguments with others about the consequences of your gaming behavior?
GD9	During the last year, how often have you lost interest in hobbies or other activities because gaming is all you wanted to do?

Appendix B: Measures for Study 2

Study 2 – Questionnaire

DEMOGRAPHIC ITEMS

ID	Participant ID for Study 1
Gender	Gender (Male = 1; Female = 2)
Age	Enter in Years
University	Are you currently enrolled (i.e., registered to take courses) at an institution of higher education such as college or university? (Yes = 1; No = 2)
Employment	Which of the following best describes your current work status? 1 = Not currently employed: Not seeking employment 2 = Not currently employed: Seeking employment 3 = Less than 4 hours per week 4 = Approximately 5 to 15 hours per week 5 = Approximately 16 to 30 hours per week 6 = More than 31 hours per week
Attention1	This is an attention item. Please choose "Almost Never" for this question. Participants who did not select Almost Never (1) were excluded for being insincere. **This item is not included in the dataset as only those responding sincerely were included.**
Frequency	Do you play video games (i.e., any game played on an electronic device) most days of the week? (Yes = 1; No = 2)
Hours	Please estimate the amount of time (in hours) you play video games per week:
Ethnicity	Please indicate ethnicity (e.g., Caucasian, Hispanic):
Country of Residence	Please indicate country of residence (please avoid using any acronyms):

MINDFUL AWARENESS ATTENTION SCALE: Items were prompted with the following: The items below refer to your general experiences in life. Please read each item carefully and indicate how frequently or infrequently you experience each one.

(Scale ranged from 1 [*not at all*] to 6 [*almost always*])

MAAS1	I could be experiencing some emotion and not be conscious of it until sometime later.
MAAS 2	I break or spill things because of carelessness, not paying attention, or thinking of something else
MAAS3	I find it difficult to stay focused on what's happening in the present.
MAAS4	I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.
MAAS5	I tend not to notice feelings of physical tension or discomfort until they really grab my attention.
MAAS6	I forget a person's name almost as soon as I've been told it for the first time.
MAAS7	It seems I am "running on automatic," without much awareness of what I'm doing.
MAAS8	I rush through activities without being really attentive to them.
MAAS9	I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.
MAAS10	I do jobs or tasks automatically, without being aware of what I'm doing.
MAAS11	I find myself listening to someone with one ear, doing something else at the same time.
MAAS12	I drive places on 'automatic pilot' and then wonder why I went there.
MAAS13	I find myself preoccupied with the future or the past.
MAAS14	I find myself doing things without paying attention.
MAAS15	I snack without being aware that I'm eating.

GAMING DISORDER SCALE: Items were prompted by the following instructions: The following items address specific tendencies with regard to your video game use. Please indicate the extent to which you agree with each of these items.

(Scale ranged from 1 [*not agree at all*] to 5 [*very strongly agree*])

CHAR1 I tend to want to spend increasing amounts of time playing video games

CHAR2 I often fail to get enough sleep because of playing video games

CHAR3 Playing video games has sometimes interfered with my work

CHAR4 When I am not playing video games, I often feel agitated

CHAR5 I often experience a buzz of excitement while playing video games

CHAR6 My social life has sometimes suffered because of playing video games

CHAR7 I have made unsuccessful attempts to reduce the time I spend playing video games

CHAR8 I rarely think about playing video games when I am not gaming

CHAR9 Arguments have sometimes arisen at home because of the time I spend playing video games

CHAR10 I never miss meals because of playing video games

LIFE SATISFACTION SCALE: Items were prompted by the following instructions: The following items reflection general feelings about your life. Please select the most accurate response for each item.
(Scale ranged from 1 [*not agree at all*] to 7 [*very strongly agree*])

LS1 In most ways my life is close to my ideal.

LS2 The conditions of my life are excellent.

LS3 I am satisfied with my life.

LS4 So far I have gotten the important things I want in life.

LS5 If I could live my life over, I would change almost nothing.

POSITIVE AND NEGATIVE AFFECT (SHORT FORM): Items were prompted by the following instructions: This list consists of a number of words that describe different feelings and emotions. After reading each word, please indicate to what extent you generally feel this way, that is, how you feel most of the time by selecting the appropriate circle.
(Scale ranged from 1 [*very slightly to not at all*] to 7 [*extremely*])

NA1 Upset
NA2 Hostile
NA3 Ashamed
NA4 Nervous
NA5 Afraid
PA1 Alert
PA2 Inspired
PA3 Determined
PA4 Attentive
PA5 Active

Appendix C: Consent form for Study 1

Thank you for your interest in participating in this online study. This questionnaire will take approximately 25 minutes of your time. Completing the questionnaire and providing contact information will enter you in a raffle for one of ten $50 gift cards to Amazon. The purpose of this project is to investigate individuals' motivation to play video games. Below you will find additional information regarding this study. Please forward any questions or concerns to the confidential email address that has been established for the sole purpose of this study: gamingmotivationstudy2@gmail.com.

Confidentiality: Your participation will be kept confidential. All responses will be kept in a password protected file stored within a secure computer accessible only to myself and my advisor, Dr. Nancy Heath (Nancy.Heath@mcgill.ca). All data will be coded to ensure your confidentiality. Your data will be used in the development of scholarly works that will be presented at various academic conferences, submitted to academic journals for publication, and used as part of my own dissertation. At no point during the dissemination of the results of this study will any identifying information be released.

Potential Risks: While there are no anticipated risks involved in participating in this research project, some participants might be sensitive to, or uncomfortable with, some of the questions. You do not have to answer any questions you do not want to. Additionally, if you have not completed the survey anonymously, you are free to withdraw from the study, at any time, without penalty or prejudice.

Study Objective: Your participation in the present study will increase our understanding of the motivation to play video games and the possible benefits as well as risks of gaming to gamers' well-being.

This study has been reviewed by the Research Ethics Board at McGill University and given the Reference Number 208-1015 indicating it meets the acceptable criteria for research involving humans. If you have any questions or concerns about your rights or welfare as a participant in this research study, please contact the McGill Research Ethics Officer at (514) 398-6831 and/or at the following email address, Deanna.Collin@mcgill.ca. While it is recommended that you print or save a copy of this consent form, an electronic copy can be requested from the following email address: gamingmotivationstudy2@gmail.com.

Thank you very much for your time.

By proceeding to the following page, you have provided consent to participate in the study.

Devin J. Mills, M.A.
McGill University, Project Coordinator
Ph.D. Candidate

Appendix D: Consent form for Study 2

Thank you for your interest in participating in this online study. This questionnaire will take approximately 25 minutes of your time. You are able to save your place in the survey and return later. Completing the questionnaire and providing contact information at the end of the questionnaire will enter you in a raffle for one of ten $50 gift cards. The purpose of this project is to investigate individuals' motivation to play video games. Below you will find additional information regarding this study. Please forward any questions or concerns to the confidential email address that has been established for the sole purpose of this study: gamingmotivationstudy@gmail.com.

Confidentiality: Your participation will be kept confidential. All responses will be kept in a password protected file stored within a secure computer accessible only to myself and my advisor, Dr. Nancy Heath (Nancy.Heath@mcgill.ca). All data will be coded to ensure your confidentiality. Your data will be used in the development of scholarly works that will be presented at various academic conferences, submitted to academic journals for publication, and used as part of my own dissertation. At no point during the dissemination of the results of this study will any identifying information be released.

Potential Risks: While there are no anticipated risks involved in participating in this research project, some participants might be sensitive to, or uncomfortable with, some of the questions. You do not have to answer any questions you do not want to. This survey will be completed anonymously. However, you have the opportunity to submit your contact information at the end of the questionnaire to be entered into the raffle. Given the anonymous nature of this questionnaire, submitted data are not identifiable unless you provide contact information. Once a questionnaire has been submitted anonymously, it can't be withdrawn. Those who provide contact information can ask to have their data withdrawn at any time.

Study Objective: Your participation in the present study will increase our understanding of the motivation to play video games and the possible risks as well as benefits of gaming to individuals' overall well-being.

This study has been given the reference number 339-0215 demonstrating it has been approved by the Research Ethics Board at McGill University (Montreal, QC). If you have any questions or concerns about your rights or welfare as a participant in this research study, please contact the McGill Research Ethics Officer at (514) 398-6831 and/or at the following email address, Deanna.Collin@mcgill.ca. While it is recommended that you print or save a copy of this consent form, an electronic copy can be requested from the following email address: gamingmotivationstudy@gmail.com. Thank you very much for your time.

By proceeding to the following page, you have provided consent to participate in the study.

Devin J. Mills, M.A.
McGill University, Project Coordinator
Ph.D. Student