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Navigating Online and Offline Social Spaces: Interpersonal Relationships and Problematic Gaming Behaviour in MMORPG Players

Aranda Christine Wingsiong
University of Windsor

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By

Aranda Christine Wingsiong

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By

Aranda Christine Wingsiong

APPROVED BY:

_____

D. Mills, External Examiner
Texas Tech University

_____

P. Graniero
School of the Environment

_____

P. Timmons Fritz
Department of Psychology

_____

R. Menna
Department of Psychology

_____

K. Babb, Advisor
Department of Psychology

September 9, 2020

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ABSTRACT

Previous research suggests that individuals who play Massively Multiplayer Online Roleplaying Games (MMORPGs) may experience interpersonal benefits from their in-game interactions with other players (Kaczmarek & Drazkowski, 2014). At times, however, these online relationships may develop at the expense of their offline relationships and some players may even be at risk for developing problematic gaming behaviours (PGB). The current study aimed to better understand the online and offline interpersonal experiences of MMORPG players and to identify interpersonal risk factors for developing PGB. A total of 149 MMORPG players between the ages of 18 to 46 years completed a set of online questionnaires which included measures for PGB, time spent playing, social support, loneliness, gamer identity, attachment, coping behaviour, antisocial behaviour, and impulsivity/risk-taking behaviour. They also completed a set of open-ended questionnaire items that examined their perspectives on their online and offline relationships, as well as their online gaming behaviour.

The findings indicated that participants who spent more time playing MMORPGs reported lower offline interpersonal support, greater avoidant attachment, and greater identification with the online gaming community. Time spent playing was not associated with online interpersonal support nor was it associated with online or offline loneliness. Contrary to expectations, neither avoidant attachment nor coping style moderated the link between time spent playing, and either interpersonal support or loneliness. However, players with greater avoidant attachment and those with greater avoidance coping tended to report lower interpersonal support and greater loneliness within online and offline domains. Players with greater social support coping also reported greater online and offline interpersonal support, as well as lower online loneliness; but, greater social support coping was not linked to offline

loneliness. Lastly, findings indicated that players with greater avoidance coping, greater antisocial behaviour, and those who reported less offline interpersonal support were at greater risk of having higher levels of PGB.

The findings indicated some parallels between players' online and offline relationships; however, players' interpersonal gains within one domain did not necessarily compensate for deficits within the other domain. Players who are socially motivated to play, engage in more social support coping, and fewer avoidance coping behaviours may find it easier to create and maintain online connections. Thus, understanding how players engage with online games, rather than relying on overall time spent playing, may better predict players' risk for developing higher levels of PGB.

The findings from the study may inform health professionals about the online and offline social contexts in the lives of online gamers, which may help individuals at risk for developing significant distress related to their online gaming behaviour. This research may also inform game developers seeking to improve user experiences by establishing a more supportive online community for players and promoting healthier video game engagement.

DEDICATION

For Will,
my *Player Two*
and for my family…

We did it.

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CHAPTER I

Introduction

Video games originally catered to a small subset of the population; however, they have since evolved over the years to appeal to wider audiences. University students were the target audience of video games in the early 1950s, a product of the efforts of academics who used computers in universities for research and training purposes (Kowert & Quandt, 2016). By the 1970s, the public was introduced to video games through the commercialization of personal computers and game consoles. This resulted in the creation of the *gamer stereotype*, which presented the typical video game user as an adolescent male (Williams, 2003). However, research on video game users revealed that by the early 2000s, game clientele also included a large portion of adult men and women. According to a Canadian survey which included 2579 adults (18-64 years), 260 teens (age 13-17 years), and 281 children (age 6-12 years), 64% of participants played video games in the past 4 weeks (M = 10 hours per week) and 50% of them identified as female (M = 39 years old; Entertainment Software Association, 2018). A U.S.-based survey of 4,000 households reported that 65% of adults played video games (M = 33 years old), and 46% of these gamers were female (Entertainment Software Association, 2019). Thus, playing video games is no longer an adolescent male's past-time, and some of the most popular video games today cater to a broader range of adult consumers.

The growth of the video game industry also has been accompanied by concerns regarding the impact of video games on players' social functioning and mental health. These concerns were precipitated by news reports of youths engaging in mass violence that was attributed to playing video games with violent themes (Lawrence & Birkland, 2004). Early research interest on the

impact of playing video games has resulted in a considerable body of literature linking children and youth gaming behaviour to loneliness and social withdrawal (Young, 2009a).

Internet gaming disorder (IGD) has been proposed as a new condition in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM–5*; American Psychiatric Association [APA], 2013) appendix. IGD is described as the persistent and recurrent use of online video games, leading to clinically significant impairment in the last 12 months, in the areas of social, occupational, or other important activities (American Psychological Association, 2013). Considering that IGD has not been established as an official disorder, there is a need to better understand risk factors associated with developing problematic gaming behaviours that may eventually lead to clinically significant impairment. For the purposes of the current study, the term *problematic gaming behaviour* (PGB) was used to refer to a continuum ranging from a few symptoms of distress related to video game use to clinically significant Internet gaming disorder (IGD).

One video game genre in particular is known as *Massively Multiplayer Role-Playing Games* (MMORPGs), and these games include features that may promote social interactions among players, while also encouraging persistent playing. MMORPGs are story-based games that challenge users to complete specific objectives and allow large masses of users from broad geographical locations to simultaneously play on the Internet (Barnett & Coulson, 2010). Within these games, users can create visual representations of their own characters, known as *avatars*. Players use these avatars to engage in collaborative and/or competitive interactions with other players who are simultaneously navigating the same virtual world and are assigned a similar set of objectives. MMORPGs are also characterized by built-in features (e.g., text or voice chat systems) which allow players to communicate with each other as they explore their online

environment. Combined, these features contribute to an online environment that may closely mimic offline relationships. These social features may also promote greater player engagement as MMORPG players have been found to be at greater risk for spending more time playing compared individuals who play other video game genres (Puerta-Cortés et al., 2017). As such, the current study focused on MMORPG players to investigate online and offline interpersonal experiences as potential risk factors for PGB in online gamers.

Overall, there is a gap in the literature related to the online and offline interpersonal experiences of individuals who spend time online gaming. There is a need to investigate the factors contributing to increased risk for psychological distress in individuals who spend a considerable amount of time gaming. The current study aims to better understand the online and offline interpersonal experiences of adult MMORPG players and how this relates to their risk for developing PGB. Specifically, the first objective was to examine whether time spent playing MMORPGs, avoidant attachment, and coping style would predict interpersonal support and loneliness, and whether this generalizes to players' experiences both online and offline. The second objective was to examine risk factors related to PGB. Exploring these avenues, expands our understanding of how players interact with online games, and a comparison of their online and offline social interactions may help uncover relationship patterns across the two domains. The findings from the study may inform health professionals about the online and offline social contexts in the lives of online gamers, which may help with early identification of individuals at risk for developing PGB and also identify more adaptive ways for players to engage with online games.

The following sections provide an overview of relevant literature. It begins with examining the features and characteristics of MMORPGs, along with common motivations for

playing. This is followed by a review of the characteristics of PGB, and the link between PGB and MMORPG players. The next section briefly examines the literature on problem gambling as a guide for understanding risk factors for PGB: gaming as a response to distress, and gaming as it relates to antisocial and impulsive behaviours. The final section examines literature pertaining to the online and offline interpersonal experiences of MMORPG players, and interpersonal risk factors for PGB.

Massively Multiplayer Online Role-Playing Games

According to Chan and Vorder (2006), MMORPGs are characterized by six broad characteristics: (a) persistence -- accessible any time of day, everyday, (b) physicality -- virtual world based on a physical environment, which, to some degree, abides by laws of physics and gravity, (c) social interaction -- features allow for, and promote communicating with individual players or with an entire group, (d) avatar-mediated play -- users create *avatars* or characters to represent them and achieve specific objectives in the virtual world, (e) vertical game play -- game achievement or progress is assessed by avatar level, wealth, etc., and (f) perpetuity -- indefinite end goal and objectives. The combination of these features is unique to MMORPGs and they make MMORPGs the most fitting medium for examining online and offline social interactions.

MMORPG players can choose from an array of pre-set virtual characters, and in some cases, have the option of customizing their physical appearance and clothing. These character options allow players to navigate and interact with their virtual environment and with other players using these avatars to represent themselves. Compared to other game genres, MMORPGs allow for what Bowman et al. (2008) refer to as *character attachment* (CA), which occurs when a game promotes player internalization of their avatar's experiences, thereby psychologically

merging the avatar and the self. This may promote more engagement with the game. Although other online activities such as social media websites allow users to create their own profiles where they can upload pictures, they are not expected to create and control a physical representation of their self that moves in real time. The virtual environment in MMORPGs also often emphasizes more realism by closely following physical rules, incorporating concepts of gravity and force in the game's interface. Although advances in technology allow video game environments to appear more realistic, players can still safely explore and interact with their surroundings without any perceivable and immediate real-life consequences.

The built-in social features of MMORPGs connect thousands of users online and encourage interactions between players in real-time. MMORPG chat systems are open lines of verbal (using a microphone and headset) and written (using keyboard and live text) communication that allows the group to engage in online, real-time conversation on topics related to, or unrelated to the game. Due to the flexibility of these chat systems, players may also choose to share offline experiences (e.g., work or home-related events or problems) with other players, which may further promote interpersonal development. Gamers had reported making good friends exclusively through the game and discussing sensitive issues (e.g., family and work problems, loss, sexuality, discrimination) with online friends that they would not discuss with their offline friends (Cole & Griffiths, 2007). This feature is similar to the function of online chatrooms and discussion forum boards, which allow users to discuss common interests. Unlike these other online activities, however, MMORPG players may chat with each other while their avatars are in two distant locations in the virtual world or while their avatars are side-by-side working together on a shared in-game goal or task.

The persistence and perpetuity of MMORPGs, together with the accessibility of the Internet, may also encourage gameplay at any time of the day and promote greater overall playing time. Studies have suggested that game genre is significantly associated with time spent playing video games. MMORPGs have been associated with greater number of days playing and greater number of hours played per day, compared to other genres (Elliot et al., 2012). Laffan et al. (2016) also found that specific features commonly found in MMORPGs (i.e., social, reward, punishment, and presentation features) significantly predicted higher levels of flow when playing video games. Flow is a mental state believed to occur when the individual perceives the challenges related to the activity at hand to be appropriate to their current capabilities, they have clear goals, and immediate feedback is available for assessing their progress and guiding potential adjustments to their action (Csikszentmihalyi & LeFevre, 1989). Based on the flow theory, the experience of flow while playing video games is characterized by a subjective state of intense focus on the game, loss of sense of time while playing, and experience of the game as intrinsically rewarding. These features present some advantages and disadvantages for players as they allow for easier integration of time spent playing video games into players' daily lives but may also interfere with other commitments as players focus their energy on playing games. Hussain and Griffiths (2009) conducted interviews with 71 online gamers (18 to 54 years, 73% male) and found that 61% played during their free time after work or school, whereas 7% reported playing during work hours.

When engaged in MMORPGs users use the Internet in a different way compared to other Internet users and their in-game experience also differ from those who play non-MMORPG video games. A number of studies have reported empirical evidence for the importance of distinguishing between using the Internet for a specific activity and general Internet use (using

the Internet for various activities without a clear preference). A systematic review by Anderson (2016) revealed that although studies infrequently included information distinguishing between participants' Internet activities, those that compared types of Internet applications have found significant links between problematic use and activities such as gaming and chatting. Rosenkranz and colleagues (2017) conducted a study on a group of 5,667 adolescents to examine problematic Internet use and psychosocial factors and they found that among the individuals who demonstrated problematic Internet use, general Internet users reported greater emotional problems, greater psychosomatic complaints, and less effective coping strategies compared to gamers. As such, understanding the differences between the nature of user experiences on different Internet applications can contribute to our understanding of factors that may contribute to emotional problems and distress.

Taken together, MMORPGs provide opportunities for social interactions, promote player self-identification with their virtual characters, encourage player cooperation, and involve a massive group of players simultaneously sharing the same virtual environment in real time. Their widespread popularity and tendency to promote greater play time also makes them more salient in players' lives as online interactions become more integrated into offline experiences (e.g., players who initially meet through the game arrange to meet in-person). Compared to other video game genres, and compared to other Internet activities, there are features unique to MMORPGs that may strengthen their capacity for social interactions that closely mimic offline interpersonal relationships. Thus, these features make MMORPGs an ideal video game genre and Internet application for examining online and offline social interactions, while also investigating PGB.

Motivations for Playing Online Video Games

There are various reasons for why players engage in online video gaming. Demetrovics and colleagues (2011) surveyed 3,818 individuals who played online games and identified seven major motivational factors for playing: *escape, competition, coping, skill development, fantasy, recreation,* and *social*. Online games served as a means of escape from offline problems and as a way to cope with distress and aggression or improve overall mood. It allowed players to explore new identities and fantasy worlds that were not available offline. Some players were also motivated by a desire to improve skills, such as motor coordination and cognition. Playing online gave players a sense of achievement through competing and defeating or scoring higher than other players. There were also players who engaged in online play as a means of relaxation and entertainment. Lastly, they identified a *social domain*, which was characterized by players reporting that they enjoyed meeting and getting to know other players, spending time playing with others online, belonging to a group or community, and having company. Similar to the study by Demetrovics and colleagues, the current study examined motivations for playing, with particular interest in interpersonal factors related to gaming.

Social motivation may be particularly salient in MMORPG games in which the game's interface allows greater opportunities for interactions among players. Li and colleagues (2015) conducted an online survey to examine factors that contributed to adolescents' and adults' continued use of online games on social network websites. In their study, social interaction referred to the extent to which "players use the game as a social environment to interact with others" (p. 264), whereas social presence referred to "the extent to which players' psychological sense of physically interacting and establishing a personal connection with others via playing a SNG (social network game) is achieved" (p. 264). The need for social interaction and social

presence were both found to be predictive of continued intention to play video games and were found to significantly affect both male and female players. Their findings suggested that some users may experience social gratification through interacting and developing a relationship with other players online, which may promote continued use of online games. There was also strong support for age as a moderator in the relationship between initial intention to play an online game and the intention to continue playing. Social presence (sense of establishing personal connections with others) significantly predicted continued play, regardless of age group (below 15 years old to above 35 years old). However, social interaction significantly predicted continued play only for particular age groups (age 24 years and under, and between 31-35 years old). Thus, the role of age may be important to consider when investigating motivating factors that contribute to maintaining game playing behaviour.

Another study by Williams et al. (2008) surveyed *EverQuest 2* (one of the most popular MMORPG in the United States at the time of the study) users to examine their motivations and physical and mental health. The authors found support for three major factors contributing to players' motivation for playing: achievement, sociability, and immersion. The *achievement* factor referred to acquiring in-game items and rewards, developing character skill and prestige, and competition. The *social* factor referred to chatting with, and developing relationships with other players. Lastly, *immersion* referred to exploration, role-play, customization, and escapism. The results suggested that players reporting greater levels of sociability and achievement motivating factors also tended to report greater total playing time. Unexpectedly, however, immersion factor scales (exploration, role-play, customization, and escapism) were correlated with less total playing time. One explanation suggested by the authors is that players motivated by immersion may lose interest earlier on during game play, as role-playing features are more

readily available only after the player has advanced in the game. Although there was support for sociability, achievement, and immersion as motivating factors for playing MMORPGs, gamers' degree of commitment and interest in playing may have been contingent on the degree to which the game features support these three motivating factors. Players motivated by social interactions may have been more drawn to MMORPGs, which gave users access to a much larger group of players simultaneously playing online, and, in turn, provided greater opportunities for social interaction.

Problematic Gaming Behaviour

Internet Gaming Disorder

A broad range of terms have been used to refer to excess video game consumption accompanied by significant negative consequences, including compulsive Internet use, problem video game playing, problematic online game use, video game dependence, and video game addiction (Kuss & Griffiths, 2012b). For the current study, the term *problematic gaming behaviour* (PGB) was used to refer to a continuum ranging from a few symptoms of distress related to video game consumption to clinically significant *Internet gaming disorder (IGD)*. This distinction is important, as in the past a majority of the video game literature used the term *addiction*. More recently, however, there has been a shift away from applying *addiction* as a diagnostic term in North America and a movement towards terms such as *substance use disorder* or *dependence* and *pathological* to emphasize the broad range of features and severity observed in individuals with the disorder (APA, 2000, 2013). In some cases, however, clinicians may use addiction to describe severe presentations of symptoms.

IGD is now included in the *DSM-5* appendix (APA, 2013). This suggested that, although IGD is not officially recognized as a clinical disorder, the hope was that the diagnostic criteria

proposed in the *DSM* would provide a foundation for and promote research on IGD. New research will inform decisions about including it in the next edition of the *DSM*. Despite the lack of consensus regarding its precise features, a majority of recently published studies have suggested that it shares similar components to nonsubstance-related disorders and is distinct from online gambling addiction. The suggested description for IGD is "persistent and recurrent use of the Internet to engage in games, often with other players, leading to clinically significant impairment or distress" within a 12-month period (APA, 2013)**.** Based on APA's definition for a mental disorder, IGD is associated with significant distress or disability in social, occupational, or other important activities. To meet criteria for IGD, at least 5 of 9 symptoms must be present: preoccupation with Internet games, withdrawal (i.e., irritability, anxiety, or sadness) when access is restricted, tolerance development (need to spend increasing amount of playing time), unsuccessful attempt to control use, loss of interest in previous hobbies, continued use despite knowledge of a psychosocial problem, deception of others regarding amount of use, escapism and mood alleviation as motivator for use, and jeopardized quality of life resulting from use. The problematic gaming behaviour measure used in the current study applied the *DSM-5* definition and criteria for IGD.

Similar to gambling disorder, IGD may be seen as an addictive behavioural syndrome. It is widely accepted that both gambling behaviours and substance use behaviours lead to activation of neural regions associated with our reward system. Individuals who engage in excessive gaming have similar patterns of physiological responses as individuals with substance addictions. fMRI studies have shown that individuals presenting with symptoms of IGD demonstrated neural activation patterns for cue-induced gaming cravings that were similar to that of cue-induced cravings in substance-dependent individuals (Han et al., 2010; Ko et al., 2009).

Neuroimaging studies have reported changes in neural circuitry and brain structure that were associated with prolonged increased activity in regions associated with reward and addiction (e.g., mesocorticolimbic system) in individuals who presented with symptoms that map onto the features of IGD (Kim et al., 2014; Kühn & Gallinat, 2014; Weinstein & Lejoyeux, 2015).

It is tempting to group individuals who had engaged in PGB with problematic online gamblers. However, there were distinctions between the nature of their online activity, their motivations, and the maintenance factors. Although some video games might have included some minor components related to gambling (e.g., brief activities within the video game that are based on chance, such as draw for a random prize valued within the game), the online activities of individuals presenting with PGB were centred around the video game as a whole rather than the gambling components. Studies on the motivation for playing suggested that video game players also value strategy and planning (Forrest et al., 2015), which may be rooted in the way video games reward players based on their skill as opposed to chance, unlike in online gambling websites.

As it currently stands, there are no studies that report the prevalence of overlap between those who score high on both PGB and pathological gambling. However, there are studies that have examined the relation between pathological gambling and problematic Internet use. A study by Dowling and Brown (2010) examined the commonalities between the psychological factors associated with pathological gambling and problematic Internet users. Using their sample of 170 adults aged 18-50 years, they administered the Problem Gambling Severity Index (PGSI, Ferris & Wynne, 2001) of the Canadian Problem Gambling Index along with the Internet Addiction Test (IAT; Young, 1996a). Contrary to their hypotheses, they did not find an overlap between those who were classified as pathological gamblers (prevalence of 0.6%) or moderate risk

gamblers (4.1% prevalence rate), and those who were classified as at-risk for Internet dependence (9.5% prevalence rate).

Kuss and Griffiths (2012b) conducted a review of the literature on gaming addiction published between the years of 2000-2012 and found that a considerable amount of studies have identified substance addiction-like elements in excessive video game use or addiction. They found six factors that support the criteria proposed by APA: *salience*, *mood modification*, *tolerance*, *withdrawal*, *conflict*, and *relapse*. However, there is still considerable debate regarding the role of each component in IGD. According to a study by King and colleagues (2013), existing instruments for assessing IGD are inconsistent in setting criteria for classification, but seem to converge at a consensus that IGD's key components include withdrawal, loss of control, and conflict. Thus, the authors emphasize that further research into the clinical features of IGD are needed.

Problematic Gaming Behaviour and MMORPGs

Studies have found that specific structural video game characteristics, particularly those found in MMORPGs, may be linked to greater PGB symptoms (Festl et al., 2012; Ghuman & Griffiths, 2012; Rehbein et al., 2010). Unlike other genres, MMORPGs provide greater opportunities for social interaction and cooperation and promote player self-identification with their virtual characters (Lewis et al., 2008).

Some studies have found that MMORPG players may experience greater PGB symptoms and addiction-related symptoms compared to individuals who play other video game genres. Kuss and Griffiths (2012b) conducted a literature review on video games that included 58 empirical studies (published between the years 2000 to 2011) on addiction-related symptoms (i.e., salience, tolerance, mood modification, withdrawal, conflict) and found that these

symptoms were most prevalent among MMORPG players, compared to those who played other types of games. A comparison of PGB studies from different countries (i.e., Australia, Germany, Netherlands, Norway, Taiwan, United States, and Canada) reported that larger clinically significant PGB prevalence rates were found in studies that targeted MMORPG players (Festl et al., 2012). For example, Rehbein and colleagues (2010) surveyed 44,610 German male and female ninth graders and found that adolescent risk for developing video game dependency increased by 78% if they played MMORPGs. The authors compared MMORPG players to shooter and strategy game players and found that this effect was unique to MMORPG players. Additionally, in a national survey (age 18 to 95 years old, 42% female) in the United States, Elliot and colleagues (2012) found that those who identified as playing MMORPGs also tended to report higher scores on problem video game play.

On the other hand, there are studies to suggest that severe PGB is not any more prevalent in MMORPG communities, compared to other video game genres. Collins and Freeman (2013) conducted an online survey of a total of 416 participants (age 18 to 68 years, 37.5% female) to examine problematic video game use as it related to extraversion, empathy, bridging (developing new, weak ties that promote exploration of new experiences and perspectives) and bonding (developing emotionally supportive, close relationships), and prosocial tendencies. Separate analyses were conducted on participants who identified as MMORPG players (n = 166). The authors did not find evidence to suggest that MMORPG players were more likely to develop clinically significant PGB compared to players of other video game genres. Compared to those with lower levels of PGB; however, participants with higher levels of PGB also had a greater number of and stronger online relationships; and they also had a smaller number of offline relationships and weaker offline relationships.

The type of passion players experience towards video games may also be contributing to the quantity and quality of their relationships in both domains. Utz and colleagues (2012) examined the link between passion and social capital in a survey of 406 MMORPG players (M_{age} = 23 years, *SD* = 8.13 years, 85% male). Social capital refers to the resources perceived to be available from interpersonal relationships. The authors found that participants who engaged voluntarily in MMORPGs (harmonious passion) tended to have a greater number of, and more meaningful online friendships. Harmonious passion was not linked to players' offline friendships. Those who experienced an urge or compulsion to play MMORPGs (obsessive passion) tended to report greater number of online friends. There was no link, however, between obsessive passion and the quality of players' online friendships. Their findings also suggested that greater time spent playing was associated with fewer offline friends, but only for players who experienced greater obsessive passion.

Moreover, Perry and colleagues (2018) reported similar findings with regards to the two types of passion and social capital. In their survey of online users of a specific MMORPG (*N* = 2030, M_{age} = 25 years, *SD* = 8.05 years, 93% male), they found that participants who played with others tend to have a greater number of friendships, but only if they their gaming was characterized by harmonious passion. Playing with offline friends was associated with greater social bonding, playing with strangers was associated with social bridging, and playing with online-only friends was associated with both bonding and bridging. Thus. it will be important to examine video game structure and demographics, as well as players' engagement with the game and their interpersonal relationships in order to better understand PGB.

Models of Problematic Internet Use

Considering there is no framework specifically for understanding the etiology of PGB, studies have looked to the cognitive behavioural model of pathological Internet use (Davis, 2001) as a guide for identifying PGB features. According to this model, "pathological Internet use results from problematic cognitions coupled with behaviours that either intensify or maintain the maladaptive response" (Davis, 2001, p. 188). As such, cognitive symptoms of pathological Internet use (e.g., ruminative coping, low self-worth, social anxiety) lead to affective or behavioural symptoms (inability to stop using the Internet, less time spent on other pleasurable activities). There are two types of pathological Internet use: specific pathological Internet use (dependence associated with specific function of the Internet) and generalized pathological Internet use (general overuse of the Internet, at times, without a clear objective). Distal causes of pathological Internet use are understood in terms of a diathesis-stress approach, such that having a pre-existing vulnerability to developing pathological Internet use and experiencing a stressful life event are both necessary components to developing pathological Internet use.

The cognitive behavioural model highlights the role of players' perceptions and beliefs about their interpersonal relationships. Davis (2001) posits that social features of the Internet are associated with pathological Internet use, particularly generalized pathological Internet use. For example, a proximal cause of generalized pathological Internet use is maladaptive cognitions about the self (e.g., I am only good online) and the world (e.g., people treat me badly offline), which leads to acting on these cognitions when on the Internet (e.g., spending more time online) and reinforcement (e.g., experiencing positive online interactions) and maintenance of the behaviour. Ruminative cognitive styles may promote more maladaptive responses to pathological Internet use (e.g., spending time thinking about problematic use) and interfere with

more adaptive responses (e.g., problem solving or seeking intervention). Thus, offline social isolation and/or lack of social support may contribute to generalized pathological Internet use as users create, are reinforced by, and maintain an online social life.

These proximal and distal causes of generalized pathological Internet use may be applied to PGB, a specific pathological Internet use. Individuals who play online games may be initially reinforced by different rewards (e.g., online social interactions, in-game rewards, mood shift), but go on to experience secondary reinforcement when they ruminate about their experiences in the game, which promotes play and may maintain PGB. Indeed, studies have shown that low social competence, self-esteem, and loneliness are predictive of PGB (Lemmens et al., 2011). Players' attachment to their characters may also contribute to their development of self-identity and maintain gaming behaviour (Lewis et al., 2008).

Using Davis' (2001) model as a guide, King and Delfabbro (2014) reviewed a total of 37 empirical studies and intervention evaluations on cognitions related to PGB. The findings suggested four major cognitive factors, which the authors suggest are associated with *DSM-5* criteria for IGD. The factor "beliefs about game reward value and tangibility" is relevant to *DSM-5* criteria of preoccupation and loss of interest in previous hobbies and entertainment. The factor related to "maladaptive and inflexible rules about gaming behaviour" is relevant to tolerance, unsuccessful attempt to control gaming behaviour, and continued excessive use despite awareness of problems (King & Delfabbro, 2014). Similarly, the factor pertaining to "over-reliance on gaming to meet self-esteem needs" is relevant to withdrawal and use of gaming as means of escape. Lastly, the factor of "gaming as a method of gaining social acceptance" is relevant to jeopardized quality of life (occupational or relationship) due to gaming.

The fourth factor of "gaming as a method of gaining social acceptance," which includes cognitions associated with social relatedness, competition, social avoidance, and sense of belonging, captures some of the factors that contribute to the present investigation of PGB as it relates to online and offline interpersonal relationships. Individuals who have these cognitions believe that only their fellow players can understand them, that winning in-game competitions will contribute to social gain, that gaming will provide an escape from social failure, and that gaming communities provide a sense of belongingness. The authors also highlighted the potential role of this fourth factor as a clinically significant feature of IGD. These findings by King and Delfabbro (2014) corroborate Davis' (2001) model, which suggests that cognitions about the self and the world may lead adults to turn to games to feel safe, personally accomplished, and in control, and to promote self-esteem.

Overall, the cognitive model of pathological Internet use provides a framework for understanding how individuals' perceived quality of their relationships may contribute to developing PGB. However, the literature on PGB is still very limited and further research is needed to map out the development of PGB. Given that the PGB literature is relatively new, some researchers have turned to the problematic gambling literature, which is more established, as a guide for investigating the features of problematic gaming. One model in particular, known as the pathways model, suggests that there are different subtypes of problematic gamblers. Because clinically significant PGB shares similar features as pathological gambling, it is possible that PGB may also be understood in terms of gamer subtypes and that inconsistencies in the literature may be traced to differences between these gamer subtypes. Furthermore, the social interactions and relationships of online gamers may be particularly relevant and warrants further

examination. Thus, the pathways model of pathological gambling will be explored in the present investigation of PGB, as well as gamers' online and offline interpersonal relationships.

Pathways Model of Pathological Gambling

Gambling disorder is a nonsubstance-related addictive disorder listed in the *DSM-5* and is characterized by "persistent and recurrent problematic gambling behaviour leading to clinically significant impairment or distress" within a 12-month period (APA, 2013, p. 585). The pathways model of gambling, proposed by Blaszcynski and Nower (2002), has been widely used in research to understand the development and characteristics of gambling disorder and in clinical settings to guide case conceptualization and intervention planning (Séguin et al., 2013; Tirachaimongkol et al., 2010). According to this model, there are three major pathways that lead to pathological gambling and gambling disorder: behaviourally conditioned, emotionally-vulnerable, and antisocial impulsive risk-taker.

Behaviourally conditioned gamblers (Pathway 1) do not present with premorbid psychopathology (i.e., psychopathological symptoms prior to development of gambling behaviour), and their problems are mostly a result of cognitive distortions about gambling (e.g., chances of winning) and operant conditioning (e.g., reinforcement). *Emotionally-vulnerable* gamblers (Pathway 2) present with premorbid mood disorders, and may have longstanding problems with coping, problem solving, and past traumatic experiences that may lead them to use gambling as an escape. *Antisocial impulsive risk-taker* gamblers (Pathway 3), which are believed to be a subset of the emotionally-vulnerable gamblers, share similar features as the emotionally-vulnerable, and exhibit problems with attention, as well as impulsive and antisocial behaviour.

There is a considerable number of studies that have found empirical support for the pathways model. For example, Milosevic and Ledgerwood (2010) conducted a comprehensive review of the literature between 1970 to 2009 on empirically and clinically subtypes of pathological gamblers and examined 17 relevant publications. They found that three distinct subtypes were consistent across the literature and appear to map onto subtypes presented in the pathways model. The first subtype is characterized by high levels of depression and anxiety, emotional vulnerability, and a tendency to use escape-related coping strategies. The second subtype is characterized by impulsivity, sensation-seeking, and antisocial behaviour. Lastly, the third subtype is characterized by less severe problems, low levels of impulsivity and sensation-seeking, and external motivations for gambling (e.g., social pressure, behavioural conditioning).

Nower and Blaszcynski (2016) developed and assessed the validity of a gambling pathways questionnaire based on the pathways model on 1,176 gamblers (age 18 and older) in Canada, the United States, and Australia. Their factor analyses findings provided support for the three pathways and supported the use of their questionnaire to assess gambling subtypes. The clusters were distinguished by characteristics such as antisocial traits, impulsivity, risk-taking, sexual risk-taking, gambling as a means to cope, pre-problem-gambling mood disorders, post-problem-gambling mood disorders, and gambling as a purpose in life. Overall, the severity of pathological gambling behaviour for behaviourally conditioned gamblers was significantly lower compared to the other two clusters. Classification as an antisocial impulsive risk-taker gambler was not significantly associated with mood disorder symptoms prior to developing gambling problems, but participants in this group seemed to exhibit mood disorder symptoms following gambling. Unlike the original model, the findings suggested that the antisocial impulsive risk-taker cluster was distinct from the other two clusters rather than a subset of the emotionally-

vulnerable cluster. These results are similar to those reported by Milosevic and Ledgerwood (2010) and supported the three-factor pathways model of pathological gambling.

Understanding PGB based on the Pathways Model

The literature on pathological gambling may serve as a guide for understanding the features of PGB. Considering that clinically significant PGB and pathological gambling share similar clinical features (Kuss & Griffiths, 2012a, 2012b) and result in similar structural changes in and activation patterns of the reward system in the brain (Kim et al., 2014; Kühn & Gallinat, 2014; Weinstein & Lejoyeux, 2015), it is possible that the factors associated with the three subtypes observed in pathological gambling may also be contributing to the development and maintenance of IGD. Early instruments used to measure PGB were based on the *DSM-IV* (APA, 2000) criteria for gambling disorder; such as Salguero and Morán's Problem Video Game Playing Scale (2002), which included preoccupation, tolerance, loss of control, withdrawal, escape, deception, and disregard. The *DSM-5* (APA, 2013) criteria for gambling disorder and the proposed criteria for IGD, respectively, include the need to increase behaviour to achieve the same desired effects, irritability or restlessness when attempting to control gambling/gaming, having persistent thoughts about gambling/gaming, unsuccessful effort to control gambling/gaming, continued behaviour despite awareness of negative consequences, and lying to others about frequency of gambling/gaming.

In their review paper, Lee and colleagues (2016) proposed a similar framework involving three major typologies: impulsive/aggressive, emotionally vulnerable, and socially conditioned. Players who are impulsive/aggressive tend to play games as a means to relieve aggressive impulses and reduce boredom. Those who are emotionally vulnerable play to escape negative emotions and experiences. Players who are socially conditioned fall within two additional

subtypes: covert and overt. Those who fall within the covert type are characterized by their avoidant personality, harm avoidance personality, and their tendency to socially withdraw. On the other hand, the overt type is characterized by their need for social recognition and narcissistic personality. Overall, the authors advocated for the need to examine empirical evidence for the role of social risk factors in predicting IGD subtypes and to examine game preferences of emotionally vulnerable players with IGD.

Thus, the current study aimed to examine if avoidance coping strategies, impulsivity, and antisocial behavior also contribute to PGB. Given that the literature on online gaming suggests that social motivations may be contributing to PGB, I also examined potential interpersonal risk factors of PGB (i.e., avoidant attachment, lack of interpersonal support, loneliness). The following sections review the literature on the factors associated with the pathways model of pathological gambling (coping behaviours, impulsive behaviour, and antisocial behaviour; Milosevic & Ledgerwood, 2010; Nower & Blaszcynski, 2016), along with the literature on interpersonal risk factors as they relate to playing online video games.

Although studies have reported evidence for the existence of *behaviourally conditioned* gamblers (Pathway 1), there is no standard quantitative method of identifying individuals who have developed gambling problems as a result of operant conditioning. Previous studies on the pathways model have examined samples of individuals who met criteria for pathological gambling, and the *behaviourally conditioned* pathway has served as a broad category for those who exhibited clinical features of pathological gambling but did not score high on factors suggesting *emotional vulnerability* or *antisocial impulsive risk-taking*. As such, the current study focuses on quantitatively examining three factors associated with these latter two pathways: avoidant coping, antisocial behaviours, and impulsive behaviours.

Gaming as a Response to Distress. Research has suggested that time spent playing MMORPGs may be associated with greater distress, particularly if players are using the game to escape from facing problems (Kuss & Griffiths, 2012b). MMORPG players may play games as a way to cope with distress, and aggression and to alleviate negative emotions (Demetrovics et al., 2011). However, as Young (2009b) suggested, playing games as a form of escape not only tends to exacerbate players' problems, but also interferes with opportunities to develop more adaptive coping skills. For example, studies have shown that individuals who use the Internet for mostly entertainment purposes, as opposed to informational or communication purposes, also tended to use more passive-avoidant strategies and rumination to cope with feelings of loneliness (Seepersad, 2004). These players also tended to report poorer commitment to, as well as intimacy and companionship with, their best friends and romantic partners (Blais et al., 2008).

King and Delfabbro (2014) reviewed 29 studies on the cognitive model of IGD and found several studies have reported that gamers who demonstrated more features of IGD also reported that they were motivated to play the game to avoid problems. Players were likely to become immersed in the game because it "provides an escape from unpleasant emotional states caused by core beliefs about the self, others, and the real world" (King & Delfabbro, 2014, p. 306). One participant, for example, explained that gaming allowed them to avoid specific social situations that they found uncomfortable. This may lead to alleviating the person's distress, but also reduces their opportunities for building on current social skills to better manage similar situations in the future.

Individuals' reasons for coping may also be contributing to the relationship between video game behaviour and psychological distress. A study by Loton et al. (2016) examined the role of coping in the relationship between video game addiction and engagement and mental

health (depression, anxiety, and stress) in adults ($N = 552$). Based on previous research by Charlton and Danforth (2007), they distinguished between *engagement* (intensely engaged and prioritizes video games but does not experience negative consequences) and *addiction* (experiencing negative consequences, as outlined in IGD features). The authors found that coping fully mediated the positive relation between engagement and stress, and between engagement and depression. Coping partially mediated the positive relation between engagement and anxiety. Gamers' degree of engagement with the game predicted their outcomes. Gamers who reported lower levels of engagement also tended to report less approach coping (e.g., active effort to manage problems) and more resignation/withdrawal (e.g., giving up on dealing with problems and withdrawing from others) coping, which in turn, was associated with less psychological distress. Participants who reported higher levels of addiction also reported less approach coping and more resignation/withdrawal coping, which was in turn associated with greater distress. Diversion coping (e.g., using other activities as a temporary distraction from problems) did not significantly contribute to the relation between psychological distress and engagement or addiction. Although playing video games as a temporary distraction from problems may not necessarily lead to negative consequences, greater use of these avoidance-related coping behaviours and giving up on dealing with problems may lead to significant psychological distress. Overall, few studies have investigated possible mediator or moderator variables in the relationship between gaming behaviour and players' outcomes (Loton et al., 2016), and exploring coping may provide insight to social outcomes in MMORPG players.

Antisocial and Impulsive Behaviours. There is limited research on PGB as it relates to antisocial, impulsive, and risk-taking behaviours, which have been associated with the third cluster of the pathways model of pathological gambling. Antisocial personality disorder is

characterized by the following features: failure to conform to social norms, deceitfulness for personal gain or pleasure, impulsivity, irritability or aggression, reckless disregard for self or others, consistent irresponsibility, lack of remorse (APA, 2013). Although there are no studies that have directly examined antisocial personality disorder and video games, there is empirical support for the link between PGB and relevant factors such as aggression, impulsivity, sensation-seeking, and self-control (Kuss & Griffiths, 2012b), which may serve as a guide for exploring the link between antisocial behaviours and PGB in MMORPG players.

MMORPGs may serve as a means to gain social acceptance, particularly as online interactions allow players to cooperate and/or compete with other players, and include features such as ranking systems (method for calculating players' progress and skill level and assigning a rank to players) and a leaderboard (a scoreboard showing the usernames and current scores of the players with the highest scores and/or rank; King & Delfabbro 2014). These features provide players with opportunities to increase their self-esteem by earning a higher social status and respect from others, which may attract individuals who exhibit narcissistic characteristics (e.g., having a grandiose sense of self-importance; a preoccupation with fantasies of unlimited success, power, brilliance, beauty, or ideal love; and may take advantage of others for personal gain; APA, 2013). Kim et al. (2008) examined 1,471 online game users (*M* age = 21 years) to explore the relationship between online game addiction and aggression, self-control, and narcissistic personality. They found that those who scored high on aggression and narcissism also tended to score high on addiction, whereas those who scored high on self-control reported lower levels of addiction. Thus, players who are more aggressive and exhibit more narcissistic traits may be at risk for developing more severe PGB.

In another study, Caplan et al. (2009) examined 4,278 (81% male, age 18 to 65 years) MMORPG players (i.e., *EverQuest 2*) to investigate the relation between game structure and characteristics, general problematic Internet use, aggression, depression, and anxiety. Higher scores on physical and verbal aggression predicted higher scores on pathological Internet use. Players who perceived a stronger sense of community from their online community were more likely to score high on pathological Internet use, whereas those who derived a stronger sense of community from their classmates and co-workers scored lower on pathological Internet use. Thus, players who exhibited more aggression and identified strongly with the online community were more likely to exhibit pathological Internet use.

MMORPGs require players to use psychological resources to attend to the game, perform and/or inhibit specific actions to meet a set of objectives, and engage in decision making. There is evidence to suggest that in striving to meet these demands, players may be left with limited self-regulatory resources to manage their life offline, which may make them less likely to engage in careful decision making. Harma et al. (2015) conducted two experiments (*n*s = 43 and 94, respectively) examining self-regulation and video games in adult participants. In the first experiment, participants assigned to the video game group were asked to play a multiplayer, first-person shooter (MFPS) game, whereas those in the Internet group were asked to browse the Internet the way they usually do for 10 minutes. Those in the video game group performed worse on a timed task requiring participants to attend to a set of words and pronounceable nonwords, and simultaneously distinguish real words from nonwords. Their findings suggested that video games may require a significant amount of self-regulatory resources, which leads to limited self-regulatory resources for completing the new task.

In their second experiment, participants were asked to do one of three tasks: (a) play a MFPS, (b) write down their momentary thoughts while trying to avoid thinking about a white bear, and (c) watch a video clip of someone's performance on the MFPS. They were then asked to work on an 11-letter unsolvable anagram to measure persistence. Those who were asked to play the MFPS and those who were asked to suppress their thoughts about the white bear showed less persistence compared to the third group who watched the video clip of someone playing video games. Consistent with the findings from their previous study, degree of engagement in video games predicted self-regulation outcomes. The findings suggested that engagement in video games may result in the depletion of self-regulation resources, which may interfere with individuals' ability to respond to other daily demands, and make them less likely to persevere in tasks or engage in active problem-solving strategies to deal with challenges.

Compared to individuals who play other video game genres, MMORPG players may be at greater risk for impulsivity compared to individuals who play other video game genres. Puerta-Cortés et al. (2017) surveyed 630 adults (ages 16 to 31 years) to investigate the role of passion for playing video games and impulsivity on playing time and preferred game genre. They distinguished between *harmonious passion* (playing video games is in harmony with other aspects of the individual's life) and *obsessive passion* (uncontrollable and persistent urge to play, which leads to interpersonal conflict). Their findings showed that MMORPG players spent more time playing video games and exhibited greater functional impulsivity (characterized by high risk-taking, quick decision-making, and enthusiasm, adventurousness, and higher activity level) compared to players of other video games. MMORPG players also exhibited greater harmonious and obsessive passion.

Taken together, players who are more physically and verbally aggressive and narcissistic are at greater risk for developing more severe PGB. Playing video games also requires use of self-regulation resources, which may result in players having less resources for other daily demands. MMORPG players, specifically, may spend more time playing and may be at risk for impulsive behaviours.

Interpersonal Risk Factors

Along with the pathways of emotionally-vulnerable and antisocial impulsive risk taking, I also posit that a social component unique to PGB will be observed, with features similar to King and Delfabbro's (2014) fourth cognitive factor of social acceptance, which they suggested as a unique feature of IGD. This is also in line with the findings from the study by Lortie and Guitton (2013), which examined fourteen existing questionnaires (from the years 1993-2011) designed to measure Internet addiction in order to evaluate their psychometric properties. The authors reported that measures tend to neglect social motivation as it relates to excessive playing, which is alarming considering that the social features of the Internet may be more addictive and more strongly associated with psychological problems and greater time spent online (Laffan et al., 2016; Li et al., 2015; Young, 2009b).

Previous studies have reported that, similar to MMORPG players, social environment may be particularly important for specific gambling populations. Tirachaimongkol et al. (2010) used the pathways model as a guide for their review of the literature investigating the routes to problem gambling in older adults (age 55 years and older) who developed problematic gambling later in life. They identified three clusters that were similar to the original model proposed by Blaszcynski and Nower (2002), but also emphasized a unique social component. The clusters

included individuals who struggled with behaviour regulation, were emotionally-vulnerable, and whose gambling behaviours were associated with various social and environmental factors.

Tirachaimongkol and colleagues (2010) noted that the third cluster, social and environmental, was more complex compared to the other clusters. It is characterized by gambling motivated by novelty-seeking, love of suspense, and impulsive temperament, which is similar to Blaszcynski and Nower's (2002) third pathway of antisocial impulsive risk-taker gambling. However, along with the components of antisocial impulsive risk-taking, the social and environmental cluster is also characterized by factors that are not emphasized in the original model, such as unsupportive environments (e.g., lack of recreational options, gambling as means to cope and manage discrimination and neglect in life), and a reliance on gambling as a main source of social interaction, sense of identity, and belonging. This second gambling cluster emphasized that the social features of gambling may promote increased play (e.g., social events and the care they perceive from staff members), which resembles the built-in social features of MMORPGs.

Because PGB refers to a continuum, ranging from a few symptoms of distress related to video game consumption to clinically significant distress, individuals with subclinical levels of PGB would exhibit severe versions of the nine proposed symptoms for IGD in the *DSM-5*. Understanding how social interactions may differ for individuals at different points of the PGB scale may guide us in our understanding of the interpersonal factors that contribute to developing more severe PGB. In order to understand the role of social acceptance and interpersonal relationships in developing PGB, the current study will examine interpersonal support, attachment, loneliness, and coping in MMORPG players. Because there are a limited number of

studies that are exclusive to MMORPG players, the literature review will focus on MMORPGs but also broadly extend to online video games to guide the investigation.

The following sections provide an overview of the literature on MMORPGs and online and offline interpersonal relationships, including social support, attachment and sense of belonging, loneliness, and coping as they relate to playing online video games.

Comparing Offline and Online Interpersonal Relationships

The social interaction component of MMORPGs has led some researchers to investigate its impact on users' online and offline interpersonal experiences. MMORPGs are characterized by built-in social features such as real-time chat systems and team-based objectives, which promote interactions between players. The flexibility of these chat systems allow players to communicate and discuss topics related to the game, as well as their experiences outside of the game. Because of these features, understanding the relationship between PGB and belongingness and social support within their offline and online relationships, may be more relevant to MMORPG players compared to other gamers (Barnett & Coulson, 2010).

Offline Relationship Quality. Very few studies have investigated the nature of online and offline relationships of MMORPG users. Although there is evidence to suggest that increased PGB may result in players spending less time on offline relationships, there is less consistency in the findings regarding the relationship between PGB and quality of offline relationships. Kowert et al. (2014) conducted phone interviews with 570 adolescents (age 17 and younger) who played computer and console video games to examine the link between video game play and participants' interpersonal relationships (number and quality). About 93% of the players reported playing video games with other players (either online, offline, or both). They found that participants who frequently played with other players online were more likely to

report lower levels of generally perceived emotional support in their relationships. Participants who frequently played online with other players also reported fewer number of confidants. That said, although this relation was significant, the frequency of playing with other players online only accounted for a small portion of the variance, which suggested that other factors may be contributing to the relationship between frequency of online play and number of confidants and degree of perceived emotional support.

Blais and colleagues (2008) found that Internet use predicted relationship quality, but relationship quality did not predict later Internet use. Those who reported using the Internet for gaming purposes tended to report reduced levels of commitment, trust, and communication in their romantic relationships, whereas those who reported using the Internet for instant messaging current best friends and romantic partners were associated with more positive relationships with these individuals. These findings suggested that gamers may be spending more time playing video games rather than spending time on their existing friendships.

On the other hand, it is also important to remember that MMORPGs are structurally different from other video games and allow the use of the Internet for both gaming and communication purposes. MMORPGs may also be qualitatively different than other games as the options for communication may be similar to communicating via telephone. This poses some challenges for generalizing Blais and colleagues' (2008) findings to MMORPGs. Indeed, studies have shown that online gaming may also serve as a means to stay in touch with significant others, particularly for those who are geographically distant from their partners, friends, and/or relatives (Hussain & Griffiths, 2008).

A study by Snodgrass et al. (2011) examined players on *World of Warcraft*, a MMORPG game, to investigate the relationship between PGB and players' social interactions using

participant-observation, rating scales, and questionnaires. Their findings suggested that less time spent playing games with existing, offline friends was associated with greater PGB, even after controlling for players' offline relationship satisfaction. Their qualitative analyses also suggested that playing with existing, offline friends may reduce PGB and promote better offline quality of life. Players reported being able to transfer game-based achievement and success into offline accomplishment by sharing them with friends and family who play online with them. These offline friends may also contribute to monitoring and regulating participants' gaming behaviour. Thus, spending time playing MMORPGs with friends and family members with whom participants maintain an offline relationship may contribute to reducing risk for PGB.

Studies suggest that although playing MMORPGs may interfere with time spent on offline relationships, this does not necessarily result in poorer social quality of life. Smyth (2007) examined the relation between online gaming behaviour and offline interactions in 100 university students, aged 18 to 20 years old. The participants were randomly assigned to play one of four types of video games (arcade, console, solo computer, and MMORPG) and were asked to rate the degree to which they enjoy video games, and to rate their overall health, sleep quality, academic performance, social life, and well-being. The results showed significant group differences at one-month follow up, with MMORPG players reporting spending more hours playing, and experiencing greater enjoyment and interest in continuing to play the game. MMORPG players also reported having a greater number of new online friendships, and fewer opportunities for socializing with other people offline. Interestingly, when asked to rate the overall quality of their social life, there were no significant group differences between the ratings of the MMORPG players compared to the other gamers.

These findings suggest that although dedicating more time to playing MMORPGs may leave players with less time for other activities, other interpersonal factors may be compensating for the reduction in the time they spend on their offline relationships. One possible explanation for this finding regarding social quality of life is that players may be benefiting from positive online interactions and relationships, which may be attenuating the reduction in their offline interactions. It is still important to note, however, that MMORPG players in the study experienced more negative outcomes in other domains compared to other gamers, including significantly worse health, poorer sleep quality, and interference with school work.

Online Relationship Quality. MMORPGs may provide players with access to welcoming and supportive environments, which promote the development of new relationships and may encourage players to spend increasing amounts of time playing. As MMORPG players spend more time playing online, they may be benefiting from their social interactions through the game. A considerable number of studies have reported finding a relation between increased interaction between players in MMORPGs and the increased opportunity for developing online friendships that players value.

Hussain and Griffiths (2008) surveyed 119 online gamers (18 to 69 years old), recruited from mostly MMORPG websites, to examine the impact of online gaming behaviour and online socializing in their lives. They found differences between players' ratings of perceived level of acceptance by others within their online and offline communities. About 28% reported that "online gaming satisfied their social needs that were not satisfied in the real world" and cited reasons such as having the freedom to engage in online conversations with strangers without fear of being perceived as odd, the opportunity to connect with long-distance friends and relatives,

and the consistent availability of online friends despite their own frequent change in residence or geographic location.

About 21% reported that they preferred to socialize online rather than offline, and some of their reasons included: perceiving communication to be more effective and the online community as generally more accepting and less prone to judgment based on physical appearances; and the in-game objectives as a promotion of friendship and camaraderie between players. On the other hand, 67% reported that they preferred socializing offline. Very few elaborated on their responses. One player reported finding less fulfilment from discussing online characters compared to "real" people, whereas another player reported that she could not choose between online and offline relationships as they were different and equally satisfying.

Other studies corroborated the finding that some players perceive online relationships to be more supportive. In their survey of 912 MMORPG players, Cole and Griffiths (2007) found that most players (76.2% of male gamers and 74.7% of female gamers) developed new, supportive relationships through online gaming. They also shared intimate conversations within these relationships, and 39.3% reported discussing sensitive issues (e.g., family and work problems, loss, sexuality, discrimination) with online friends that they would not discuss with their offline friends. Thus, online game features may create unique opportunities for social interactions that are different from offline social interactions, but players may not necessarily perceive these differences to be detrimental, and some even perceive them as promoting the development of positive online relationships.

Although players may perceive online communities as supportive, these relationships may not be enough to alleviate the negative consequences associated with playing MMORPGs as a means to cope with problems. Kaczmarek and Drazkowski (2014) surveyed 1,053 participants

(age 12 to 49 years) recruited from MMORPG message boards to examine the pathways (via offline social support, online social support, gaming time, and beliefs about game realism) that mediate the relation between using MMORPGs to escape from problems and poor psychological well-being (defined as experience of pleasure, engagement, and meaning in their lives). Greater time spent playing games, stronger belief in the realism of the gaming environment, and use of MMORPGs to cope with problems predicted lower levels of offline social support. Players who spent more time playing online and reported perceiving the game as more realistic were more likely to report greater perceived support from online players, which was in turn associated with better well-being. It is important to note that this effect was still significant after controlling for offline social support, which suggests that the impact of this online social support is independent from perceived offline social support. That said, greater online social support did not appear to compensate for poorer offline social support. Those who spent more time with online players and had poorer offline social support also reported poorer well-being. Hence, there may be other factors that may be restricting the degree to which players can benefit from having a supportive online community.

Overall, there is some evidence to suggest that playing MMORPGs may be associated with the development of new online relationships and associated with reduced opportunities for offline social interactions. The link between video gaming behaviour and quality of players' online and offline relationships, however, is unclear. In order to better understand this link, it is important to examine other factors that are associated with PGB and players' online and offline relationship quality. As such, the current study will also explore attachment and coping behaviour, which are widely accepted as contributing factors to relationship quality, as moderators in the relation between playing MMORPGs and interpersonal relationship quality.

The following sections will review attachment and perceived sense of belonging, and loneliness and coping as they pertain to MMORPG players.

Attachment and Sense of Belonging

Players' attachment styles may be contributing to the quality of their online and offline relationships. According to attachment theory, early childhood experiences with individuals' primary caregivers shape individuals' expectations and beliefs about the availability of others as a source of trust and security (Ainsworth et al., 1978). Brennan et al. (1998) suggested two fundamental dimensions of adult attachment: attachment-related anxiety and attachment-related avoidance. *Attachment-related anxiety* is characterized by a pattern of worrying about the availability, responsiveness, and attentiveness of others. *Attachment-related avoidance* is characterized by a reluctance to rely on other people or opening up to others. Adult attachment style has been linked to interpersonal behaviours and emotional well-being related to romantic love and friendships (Fraley & Shaver, 2000). As online communication through the Internet has become more readily available, researchers have turned to investigating how online relationships may be influenced by attachment styles. For example, Jenkins-Guarnieri and colleagues (2012) examined attachment style, personality traits, and self-esteem as they related to Facebook use. Their findings suggested that those with lower levels of anxious attachment were more likely to initiate relationships, and those with lower avoidance attachment tended to report greater perceived competency at providing emotional support to others.

Given the online communication available through online video games, the attachment literature has also expanded to include some studies on MMORPGs. Based on attachment theory, MMORPG players' online and offline relationships are likely to be influenced by the degree to which they worry about whether people are available to provide them with care and support, and

their level of comfort when it comes to sharing personal experiences with others, online or offline. A study by Kowert and Oldmeadow (2015) found that players' attachment styles may predict their motivation for playing and the types of video games they play. They surveyed 409 participants (age 18 to 39 years, 62.6% male) to investigate the relation between social skills and online video game involvement using an attachment theory framework. Among the individuals who played exclusively online, those who reported higher levels of either attachment avoidance or attachment anxiety were more likely to play when feeling negative emotions and less likely to play when feeling positive emotions. However, they found that higher levels of avoidant attachment predicted playing exclusively online video games more often and predicted playing exclusively offline video games less often. Those who reported greater levels of attachment avoidance also reported playing online when feeling negative emotions. On the other hand, greater attachment anxiety was associated with playing both online and offline when feeling negative emotions. Players low on social expressivity (ability to verbally communicate with others) and high on emotional sensitivity (ability to understand and respond to nonverbal communication) tended to report greater game involvement. Higher scores on game involvement also corresponded to greater playing frequency, greater variety of games played, and greater levels of perceived identification with an online gaming community (e.g., "*I feel strong ties with other gamers*").

Their findings suggest that unique features of the online gaming environment may be particularly useful and appealing to those scoring high on avoidant attachment. Moreover, players with greater avoidant attachment may also benefit from the format of communication (i.e., chat system) available in online games, which may promote more playing. Players low on social expressivity and high on emotional sensitivity may also be more attracted to playing

online and feel closer to the online gaming community, which promotes greater involvement with the game.

There is also evidence to suggest that some MMORPG players turn to online gaming to compensate for social needs that are not met offline, such as the opportunity to communicate with others without fear of judgment and for the opportunity to experience a greater sense of acceptance from others (Hussain & Griffiths, 2008). This is in line with previous findings that online video game players are motivated by social features of the game (e.g., meeting and getting to know other players, spending time playing with others online, belonging to a group or community and having company; Demetrovics et al., 2011). As such, having social motivations for playing may maintain playing behaviour (Li et al., 2015).

Limke-McLean (2018) examined MMORPG players' attachment styles, and their findings suggested that those who spent more time playing online (daily) were more likely to report higher levels of avoidant attachment. Those who spent more time playing tended to report less relationship satisfaction and greater uncertainty in their romantic relationships, and the link between these variables were partially explained by greater avoidant attachment. Limke-McLean suggests that the negative outcomes reported by individuals with greater avoidant attachment may indicate that players' attachment styles may be reflected in their avatar's behaviours, such that players with higher avoidant attachment may perceive forming relationships with online players as less beneficial and have more difficulty with forming intimacy and commitment with other players.

Loneliness and Coping Behaviours

Coping refers to the cognitions and thoughts an individual uses to manage taxing life demands (Lazarus & Folkman, 1984), and it has been reliably associated with reduced

psychological distress. Researchers have identified various coping behaviours, some of which have been identified as adaptive because of their link to better emotional outcomes. For example, studies have found that avoiding the problem or wishing the problem away is associated with worse emotional adjustment compared to strategies such as acceptance and defining the problem (Kneebone & Martin, 2003).

Carver (1997) identified 14 coping behaviours which have been extensively examined to predict health outcomes and led to the coping measure known as the BriefCOPE: active coping, planning, instrumental social support, emotional social support, denial, substance use, behavioural disengagement, venting, positive reframing, humour, religion, acceptance, self-blame, self-distraction. Although avoidance coping is widely associated with poorer health outcomes, the research on social support coping indicate mixed findings. Bose and colleagues (2015) conducted a confirmatory factor analysis on the 14 behaviour scales within the BriefCOPE, and they identified that avoidance coping was comprised of behavioural disengagement, denial, and substance use whereas social support coping was comprised of seeking emotional support, seeking instrumental support, and venting. The authors found that greater avoidance coping in patients with chronic illness were linked to greater physical and mental health problems; however, there was no support for the role of social support coping in predicting physical and mental health problems. On the other hand, a study by Park and colleagues (2008) found that, contrary to their expectations, greater social support coping was linked to better physical and mental health (Park et al., 2008).

Using a coping lens to understand gaming behaviour, individuals may be using online gaming as a means to manage current life stressors. Players motivated by the opportunity to connect with other people online may be more drawn to the larger group of players available in

MMORPGs. Along with its social features, MMORPGs are characterized by indefinite end goals and objectives, and may be accessible any time of day (Chan & Vorderer, 2006), which may allow players to socialize with others whenever they are experiencing loneliness. Seepersad (2004) found that adolescents who reported engaging in more passive-avoidant behaviours (e.g., over-eating or watching TV to avoid problems) to deal with loneliness also used the Internet mostly for entertainment purposes and valued this feature of the Internet the most, as opposed to its communication and information features. Adolescents who tended to use avoidant coping strategies tended to use the Internet for communication purposes; however, they did not consider these interactions to be meaningful. Thus, it would seem that strategies for coping with loneliness, much like attachment style, may be contributing to individuals' motivations for playing online video games and their perceived quality of their relationships.

A more recent study by Kowert et al. (2015) examined the directionality of the relation between online video game playing and poorer well-being (loneliness, self-esteem, life satisfaction, and social competence) in gamers across different age groups: adolescents (age 14 to 18 years; *n = 110)*, young adults (age 19 to 39 years; *n = 358*) and older adults (age 40 and over; *n = 423)*. The findings suggested that although loneliness was associated with greater frequency of playing online video games, further analyses showed that it was not a significant predictor of frequency of playing online video games over time. Loneliness also did not decrease over time, despite changes in frequency of playing.

These studies suggest that although individuals experiencing higher levels of loneliness may be more likely to play online video games, other factors may be contributing to this relation between loneliness and frequency of playing. Studies have shown that players are motivated by their urge to escape from problems and to use online video games to cope with aggression and

improve their mood (Demetrovics et al., 2011). Thus, it is possible that coping behaviour plays an important role in determining playing behaviour. Players may be turning to online video games to manage feelings of loneliness and are continuing to play despite the lack of perceived reduction in loneliness.

Previous studies have focused on the relationship between frequency of playing online games and players' social outcomes and mental health. Although it is important to our knowledge of PGB as a whole, focusing on excess frequency of playing, alone, may restrict our understanding of the factors that contribute to PGB severity. One study by Lemmens et al. (2011) explored the relation between pathological gaming and well-being by conducting a longitudinal survey on 543 adolescent video game players, age 11 to 17 years. They found that well-being (social competence, self-esteem, loneliness, and life satisfaction) was not significantly associated with time spent playing games, but it was associated with pathological gaming. In their study, pathological gaming was based on the *DSM-IV* criteria for pathological gambling and included the following seven criteria: (a) salience, (b) tolerance, (c) mood modifications, (d) relapse, (e) withdrawal, (f) conflict, (g) problems. Adolescents who had poorer well-being (loneliness, self-esteem, or social competence) also had more symptoms of pathological gaming. Interestingly, loneliness appeared to be both a cause and a consequence of pathological gaming. Those who reported greater loneliness at Time 1 were more likely to report greater pathological gaming at Time 2, and those who reported pathological gaming at Time 1 were more likely to report greater loneliness at Time 2.

Other factors may be contributing to this relation between loneliness and PGB. Players who are experiencing loneliness may turn to MMORPGs to alleviate their mood (King & Delfabbro, 2014). Players with greater PGB may experience a reduction in the time they spend

on their offline relationships as they spend more time playing and dedicate more time to their online relationships. As a result, they experience greater loneliness, as online social support may not be enough to compensate for poor offline social support (Kaczmarek & Dražkowski, 2014). Altogether, the literature suggests that factors such as social support, attachment, sense of belonging, loneliness, and coping may be associated with PGB in MMORPG players.

Methodological Challenges with Studying PGB

The inconsistent terminology and limited knowledge regarding the features of PGB make it difficult to evaluate the reliability and validity of existing assessment instruments, which serves as an obstacle for producing an adequate report of the prevalence of clinically significant PGB. A nationwide survey in Germany by Rehbein and colleagues (2010) used the KFN-CSAS-II (Video Game Dependency Scale), based on the Internet Addiction Scale (IAS-20; Hahn & Jerusalem, 2001) to assess a sample of grade 9 students and found that 3% of males and 0.3% of females met the clinical criteria for video game dependency.

Kuss and Griffiths (2012b) examined 10 existing studies on the prevalence of Internet gaming addiction and found that gaming addiction was present in 8% of video gamers in one study (Porter et al., 2010) and 12% of online gamers met three or more criteria for addiction in another study (Grüsser et al., 2007). Overall, they reported discovering large variability in the prevalence estimates of PGB, which, as other systematic reviews suggest (e.g., King et al., 2013), may be due to the inconsistent assessment instruments, criteria, and samples.

Previous studies on video games have used various types of instruments for assessing PGB, along with different criteria for identifying clinically significant PGB. Earlier studies have adapted Young's (1996a) Internet Addiction Test (IAT), an 8-item questionnaire for Internet addiction, which was originally based on the *DSM-IV*'s criteria for pathological gambling. Other

instruments consist of multiple subscales reflecting Griffith's (2005) video game addiction components model. These tools tend to take a cut-off score approach to determining classification for problematic video game playing.

In contrast, some studies take a more dimensional approach to assessing pathological gaming by adapting Charlton and Danforth's (2010) scales on addiction and engagement. Other measures have incorporated Davis' (2001) model of pathological Internet use (e.g., Caplan, 2002), which evaluates the individual's experience of a combination of game-related cognitions, behaviours and outcomes. Lastly, there are studies that have taken a combination of specific items from different tools designed for assessing addiction. For example, Wong and Hodgins (2014) measured video game addiction using items from the Charlton and Danforth's (2010) addiction and engagement scale, King and colleagues' (2010) Video Game Playing Motivation Scale, and Lemmens and colleagues' (2009) Gaming Addiction Scale.

King and colleagues (2013) analyzed 18 instruments for pathological video gaming based on Cicchetti (1994) and Groth-Marnat's (2009) standards for sound psychometric assessment. They found that the instruments had excellent internal consistency and convergent validity and were potentially adequate for developing standardized norms, at least for adolescents. However, the measures were inconsistent in their range of addiction-related components and criteria for clinical diagnosis, had limited support for predictive validity and inter-rater reliability, and were inconsistent, or had limited dimensionality (number of variables reflected in the items, and correlation between the dimensions). Across all the instruments, the only consistent criterion for addiction was interpersonal conflict, which suggests consensus regarding the importance of players' relationships with others in understanding PGB.

An evaluation of these different instruments led to the decision to use the Internet Gaming Disorder Scale (Lemmens et al., 2015) for the current study, which is based on the nine core criteria recommended in the *DSM-5*. Unlike its predecessors, it is composed of three items for each of the nine criteria, providing better dimensionality. It has also been reported to have good reliability and criterion validity (Sioni et al., 2017).

Summary and Overview of the Present Study

Overall, the evolution of video games has resulted in significant changes in terms of its audience and game structure and features, which have a profound impact on users' social experiences. In some cases, players may exhibit *problematic gaming behaviour* (PGB), which refers to a continuum ranging from a few symptoms of distress related to video game consumption to clinically significant PGB.

Compared to other genres, *Massively Multiplayer Role Playing Games (MMORPGs)* have built-in social features that seem to more closely mimic offline interactions, promote greater engagement with the game, increase playing time in users, and has been linked to PGB (Festl et al., 2012; Kuss & Griffiths, 2012b; Rehbein et al., 2010). However, the literature on the interpersonal relationships of MMORPG players are limited and mixed in their findings. For some players, these opportunities for social interaction and social presence may encourage continued play and promote PGB (Li et al., 2015; Williams et al., 2008). Playing MMORPGs has also been linked to reduced time spent on relationships outside of the game, although the reports on its effects on relationship quality are mixed (Kowert et al, 2014; Smyth, 2007). Studies have also found that players may benefit from developing supportive relationships online (Hussain & Griffiths, 2008), though it is uncertain if these online relationships may serve to alleviate unsupportive offline relationships (Kaczmarek & Dražkowski, 2014).

These findings lead me to believe that along with video game genre and time spent playing, other factors, such as attachment style and coping behaviour may be contributing to the association between playing MMORPGs and relationships online and offline. There is some evidence to suggest that players who report higher levels of avoidant and anxious attachment are more likely to play online video games to alleviate negative emotions (Kowert & Oldmeadow, 2015). Overall, however, very few studies have assessed the quality of MMORPG players' online and offline relationships, and further research is needed. Thus, the current study examines the link between MMORPG players' online and offline relationship quality; their attachment style and coping behaviour; and how relationship quality, attachment style and coping behaviour relate to PGB.

Despite the growing literature on video games, very little is known about the interpersonal risk factors related to PGB and the development of clinically significant problematic gaming. In order to understand PGB, previous studies have looked to pathological gambling, which closely resembles problematic gaming in terms of clinical features and physiological responses (Kim et al., 2014; Kühn & Gallinat, 2014; Kuss & Griffiths, 2012a; Weinstein & Lejoyeux, 2015) and is founded on a more established body of literature. In the present study, informed by the literature on pathological gambling, it is expected that PGB may be linked to avoidant coping, antisocial, and impulsive risk-taking behaviours (Blaszcynski & Nower, 2002). Social environment may also be particularly important for specific gambling populations (Tirachaimongkol, Jackson, & Tomnay, 2010), which is consistent with previous research emphasizing social motivations for online gaming. Hence, there is reason to believe that factors, such as perceived social support, sense of belonging, loneliness, and attachment, may play a role in the development of PGB in MMORPG players.

Although the literature on video games have mainly focused on children and adolescents due to interest exploring the disruptive effects of gaming on child development, there is evidence to suggest that tasks such as developing coping strategies and positive interpersonal relationships are important throughout adulthood and contribute to adult well-being (Carlsson et al., 2015). Moreover, the video game market has expanded over the years to attract adults, with the average age of video game users estimated at 31 to 35 years old (Entertainment Software Association, 2015, 2016). Thus, examining an adult population would be representative of the online gaming population as it stands today.

The present study aimed to better understand the quality of online and offline relationships in adult MMORPG players and how this relates to their risk for developing PGB. To do this, the first objective was to examine whether time spent playing MMORPGs, avoidant attachment, and coping style would predict interpersonal support and loneliness, and whether this generalizes to both online and offline experiences. Participants completed self-report questionnaires assessing their perceived support from their online and offline relationships, degree of online and offline loneliness, and gamer identity. Although previous studies have examined general perceived social support and loneliness across players' relationships, very few have examined them within the context of online and offline relationships, independently.

The second objective was to examine risk factors related to levels of PGB. Using some of the variables included in the pathways model for pathological gambling (Blaszczynski & Nower, 2002) as a guide, participants completed questionnaires assessing their coping behaviour, antisocial and impulsive behaviours, and interpersonal risk factors (i.e., avoidant attachment, interpersonal support, loneliness) as predictors of levels of PGB. Although the main analyses included factors that have been associated with problematic gambling, the current study did not

aim to explore direct links between PGB and gambling. Understanding PGB in MMORPG players can expand our knowledge of specific mechanisms contributing to social benefits and problems in these individuals and allows for the development of prevention and intervention methods for players experiencing significant distress and who are at risk for IGD.

Hypotheses

Hypothesis 1a: Time spent playing will negatively correlate with interpersonal support and positively correlate with loneliness, in offline relationships

One of the major motivations for using the Internet, and specifically with regards to playing online video games, is the opportunity for social interactions with other players. Players who report being socially motivated to play online video games, also report spending more time playing the game and may be at greater risk for experiencing psychological problems. As a result, they may have less time for, and perceive less support from these relationships. Given that MMORPGs are characterized by features that encourage social interaction (e.g., built-in chat) and greater playing time (e.g., availability and access, perpetuity of objectives), it was predicted that time spent playing will be negatively associated with social support and positively associated with loneliness. Specifically, those who spend more time playing MMORPGs were expected to report less perceived social support and greater loneliness in their offline relationships, compared to those who spent less time playing.

Hypothesis 1b: Time spent playing will positively correlate with interpersonal support and negatively correlate with loneliness, in online relationships

MMORPG players have reported that the online community may serve as a source of social support, and playing has led to the development of new relationships, particularly for those who spend more time playing MMORPGs. Specifically, those who spend more time playing

were expected to report greater perceived social support and less loneliness in their online relationships, compared to those who spend less time playing.

Hypothesis 1c: Time spent playing will positively correlate with gamer identity

Along with a strong sense of belonging with the online gaming community, those who spend more time playing MMORPGs may have a stronger sense of gamer identity. This is also consistent with research on the pathways model of pathological gambling, which suggests that for some pathological gamblers, gambling provides a sense of identity. Thus, it was expected that time spent playing will be associated with gamer identity. Specifically, those who spend more time playing MMORPGs were expected to report that they identified more with being a gamer and/or identified with the other gamers in their online community.

Hypothesis 2a: Avoidant attachment will positively correlate with time spent playing

Given that previous studies have shown that MMORPGs may appeal specifically to individuals with greater avoidant attachment, it was expected that those with higher scores on avoidant attachment would spend more time playing MMORPGs, compared to those with lower scores on avoidant attachment.

Hypothesis 2b: Greater time spent playing will predict less interpersonal support and greater loneliness, as moderated by avoidant attachment

Mixed findings on the role of increased time spent playing and perceived online interpersonal support and loneliness suggests that other factors may be interfering with players' opportunities to benefit from online interactions. It is widely accepted that attachment style influences individuals' beliefs about the availability of others as a source of support. Thus, it was expected that attachment style would moderate the relation between time spent playing and each of the variables of interpersonal support and loneliness, such that greater time spent playing

would be associated with less social support and greater loneliness, both online and offline, for participants who report higher levels of avoidant attachment.

Hypothesis 3a: Greater time spent playing will predict less interpersonal support and greater loneliness, as moderated by avoidance coping

Avoidance-related coping behaviour has been associated with relationship quality. Moreover, there is considerable evidence suggesting that video game players are often motivated to play video games as a means to escape problems (similar to avoidance coping). Thus, it was expected that coping behaviour would moderate the relationship between time spent playing and each of the variables of interpersonal support and loneliness, such that greater time spent playing would be associated with less social support and greater loneliness, both online and offline, for participants who report higher levels of avoidance coping behaviours.

Hypothesis 3b: Greater time spent playing will predict greater interpersonal support and less loneliness, as moderated by avoidance coping

Individuals who tend to use social support coping may be actively seeking support from friends and family members, but also use MMORPGs to seek social support from others online. Unlike individuals who play online as an escape or to avoid dealing with their problems, those who play online seeking social support may perceive greater social support and less loneliness from their relationships. This social motivation has been found to contribute to promote continued play of MMORPGs. Thus, it was expected that greater time spent playing would be associated with greater social support and less loneliness, online and offline, for participants who report higher levels of social support coping behaviours.

Hypothesis 4: Greater avoidance coping, antisocial behaviour, and impulsive behaviour will predict greater PGB

Pathological gambling has been widely used as a framework for understanding problematic gaming, and there is considerable research suggesting they have similar features and are both associated with similar patterns of activation in the brain. Thus, it was expected that the factors contributing to the pathways model of pathological gambling would also be associated with PGB in MMORPG players. Specifically, it was predicted that participants who report higher levels of avoidance coping strategies, antisocial behaviours, and impulsive behaviours would also report higher levels of PGB.

Hypothesis 5: Lower interpersonal support, greater loneliness, and greater avoidant attachment will predict greater PGB

There is considerable research to suggest that MMORPG players' online and offline relationships and attachment style may play a role in the development of PGB. Thus, I expect that players with lower levels of perceived interpersonal support and higher levels of loneliness will also report higher scores on PGB. Given that attachment style has been linked to social outcomes in video game players, it was expected that players with higher levels of avoidant attachment would score high on PGB. The effects of these factors were expected to remain significant, even after controlling for the effects of avoidance coping, and antisocial behaviour, and impulsive behaviour.

Open-ended research questions

A questionnaire consisting of nine open-ended items was used to supplement the main quantitative analyses. The aim of this questionnaire was to investigate four main questions: (a) what are players' motivations for playing MMORPGs? (b) how do MMORPG players'

motivation for playing relate to their perceived sense of belonging in their online and offline relationships? (c) how might playing MMORPGs affect players' online and offline relationships over time? and (d) what are some problems that MMORPGs players experience in their daily life, as a result of playing MMORPGs?

CHAPTER II

Methodology

Design and Procedures

The current study consisted of a pilot study and a two-part main study that contained a quantitative online survey and a set of open-ended online questions. The pilot study was conducted on 30 undergraduate students to ensure clarity of questionnaire instructions and to assess whether the *online and offline relationships* questionnaire allowed participants to distinguish between their online and offline interactions when completing the interpersonal support and loneliness measures. The pilot sample size was determined based on Hill's (1998) recommendations for online survey studies. The pilot study and main study received clearance by the University's Research Ethics Board.

Pilot Study

Participants in the pilot study were recruited through the Psychology Department participant pool website. The study was listed on the website, along with a brief description of the study, participant eligibility requirements, exclusion criteria, and incentives for participating.

Given the similarities between the features of gambling disorder and IGD, individuals who identified as being diagnosed with gambling disorder were excluded from participating in the study to control for potential confounding variables. Prior to being able to access the studies available on the participant pool, students who sign up for the participant pool have to complete a screening questionnaire. The participant pool screening questionnaire consists of an amalgamation of the different screening items submitted by all the researchers who have been approved to use the participant pool for the academic term. As such, the screening questionnaire included three items designed to determine eligibility to participate in the present study. They

were asked the following: (1) “During the past 12 months, have you become restless, irritable, or anxious when trying to stop and/or cut down on gambling?” (2) “During the past 12 months, have you tried to keep your family or friends from knowing how much you gambled?” (3) “During the past 12 months, did you have such financial trouble as a result of gambling that you had to get help with living expenses from family, friends, or welfare?” Those who responded with a “yes” to any of the items did not qualify for the study and were not able to access the study. Once eligible participants accessed the study’s website (via a link provided through the participant pool website), they completed an online consent form. Participants were then directed to the set of online questionnaires.

Participants in the pilot study ranged in age from 18 to 27 years (M = 20.38 years, SD = 2.46). Most self-identified as male (n = 23, 79.3%), with fewer identifying as female (n = 6, 20.7 %). Participants reported that their age when they first played video games ranged from 2 to 14 years (M = 7.17 years, SD = 3.15), and their weekly total playing time ranged from less than 1 to 30 hours per week (M = 5.12, SD = 6.75).

First, the questionnaire measuring demographics and video game playing history and preference was presented, followed by the questionnaire measuring online and offline relationships. Then, measures assessing the following variables were presented in a randomized order: problematic gaming behaviour (PGB), coping, gamer identity, impulsivity/risk-taking behaviour, antisocial behaviour, attachment, perceived social support, and loneliness (Appendix A). Participants were then asked to complete a set of open-ended questionnaires, which provided a more in-depth look at the online and offline interpersonal relationships of adults who play video games. Participants in both the pilot and main study completed identical questionnaires, with one exception: the participants from the pilot study also completed a second open-ended

questionnaire about their experience completing the survey, specifically assessing for problems they faced when asked to distinguish between their online and offline relationships (see Appendix B).

The responses from the pilot study were examined to check for errors with data collection due to problems with the survey settings and formatting. There were no significant errors, and the pilot study participants did not report significant concerns with the instructions (e.g. clarity, specificity) based on the open-ended questions. The majority of participants described the questionnaires items as clear and reported that there were little to no challenges when completing the study. The responses revealed that the participants were able to distinguish between individuals they mostly interact with online and those with whom they mostly interact with offline.

Using the entire sample from the main analyses ($N = 149$), I examined whether there is a significant difference between the participants who were originally recruited from the pilot study ($n = 30$) and the participants who were not a part of the pilot study (nonpilot, $n = 119$). Considering the large sample size difference, a random sample of 30 nonpilot participants was compared to the pilot study participants. There were no significant differences (p ranged from .07 to .57) between the two groups on the following demographic variables: gender, relationship status, whether they were in a relationship with someone who plays video games, and income.

There were no significant differences (t-scores ranged from .003 to 1.97; ps ranged from .06 to .99) between the two groups on the following variables from the main analyses: PGB, interpersonal support, loneliness, gamer identity, avoidant attachment, avoidance coping, support coping, antisocial behaviour, and impulsive behaviour.

The exceptions were age and time spent playing. The pilot participants reported less time spent playing ($M = 6.15$, $SD = 7.32$) compared to the nonpilot participants ($M = 19.76$, $SD = 16.92$), $t(37.58) = 4.00$, $p < .001$, *95% CI* = 6.72, 20.51, $d = .08$. The pilot study participants were younger ($M = 20.32$, $SD = 2.40$) compared to the nonpilot participants ($M = 22.24$, $SD = 3.89$), $t(58) = 2.32$ $p = .02$, *95% CI* = .261, 3.58, $d = .18$. The difference in age is not surprising given that the pilot participants consisted of only online gamers who are enrolled in a university program. Compared to the broader online gaming community, university students have a lower average age and they may spend less time playing.

Further analyses were conducted to compare pilot study participants ($n = 31$) to all the nonpilot participants in the main study ($n = 118$). Findings indicated that the pilot study participants reported less time playing ($M = 6.15$, $SD = 7.32$) compared to the all the nonpilot participants in the main study ($M = 17.07$, $SD = 17.03$), Welch's $F(1, 115.95) = 28.52$, $p < .001$, $d = .06$. The pilot study participants were also younger ($M = 20.32$ $SD = 2.40$) than the nonpilot participants in the main study ($M = 23.12$, $SD = 4.60$), Welch's $F(1, 93.582) = 21.402$, $p < .001$, $d = .21$. The pilot study participants also had lower levels of impulsivity ($M = 63.97$, $SD = 12.88$) compared to the nonpilot participants in the main study ($M = 71.16$, $SD = 16.29$), Welch's $F(1, 57.86) = 6.81$, $p < .012$, $d = .03$. Although the mean differences in time spent playing was statistically significant, there was less evidence for the significance of the magnitude of this difference (small effect = .2, medium effect = .5, large effect = .8; Cohen, 1988).

There were no significant differences (*p*s ranged from .06 to .47) between the two groups on the following variables from the main analyses: PGB, interpersonal support, loneliness, gamer identity, avoidant attachment, avoidance coping, support coping, and antisocial behaviour.

Taken together, the pilot and nonpilot participants were not statistically and practically different across the majority of the variables included in the main analyses, and the pilot participants were also able to clearly distinguish between their online and offline relationships, which was the goal of the pilot study. Thus, no changes were applied to the procedures of the study and the responses from the pilot study were pooled into the main study.

Main Study

Participants for the main study were recruited from the Department of Psychology participant pool at a mid-size university in Ontario and from active online gaming forums. These included Battle.net, MMO Champion networks, JeuxVideo, Runescape, DC Universe Online, NeverWinter, EveOnline, Rift, Tamriel Foundry, Square-Enix FFXIV, FFXIVRealm, Reddit MMORPG networks, and Stratics. These forums were selected because they cater to the players of some of the most popular MMORPGs to date, such as World of Warcraft, Final Fantasy XIV: A Realm Reborn, Guild Wars 2, and The Elder Scrolls Online (Bradley, 2017; IGCritic, 2016). These forums were also chosen for their online activity level; specifically, they must have had at least three new daily postings in the forum in order to be considered active. A study advertisement that included a description of the study and the link to the online survey was posted on these MMORPG-related online forums. The target audience for these forums were English-speaking gamers and the majority of the recruited participants were from North America.

Participants eligible for the study were the ones who identified as having played an MMORPG at least once in the last six months. In this study, an MMORPG was defined as an online video game that allows users to control their own avatars and complete specific objectives while navigating a virtual world and interacting with other online players. Similar to the pilot

study, individuals who identified as being diagnosed with gambling disorder were excluded from participating in the study. Information about gambling disorder symptoms was collected using the same screening questions for the pilot study, and using a demographic questionnaire item which asked participants identify if they have ever been diagnosed with a disorder, including gambling disorder (Appendix C).

Participants. A total of 170 adult participants, age 18 and older, were recruited for the present study. A priori power analysis was conducted using G*Power 3.1 (Faul et al., 2009) with $f = 0.15$ (medium effect size; Cohen, 1988), $\alpha = 0.05$, power $(1 - \beta) = 0.8$, and 11 predictor variables (three potential covariates, avoidance coping strategies, antisocial behaviour, and impulsive behaviour, online and offline perceived social support, online and offline loneliness, and avoidant attachment). The analyses yielded a recommended total sample size of $N = 123$. Based on previous studies on MMORPG players, it was expected that the participants would be predominantly male, which is representative of the gender distribution of the MMORPG community (Griffiths et al., 2004).

Demographic information for participants can be found in Table 1. The participants from the full sample ranged in age from 18 to 46 years. Most self-identified as male (71.8 %), with fewer identifying as female (25.5 %), and two identified as non-binary (1.3%). The majority self-identified as White (65.1 %), and other participants identified as Asian (10.1 %), Arab (8.7 %), Latin American (7.4 %), Black (4.0 %), Aboriginal (0.7 %), and the remainder identified as Other/Biracial (4.0 %).

Participants reported that their age when they first played video games ranged from 2 to 20 years, and their weekly total playing time ranged from less than 1 to 90 hours per week. The majority of the participants were not in a romantic relationship at the time of the study (49.7 %).

Table 1

Participant Characteristics for Full Sample, University Sample, and Community Sample

Demographic			Full Sample (N =149)	University (n = 82)	Community (n = 67)
Age		*M*	22.54	20.23	25.36
		SD	*4.38*	*1.89*	4.99
		Min	18	18	19
		Max	46	27	46
		Missing	0	0	0
Age (years) started playing video games		*M*	7.68	7.82	7.52
		SD	3.61	3.55	3.71
		Min	2	2	2
		Max	20	17	20
		Missing	0	0	0
Hours per week spent playing		*M*	14.80	7.08	24.09
MMORPGS		*SD*	16.13	10.40	17.35
		Min	*0*	*0*	*0*
		Max	*90*	*70*	*90*
		Missing	*0*	*4*	*4*
Hours spent playing other games		*M*	18.99	16.05	22.64
		SD	*16.83*	*12.32*	*20.65*
		Min	*0*	*1*	*0*
		Max	*120*	*56*	*120*
		Missing	*8*	*4*	*4*
Hours spent other online services		*M*	*25.18*	*28.47*	*21.10*
		SD	*22.99*	*26.60*	16.84
		Min	*0*	*3*	*0*
		Max	*130*	*130*	*92*
		Missing	*8*	*4*	*4*
		Freq	% of total	Freq	%	Freq	%
Gender of participant	Female	38	25.5	25	30.5	13	19.4
	Male	107	71.8	54	65.9	53	79.1
	Non-binary	2	1.3	2	2.4	0	0

	Prefer not to answer	2	1.3	1	1.2	1	1.5
Participant marital status	Single	134	89.9	80	97.6	54	80.6
	Common-law	2	1.3	2	2.4	0	0
	Married	12	8.1	0	0	12	17.9
	Divorced/Separated	1	.7	0	0	1	1.5
	Prefer not to answer	0	0	0	0	0	0
Participant ethnicity	Aboriginal	1	.7	1	1.2	0	0
	Arab/West Asian	13	8.7	10	12.2	3	4.5
	East Asian	15	10.1	10	12.2	5	7.5
	Black	6	4.0	3	3.7	3	4.5
	Caucasian	97	65.1	52	63.4	45	67.2
	Latin American	11	7.4	2	2.4	9	13.4
	Other	6	4.0	4	4.9	2	3.0
Annual family income	Less than 5000	47	31.5	29	35.4	18	26.9
	$5 000 to $9 999	22	14.8	18	22.0	4	6.0
	$10 000 to $19 999	28	18.8	16	19.5	12	17.9
	$20 000 to $29 999	8	5.4	2	2.4	6	9.0
	$30 000 to $39 999	9	6.0	4	4.9	5	7.5
	$40 000 to $49 999	5	3.4	1	1.2	4	6.0
	$50 000 to $59 999	4	2.7	0	0	4	6.0
	$60 000 to $69 999	3	2.0	1	1.2	2	3.0
	$70 000 to $79 999	2	1.3	0	0	2	3.0
	$80 000 to $89 999	0	0	0	0	0	0
	$90 000 to $99 999	3	2.0	0	0	3	4.5
	$100 000 or more	0	0	0	0	0	0
	Prefer not to answer	18	12.1	11	13.4	7	10.4
Gaming and romantic relationships	Partner-Play	37	24.8	16	19.5	21	31.3
	Partner-No Play	38	25.5	22	26.8	16	23.9
	No Partner	74	49.7	44	53.7	30	44.8

Note. Partner-Play = Plays online video games with current romantic partner; Partner-No Play = Does not play online video games with current romantic partner; No Partner = Currently does not have a romantic partner.

Others reported they played online with their current romantic partner (24.8 %), and the remainder reported they did not play with their current romantic partner (25.5 %). Participants reported spending time on other online activities between 0 to 130 hours per week and they reported spending time on other, non-MMORPG games between 0 to 130 hours per week. A summary of the time participants spent on other video games, non-gaming online activities, and gaming-related offline activities are found in Table 2.

Measures

Questionnaires in this study assessed demographics, video game playing history and preference, problematic gaming behaviour (PGB), online and offline relationships, social support, loneliness, gamer identity, attachment, coping behaviour, antisocial behaviour, and impulsivity/risk-taking behaviour (see Appendix A). It also included an open-ended questionnaire. Five questionnaire items were also included as a validity check in between the questionnaires to assess whether participants were paying close attention to the survey instructions. These items required participants to read a brief passage with a set of instructions and select a particular response from an array of options based on their comprehension of the passage.

Background Information Form

Participants were asked to complete a demographic survey requesting information about their gender, age, marital status, ethnicity, family income, and psychiatric history (see Appendix C).

Playing History and Preference

Participants were asked about their gaming history and video game preferences (see Appendix D). Questionnaire items included items related to participants' age at which they

Table 2

Time Spent (Hours in a Week) Playing Online and Offline Activities (N=149)

Activities	*M*	*SD*	Min	Max
Online games				
Action-adventure (e.g., Uncharted, The Last Guardian)	2.16	3.33	0	24
Online versions of board/card games (e.g., Scrabble, Solitaire)	0.81	1.87	0	10
Driving (e.g., Forza Horizon 3, Trackmania Turbo)	0.33	1.19	0	12
First-person shooter (e.g., Battlefield, Half-Life 2, Far Cry 4)	0.40	5.65	0	30
Other shooter (e.g., Rise of the Tomb Raider, Ghost Recon Wildlands)	1.28	3.28	0	20
Gambling (e.g., Poker, Blackjack)	0.04	.24	0	2
(Video) Roleplaying Games (RPG, e.g., Dark Souls 3, Final Fantasy XV)	6.50	11.32	0	80
Platform (e.g., Inside, Super Mario)	0.58	1.48	0	10
Puzzle (e.g., The Witness, Quadrilateral Cowboy and Superhypercube)	0.51	1.59	0	10
Real-Time Strategy (e.g., Total War: Arena, Starcraft II)	4.70	4.70	0	40
Other strategy (e.g., Civilization, Rollercoaster Tycoon)	0.85	2.46	0	20
Rhythm (e.g., Guitar Hero, Dance Dance Revolution)	0.22	1.06	0	9
Sports (e.g., NBA 2K17, FIFA 17)	0.93	2.59	0	20
Other	2.06	8.60	0	80
Non-gaming related online activities				
Facebook	3.97	10.93	0	100
Twitter	2.77	10.90	0	120
Instagram	3.19	9.19	0	100

Snapchat	3.17	10.25	0	113
YouTube	12.13	19.92	0	130
Pinterest	0.22	1.78	0	20
Dating sites (e.g., Match.com, eHarmony)	0.11	.54	0	5
Adult sites (e.g., Pornhub, Xvideos)	1.54	4.13	0	40
Online shopping (e.g., Amazon, Alibaba)	1.57	3.15	0	20
News/Magazine (e.g., New York Times Online, Globe and Mail Online)	0.94	2.34	0	20
Other	3.25	12.34	0	120
Gaming related offline activities				
Board games (e.g., Scrabble, Solitaire)	0.97	2.12	0	10
Tabletop role playing games (Tabletop RPGs, e.g., Dungeons & Dragons)	0.97	2.46	0	16
Live action role-playing (LARPs)	0.22	1.21	0	10
Society for Creative Anachronism (SCA)	0.02	.19	0	2
Cosplay events	0.18	1.19	0	12
Other	0.00	0.00	0	0

began playing video games, the genres of games they play, the top three games they spend the most time playing, the amount of hours they spend playing MMORPGs, and with whom the individuals they usually play MMORPGs.

Online and Offline Activities

Participants were asked about their preferred online and offline activities (see Appendix E). Participants were asked to identify other video game genres (e.g., first-person shooter, sports) they usually play, and to estimate the number of hours per week they spend on each genre. Similar approaches measuring these variables have been used in the literature to estimate time spent playing video games (Charlton & Danforth, 2010; Neys et al., 2014) and to assess game preferences (Rehbein et al., 2016). Additionally, participants were asked to identify and estimate the number of hours per week they spend engaging in other online activities (e.g., Facebook, dating sites, etc.) and offline game-related and role-playing activities (e.g., board games, Dungeons and Dragons, etc.).

Problematic Gaming Behaviour

The Internet Gaming Disorder Scale (Lemmens et al., 2015) is a 27-item self-report measure that assesses the severity of Internet gaming disorder (IGD) based on the nine core criteria recommended in the *DSM-5*: preoccupation, tolerance, withdrawal, persistence, escape, problems, deception, displacement, and conflict. Based on their experiences in the past year, participants were asked to rate items on a 6-point Likert-type scale ranging from 0 (*never*) to 5 (*everyday/almost everyday).* The *preoccupation* domain measured the degree to which participants are absorbed by gaming and spend time thinking about gaming when they are not playing (e.g., "Have there been periods when you were constantly thinking about a game while at school or work?"). *Tolerance* measured the degree to which participants increase their playing

time to feel desired effects (e.g., “Have you felt the need to continue playing for longer periods of time?”). *Withdrawal* measured the degree to which participants experience physiological and emotional symptoms when they are unable to play or attempt to reduce playing time (e.g., “Have you been feeling tense or restless when you were unable to play games?”). *Persistence* measured the degree to which participants experience an enduring desire for gaming or are unsuccessful in their attempts to reduce gaming (e.g., “Did you want to play less, but couldn’t?”). *Escape* measured the degree to which participants engage in video games to alleviate negative mood (e.g., “Have you played games to forget about your problems?”). *Problems* measured the degree to which participants continue to play despite the negative consequences (e.g., “Have you skipped work or school so that you could play games?”). *Deception* measured the degree to which participants lie to others about the extent of their gaming (e.g., “Have you hidden the time you spend on games from others?”). *Displacement* measured the degree to which participants experience reduced social and recreational activities, and gaming dominates their daily activities (e.g., “Have you been spending less time with friends, partner, or family in order to play games?”). Lastly, the *conflict* domain measured the degree to which participants experience losing or nearly losing important relationships or occupational opportunities (e.g., “Have you experienced serious problems at work or school because of gaming?”). A mean score was calculated across all items, with higher scores indicating greater PGB. The Internet Gaming Disorder Scale has been shown to have good reliability (Cronbach’s α of .94 for the mean score) and good criterion validity (Lemmens et al., 2015). Sioni et al. (2017) also reported Cronbach’s α = .85 in their study involving a large sample of adults. For the current study, Cronbach’s α = .95.

Measuring Problematic Gaming Behaviour

The Internet Gaming Disorder Scale (Lemmens et al., 2015) has incorporated the proposed *DSM-5* criteria and there is empirical evidence supporting its use for identifying individuals with clinically significant PGB. Unlike other instruments that seek to identify individuals with clinically significant PGB, the Internet Gaming Disorder Scale is available in both a dichotomous and polytomous form. The polytomous version of this instrument asks responders to rate their experiences using a Likert-type scale. This is consistent with the current study's definition of PGB, which refers to a continuum, ranging from a few symptoms of distress related to video game consumption to clinically significant distress. Furthermore, this allows participants' ratings to be translated into a continuous variable, which is most appropriate for the methodology of the current study.

The study by Lemmens and colleagues involved a sample of adolescents and adults aged 13 to 40 years, which closely matches the sample observed in the current study. Using structural equation modeling (SEM) for their confirmatory factor analysis, Lemmens and colleagues found that the correlations among the nine latent criteria can be entirely explained by IGD as a single higher order factor, χ^2 (315, N = 923) = 959.420, $p < .001$, CFI = .991, weighted root mean square residual = 1.005, RMSEA = .047. The Internet Gaming Disorder Scale has been found to have good sensitivity to identifying gamers in significant distress. It was also found to have good criterion validity based on its significant positive correlations with time spent playing games, loneliness, and aggression, and negative correlations with self-esteem, prosocial behaviour, and life satisfaction. It was reported to have good internal consistency reliability (Cronbach's α = .94, Lemmens et al., 2015; Cronbach's α = .84, Sioni et al., 2017).

The Internet Gaming Disorder Scale also has some shortcomings. A latent class analysis (LCA) was conducted on the dichotomous, 9-item version of the scale to group participants into normal gamers (score of 0-2), risky gamers (score of 1-6), and disordered gamers (score of 6-9), based on their scores on the scale. Further analysis of the LCA indicated good measurement sensitivity. On the other hand, the three items for *escape* indicated a diagnostic accuracy proportion of about .75 for both the *DSM-5* and the LCA, whereas the proportion for diagnostic accuracy was ≥ .90 for the other items. As such, there was lower specificity for the *escape* criterion, which refers to the proportion of gamers who responded negatively to the *escape* items who were identified as falling within the disordered gamers group of the LCA (identification of false negatives). The original article by Lemmens and colleagues (2015) did not include an examination of the convergent validity of their measure, and no other studies have published this information at the time of the current study.

Online and Offline Interactions

A brief measure was created for this study to ask participants to distinguish between and identify individuals outside of their family with whom they share an online and/or offline relationship (Appendix F). In a study by Domahidi and colleagues (2014), "online friends" were identified by calculating the number of friends the participants played with through online video games, distinguishing between those whom they had and had not met offline. The measure used in the current study further built on this approach by evaluating how frequently participants interacted offline with each of the participants' listed online relationships, and distinguished between those who are mostly or exclusively online (or offline), and those whom the participant interacted with in both domains fairly equally. Participants responded to items with regards to two domains: online and offline. For the *online* domain, participants were asked to list the initials

of a maximum of seven individuals with whom they communicate online the most. The maximum number of friends was based on the study by Cole and Griffiths (2007), which suggested that MMORPG players report an average of seven good friends online. For each individual, they were asked to identify whether they initially met them online or offline and to rate the degree to which they also spend time offline with this individual on a 5-point Likert-type scale ranging from 1 (*never or almost never spend time offline*) to 5 (*always or almost always spend time offline*).

For the *offline* domain, participants were asked to list the initials of a maximum of seven individuals with whom they communicate, or spend the most time with, in person (e.g., at work, at school, in the neighbourhood). For each individual, they were asked to identify whether they initially met them online or offline and rate the degree to which they also spend time with the individual online on a 5-point Likert-type scale ranging from 1 (*never or almost never spend time online*) to 5 (*always or almost always spend time online*).

This provided context for participants in their process of completing subsequent measures of interpersonal support and of loneliness, which required them to report on their relationship experiences online and offline, separately. Based on their responses on the online and offline interactions measure, the survey presented the initials of the individuals with whom they interacted exclusively or almost exclusively online or offline when responding to subsequent measures. For example, an individual who was listed under "Individuals You Interact with Online" and rated as "never/almost never spend time offline" or "occasionally spend time offline" was considered to be an individual with whom the participant interacted exclusively or almost exclusively online. In the event that the participants did not rate at least a single individual as being an exclusively online relationship or exclusively offline relationship, they

were still presented with the initials of individuals they listed under online friend during the online relationship section of the interpersonal support and loneliness questionnaires, and the initials of those they identified as an offline friend during the offline relationship section of the interpersonal support and loneliness questionnaires. Their initials (e.g., A.W.) were presented to participants when completing subsequent measures. For example:

> "Previously, you provided initials of people you exclusively or almost exclusively spend time with offline: **A.W.** For each item, rate the extent to which you believe each statement best describes your feelings about your relationship with individuals with whom you exclusively or almost exclusively spend time with offline."

Based on the open-ended questionnaire given to the pilot study participants, participants reported that this measure was clearly worded and they were able to distinguish between their online and offline interactions. All the participants reported at least one online and one offline friend. Of the full sample (N = 149), the majority of participants reported that the online friend(s) they listed was someone they initially met online (n = 104, 69.8%), whereas the remaining participants reported that they met the person(s) offline (n = 45, 30.2%). The majority of participants reported that the person(s) they listed as an online friend was someone they never or rarely interacted with offline (n = 123, 82.6%), whereas the remaining participants reported that they spent some time offline (n = 26, 17.4%). The majority of participants reported that the offline friend they listed was someone they initially met offline (n = 140, 94%), whereas the remaining participants reported that they met the person online (n = 9; 6%). The majority of participants reported that the person(s) they listed as an offline friend was someone they never or rarely interacted with online (n = 127, 85.2%), whereas the remaining participants reported that they spent some time offline (n = 22, 14.8%).

Perceived Social Support

The Interpersonal Support Evaluation List (ISEL; Cohen et al., 1985) was used to assess perceived availability of social support. The ISEL (general population version) consists of 40 items, which fall under four subscales: appraisal, belonging, self-esteem, and tangible aid. Based on their earlier responses on the *online and offline relationships* measure, they were asked to consider individuals with whom they interacted exclusively or almost exclusively in either domain (online or offline) when responding to the social subscale items. For the online relationship section of the scale, the survey was programmed to present the initials of the individuals whom the participants listed as having an online relationship and had rated as either never/almost never spend time offline or occasionally spend time offline. For the offline relationship section, the survey presented the initials of individuals whom participants listed under offline relationship and had rated as either never/almost never spend time online or occasionally spend time online. When responding to the ISEL questions, participants were asked to rate items on a 4-point Likert-type scale ranging from 0 (*definitely false*) to 3 (*definitely true).* *Appraisal* items measured participants' perceived availability of others to talk to about your personal problems (e.g., "There are several people that I trust to help solve my problems"). *Belonging* items measured participants' perceived availability of others for a shared activity (e.g., "When I feel lonely, there are several people I can talk to"). *Tangible aid* items measured participants' perceived availability of others for material aid (e.g., "If I needed help fixing an appliance or repairing my car, there is someone who would help me"). Lastly, *self-esteem* items measured participants' perceived availability of others to whom they can compare themselves in a favourable light (e.g., "Most people I know think highly of me"). All of the subscales were administered within the context of online and offline interactions in order to preserve the

reliability of the measure. Some items were not as relevant to study; however, these subscales belonged to items that do not inform the main analyses. Participants' responses on the appraisal and belonging subscales were summed to yield a total score for perceived social support in online relationships and a total score for perceived social support in offline relationships. The ISEL has been shown to have good reliability, with Cronbach's α of .94 for the total scale, .81 for the belonging subscale, and .87 for the appraisal subscale (Constantino & Bricker, 1997). It has been found to have good discriminant validity with respect to personality measures and has been shown to be highly correlated with other social support measures (Brookings & Bolton, 1988). For the current study, Cronbach's α was .90 for online interpersonal support and .93 for offline interpersonal support.

Loneliness

The Social and Emotional Loneliness Scale for Adults – Short Form (SELSA-S; DiTommaso et al., 2004) is a 15-item self-report measure of loneliness. It is composed of three subscales: social, family, and romantic loneliness. *Social loneliness* measures the degree to which participants feel social isolation (e.g., "I don't have a friend/s who shares my views, but I wish I did"). *Family loneliness* measured the degree to which participants feel lonely within their familial relationships (e.g., "I feel alone when I'm with my family."). Lastly, *romantic loneliness* measured the degree to which participants feel lonely within their romantic relationships (e.g., "I wish I had a more satisfying romantic relationship"). Participants were asked to respond to the social subscale items twice: in reference to their online relationships (5 items) and offline relationships (5 items), independently. Based on their earlier responses on the *online and offline relationships* measure, and similar to the procedures for measuring perceived social support, they were asked to consider individuals with whom they interact exclusively or almost exclusively

online and with whom they interact exclusively or almost exclusively offline when responding to the social subscale items. They were also asked to respond to the family (5 items) and romantic (5 items) subscale items for comparison. They rated items on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree).* For the main analyses, participants' responses were summed to yield a total score for loneliness in online relationships and a total score for loneliness in offline relationships. The SELSA-S has been shown to be reliable, with Cronbach's α of .87, .89, and .90 for the romantic, family, and social loneliness scales, respectively; and it is a valid measure of loneliness in adults, as evidenced by the measure's strong relationship with measures of the adequacy of intimate relationships and by the association of the three subscales to measures of social competence, self-esteem, trust, health, and well-being (DiTommaso et al., 2004). For the current study, Cronbach's α was .86 for online loneliness, and .88 for offline loneliness.

Gamer Identity

The Social Identity with the Community of Gamers Measure (Kowert & Oldmeadow, 2015) was used to assess identification with the gaming community. This 4-item scale is based on a widely-used group identification measure by Doosje et al. (1995), which was used to investigate intragroup beliefs and social identity principles. Participants were asked to rate items (e.g., "I see myself as a gamer") on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree).* A total score was calculated across all items, with higher scores indicating greater identification with the gaming community. This measure has been found to be reliable, with Cronbach's α = .93 (Kowert & Oldmeadow, 2015). For the current study, Cronbach's α = .90.

Attachment

The Experiences in Close Relationships Revised (ECR-RS; Fraley, Heffernan, Vicary, & Brumbaugh, 2011) is a 9-item self-report questionnaire used to measure adult attachment with multiple individuals using two dimensions: avoidance and anxiety. The current study used the instructions recommended by the authors for estimating global attachment as this provided information about participants' generalized working model, which guided attachment across relationships, instead of assessing their specific attachment to a specific parent(s), friend, or romantic partner. Participants were asked to rate items on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree).* The *avoidance* dimension is represented by six questions (e.g., "I don't feel comfortable opening up to others"), whereas the *anxiety* dimension is represented by three questions (e.g., "I'm afraid that other people may abandon me"). Participants' responses for the global attachment items were averaged to yield a mean score for each of the two subscales, with higher scores suggesting greater avoidant or anxious attachment, respectively. The analyses for the current study focused on avoidant attachment scores. Participants were also asked to rate these items based on their online and offline relationships, separately. Participants' responses for the online and offline attachment items were examined to explore possible attachment style differences between online and offline relationships, and possible control or moderating variables for the main analyses. The ECR-RS has been found to have good reliability, with Cronbach's $\alpha = .80$ for the global anxiety scale and .88 for the global avoidance scale (Fraley et al., 2011). Other studies have also shown that the ECR-RS has good internal reliability when used for an adolescent sample (Donbaek & Elklit, 2014) and reliability and construct validity when used with an adult sample (Moreira et al., 2015). For the current study, Cronbach's $\alpha = .87$ for both avoidant attachment and anxious attachment.

Coping

The Brief COPE (Carver, 1997) is a 28-item self-report measure that assesses an individual's response to stress. The wording of the instructions was slightly modified to take a more "dispositional" perspective (i.e., coping as a trait), one of the three formats made available by the authors, by presenting the items in present tense. The Brief COPE asks participants to rate the extent to which they usually engage in specific coping behaviours when they are stressed. Respondents were asked to rate items on a 4-point Likert-type scale ranging from 1 (*I usually don't do this at all*) to 4 (*I usually do this a lot*). The 14 subscales in this measure, 2-items each, assessed different types of coping strategies. *Active coping* assessed the degree to which participants take action or exert effort to remove or circumvent the stressor (e.g., "I've been taking action to try to make the situation better"). *Planning* measured the degree to which participants consider strategies to confront the stressor (e.g., "I've been thinking hard about what steps to take"). *Instrumental social support* measured the frequency of seeking assistance, information, or advice (e.g., "I've been getting help and advice from other people"). *Emotional social support* measured the frequency of receiving sympathy or emotional support from others (e.g., "I've been getting comfort and understanding from someone"). *Denial* measured the degree to which participants attempt to reject the reality of the stressful event (e.g., "I've been saying to myself 'this isn't real'"). *Substance use* measured the frequency of alcohol or substance use as a means to disengage from the stressor (e.g., "I've been using alcohol or other drugs to help me get through it"). *Behavioural disengagement* assessed withdrawal of effort to attain the goal impacted by the stressor (e.g., "I've been giving up trying to deal with it"). *Venting* measured the tendency to ventilate or discharge emotional distress (e.g., "I've been expressing my negative feelings"). *Positive reframing* assessed the degree to which participants make the best of the

situation or frame it in more favourable light (e.g., "I've been looking for something good in what is happening"). *Humour* measured frequency of making jokes about the stressor (e.g., "I've been making fun of the situation"). *Religion* measured change in engagement in religious activities (e.g., "I've been praying or meditating"). *Acceptance* assessed the degree to which participants accept the stressful event as real (e.g., "I've been learning to live with it"). *Self-blame* assessed the degree of self-criticism and blame for the stressor (e.g., "I've been criticizing myself"). Lastly, *self-distraction* measured engagement in other activities or responsibilities to divert attention away from the stressor (e.g., "I've been turning to work and other activities to take my mind off things"). Participants' responses for the items on the respective subscales were summed to yield a total score for each of the 14 subscales, with higher scores suggesting greater use of that coping style. Carver (1997) reported Cronbach's α ranging from .50 (venting) to .90 (substance use). The analyses for the current study focused on two clusters of coping strategies: avoidance-related coping strategies (denial, substance use, behavioural disengagement, self-distraction) and social support coping strategies (venting, instrumental social support, and emotional social support). These coding clusters have been used and reported in previous studies (Bose et al., 2015; Connor & Connor, 2003). For the current study, Cronbach's α was .65 for avoidance coping, and .76 for support coping.

Antisocial behavior

The Subtypes of Antisocial Behavior Questionnaire (STAB; Burt & Donnellan, 2009) is a 32-item measure of three subtypes of antisocial behaviour: physical aggression, social aggression, and rule-breaking. Participants were asked to rate items on a 5-point Likert-type scale ranging from 1 (*never*) to 5 (*nearly all the time).* The physical aggression subscale is represented by 10 items (e.g., "Felt like hitting people"), the social aggression (or indirect or

relational aggression) subscale is represented by 11 items (e.g., “Made fun of someone behind their back”), and the rule-breaking subscale is represented by 11 items (e.g., “Was suspended, expelled, or fired from school or work”). Participants’ responses for the items on the respective subscales were summed to yield a total score, with higher scores suggesting greater physical aggression, social aggression, and rule-breaking, respectively. The STAB has good reliability, with Cronbach’s α ranging from .71 (rule-breaking) to .91 (physical aggression), and it has been found to be a valid measure of antisocial behaviour in diverse adult populations (Burt & Donnellan, 2009). Other studies have reported Cronbach’s α ranging from .87 to .89 for the three subscales and α = .95 for the entire scale (Park, Schwartz, Lee, & Kim, 2013). For the current study, Cronbach’s α was .95 for the entire measure; whereas Cronbach’s α was .87 for the physical subscale, .93 for the rule-breaking subscale, and .90 for the social subscale.

Impulsive Behaviour

The Barratt Impulsiveness Scale 11 (BIS-11, Patton et al., 1995) consists of 30 items designed to measure domains of impulsivity (attentional, motor, and nonplanning), and was used to assess participants’ impulsive behaviours. Participants were asked to rate items on a 4-point Likert-type scale ranging from 1 (*rarely/never*) to 4 (*almost always/always). Attentional impulsivity* (8 items) measured participants’ perceived ability to sustain attention on a given task (e.g., “I don’t ‘pay attention’"). *Motor impulsivity* (11 items) measured participants’ perceived ability to control behavioural activity (e.g., “I do things without thinking”). *Nonplanning* (11 items) measured participants’ perceived tendency to not think about behaviours and plans before acting (e.g., “I say things without thinking”). Participants’ responses for the items were summed to yield a total score on impulsivity, with higher scores suggesting greater impulsive behaviour. The authors reported good internal consistency, with Cronbach’s α ranging from .79 (substance

abuse patients) to .82 (undergraduate students) across different sample groups. Stanford and colleagues (2009) also reported good reliability for the BIS-11, with Cronbach's α = .83 for the total score, and good convergent and concurrent validity. For the current study, Cronbach's α = .84.

Open-Ended Questionnaire

A set of open-ended items were created for this study in order to assess participants' experiences playing online video games, as well as online and offline interactions and relationships (see Appendix G). The questionnaire consisted of two items assessing participants' MMORPG motivation and goals for playing MMORPGs (e.g., "List some of the reasons why you play MMORPGs"); two items assessing specific factors that contribute to their perceived sense of belongingness in their online and offline relationships (e.g., "Describe how other players in MMORPGs have made you feel welcome or feel like you belong. Provide specific examples"); two items assessing any changes they have observed in these relationships since playing MMORPGs (e.g., "Have your relationships with other MMORPG players (e.g., time you spend together, topics you talk about) changed over time? And, if so, in what ways?"); and three items assessing any problems associated with the time they spend playing MMORPGs (e.g., "In what ways would your everyday life be different if you did not play any online video games? Please provide examples").

CHAPTER III

Results

Overview of Results

The following analyses are organized into four major sections. The first section includes data screening procedures related to missing data and statistical outliers. The second section includes the preliminary analyses, including tests for assumptions and identification of potential control variables. The third section consists of the main analyses of the five hypotheses. The fourth section describes the content analyses for the open-ended questionnaire, as a means to supplement the findings from the main analyses.

Data Screening

Data were originally collected from a total of 170 participants; however, three participants were excluded for failure to meet the eligibility criteria of playing an MMORPG within the last six months. Sixteen participants were also excluded because they completed less than 20% of the study. Two additional participants were excluded for not completing the section that asks them to identify and estimate the time they spend with their closest online and offline friends. Data collected from this section informed subsequent variables related to online and offline relationships (e.g., interpersonal support, loneliness) and these data were crucial for interpretation of the main analyses. The final dataset used in the analyses included 149 participants.

The excluded participants ranged in age from 18 to 33 years (M = 22.67, SD = 3.40). Participants reported spending time on other online activities between 0 to 107 hours per week (M = 22.88, SD = 30.52). and they reported spending time on other, non-MMORPG games between 0 to 80 hours per week (M = 16.44, SD = 19.39). Participants reported that their age

when they first played video games ranged from 4 to 21 years (M = 8.72, SD = 4.38), and their weekly total playing time ranged from 1 to 40 hours per week (M = 9.93, SD = 10.27). The majority self-identified as White (50%), and other participants identified as Asian (25%), Arab (10%), Latin American (5%), and the remainder identified as Other (5%). One participant did not respond to this item, and subsequent items on the questionnaire. Most self-identified as male (85%), with fewer identifying as female (10%), and one participant did not respond to the question about their gender (5%).

The dataset was analyzed to identify missing data. Less than 1% of the total data points for the main variables were missing. The results of Little's MCAR test revealed that there were no systematic patterns of missing data, χ^2 (1738, N = 149) < .001, p = 1.000, suggesting that they were likely missing completely at random. Missing data on the BriefCOPE were imputed using the expectation-maximization algorithm (Schlomer et al., 2010; Allison, 2003). Previous studies have used this approach to address missing items on the BriefCOPE (Schnider et al., 2007). Analyses including and excluding these imputed values did not result in a significant change in the main analyses using the coping variable. As such, subsequent analyses using the BriefCOPE were conducted with these substitutions.

The values for each of the target variables were examined for calculation errors and to ensure that the participants reported a realistic number of hours (e.g., less than 24 hours in a day) spent on online and offline activities. A majority of the values were found to be valid and appropriate. The exception to this were nine participants who responded with a range of hours (e.g., 4 to 8 hours) rather than a single number, when asked to estimate the time (hours per week) they spend playing MMORPGs. To maintain consistency across the responses, the midpoint of the range of hours for each participant was assigned as the participant's final value on this

variable (e.g., 4 to 8 hours was converted to a final value of 6 hours for the variable time spent playing).

Preliminary Analyses

Tests of the assumptions of univariate and multivariate analyses were conducted. I evaluated the dataset normality, multicollinearity, linearity, and homoscedasticity. I also conducted correlation analyses to identify potential covariates.

Univariate Analyses. I converted the values in the dataset to z-scores and examined them for outliers, using a z-score of 3.29 as cut-off, as recommended by Field (2009). One datapoint for avoidance coping and one for offline loneliness were identified as outliers. These outliers were from independent cases. The skewness and kurtosis values were also evaluated based on the criteria recommended by Field (2009), which indicated a normative range of -2 to 2 for skewness and -3 to 3 for kurtosis. Even with the two outliers in the dataset, the majority of the target variables still fell within this normative range. Most of the skewness values ranged from -.709 to 1.023, and the kurtosis values ranged from -.714 to 1.138. The exception was time spent playing MMORPGs, which violated the criteria for kurtosis (skewness = 1.628, kurtosis = 3.221).

Visual inspection of histograms and boxplots suggested some normality issues with offline interpersonal support (negatively skewed), offline loneliness (positively skewed), and PGB (positively skewed). However, this was to be expected given the target population of nonclincal adults. As such, it was expected that the majority of participants would be less likely to report very low levels of offline interpersonal support. They are also less likely to report very high levels of offline loneliness and PGB.

Multivariate Analyses. I also conducted Mahalanobis, Cook's distance, and Leverage values to identify influential outliers on the dependent variables. The following critical value scores were used: Mahalanobis ($p < .001$) = 27.89, Cook's = .03, and Leverage = .14. There were slight departures from these scores. Mahalanobis values ranged from 1.89 to 31.32, Cook's values ranged from .00 to .12, and Leverage values ranged from .01 to .21. As such, additional analyses were conducted to examine multivariate normality and the impact of potential influential outliers on the analyses.

Multicollinearity and singularity were examined through analysis of the correlation coefficients and Tolerance/VIF values of the target dependent variables. The correlation coefficients were all less than .46, which suggested that there were no high correlations among the independent variables. VIF values ranged from 1.08 to 2.01, which was within the cut-off point of less than 10, recommended by Field (2009). Tolerance values ranged from .46 to .69, which met the recommended value of greater than 0.2 for all the variables.

In order to avoid potentially problematic high multicollinearity with the interaction terms, the variables used in multiple regression analyses were centred prior to the interaction terms being created for each of the regression models (Aiken & West, 1991). Linearity was assessed through evaluation of residual plots in which residuals were plotted against predicted values to identify clustering patterns and outliers, as well as to evaluate the homoscedasticity of errors. Taken together, the analyses revealed that the distribution for time spent playing MMORPGs was positively skewed, and the residuals suggested potential concerns about heteroscedasticity. The remaining target variables did not present such concerns.

Transformation

A square root transformation was applied to the data points of time spent playing MMORPGs to address the potential concerns about heteroscedasticity and normality. This approach is particularly useful in reducing positive skew and for analyses sensitive to unequal variances (Field, 2009). Following the transformation, the skewness and kurtosis values for the transformed variable were within the recommended range for normality. There were also improvements in linearity and homogeneity of variance. Given that Hypotheses 1 to 3 involved time spent playing MMORPGs, these analyses were conducted two ways, using the nontransformed variable and then the transformed variable. A comparison using the two variables indicated that there were no notable differences in the main findings. As such, the main analyses were conducted and reported here using the transformed variable. No further transformations were conducted on the dataset.

Control Variables

Zero-order correlations and ANOVAs were used to evaluate the hypothesized control variables (age, gender, and problem gambling diagnosis), along with other potential variables. It was hypothesized that participants' reported age, gender, and problem gambling diagnosis would be related to scores on the target variables: time spent playing MMORPGs, interpersonal support, loneliness, gamer identity, avoidant attachment, avoidance coping, social support coping, problematic gaming behaviour, antisocial behaviour, impulsive behaviour, and avoidant attachment. Age and gender were found to be significantly correlated with some of the target variables. These findings are discussed below and summarized in Table 3. Prior to accessing the study, participants were asked to complete the three-item gambling disorder screening questionnaire. Two participants who completed the study still indicated on the demographic

Table 3

Correlations Among All Variables

Var	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	.004	.285**	.169*	.189*	.127	.001	.289**	-.113	-.068	.039	-.071	.063	.059	-.048	-.079	.039	.093
2		-.053	-.270**	-.310**	-.271**	.221*	.087	.117	-.258**	.206*	.067	.065	.02	-.143	-.047	.215*	.076
3			.611**	.571*	.152	-.041	.069	-.066	.14	-.098	.073	.159	-.033	-.122	.081	.015	-.008
4				.828**	.148	-.156	.045	-.123	.214*	-.065	.005	-.009	-.02	.032	-.034	-.125	-.006
5					.236*	-.116	.058	-.096	.190*	-.132	.018	-.01	.022	.082	-.043	-.165	-.019
6						.001	-.109	.03	-.011	-.018	.181*	.132	-.123	.03	.008	.006	-.02
7							.306**	.509**	.026	.278**	.422**	.396**	.193*	-.250*	-.401**	-.313**	-.370**
8								.132	.006	.209*	-.043	.087	.286**	.009	-.215*	-.046	.159
9									.121	.302**	.500**	.540**	.031	-.351**	-.460**	-.304**	-.456**
10										-.347**	.115	.076	-.07	-.264**	.220*	-.275**	-.129
11											.113	.094	-.082	-.346**	-.483*	.348*	.406*
12												.452**	-.063	-.269**	-.284**	-.235*	-.283**
13													.041	-.287**	-.243*	-.295**	-.281**
14														.198*	-.037	-.280**	-.032
15															-.469**	-.688**	-.407**
16																-.322**	-.665**
17																	.397**
18																	

Note. 1. Participant's Age; 2. Gender; 3. Relationship Status; 4. Gamer Partner; 5. Plays with Partner; 6. Age Started Gaming; 7. Problematic Gaming Behaviour; 8. Time Spent Playing; 9. Avoidance Coping; 10. Support Coping; 11. Avoidant Attachment; 12. Antisocial Behaviour; 13. Impulsive Behaviour; 14. Gamer Identity; 15. Online Interpersonal Support; 16. Offline Interpersonal support; 17. Online Loneliness; 18. Offline Loneliness.
*$p \leq .05$. **$p \leq .001$.

questionnaire that they had been diagnosed with problem gambling. Correlation analyses could not be completed for this variable because of this small sample size. It was noted, however, that their scores on the target variables were all within one standard deviation from the mean.

Age. Participant age was found to be positively correlated with time spent playing MMORPGs. Participants who were older tended to report spending more time playing. Age was thus controlled for in the main analyses.

Gender. Using ANOVAs, a comparison of participants who identified as female or male, suggested that men tended to report greater levels of problematic gaming behaviour, avoidance coping, and perceived loneliness online. Participants who identified as male also tended to report lower levels of social support coping behaviour. Therefore, gender was further examined and controlled for in the main analyses.

Relationship. Those who reported greater social support coping tended report that they were in a romantic relationship with someone who plays video games (i.e., gamer partner). Participants with greater social support coping also tended to play video games with their partner (i.e., plays with partner). Additional analyses were conducted to examine other potential control variables: current relationship status and duration of current relationship. These variables were not found to be significantly related to PGB, time spent playing, avoidance coping, support coping, avoidant attachment, antisocial behaviour, impulsive behaviour, gamer identity, (online or offline) interpersonal support, and (online or offline) loneliness. Thus, I controlled for only age and gender in the main analyses. The exception to this was Hypothesis 3b (time spent playing as predictor of interpersonal support and loneliness, with social support coping as moderator), which also controlled for gamer partner and plays with partner.

Main Analyses

Correlation and multiple regression analyses were used to investigate the five hypotheses. Hypothesis 2 and 3 involved the use of PROCESS SPSS Macro for simple moderation analyses (v. 3.5, Model 1, Hayes, 2018). PROCESS uses ordinary least squares (OLS) regression to estimate the model coefficients, standard errors, *t*- and *p*-values; and it generates conditional effects in moderation models. This procedure created interaction terms using the product of the predictor and moderator variables. The predictor and moderator variables were centred to avoid potentially problematic high multicollinearity with the interaction term (Aiken & West, 1991). Previous studies also have used this approach to examine moderation models which included variables represented by the participant's overall score on Likert-type behaviour scales and mental health symptom severity scales, such as anxiety, depression, life satisfaction, positive and negative affect, self-esteem, distress, guilt, and parenting behaviours (Burns et al., 2019; Slobodin et al., 2020; Arellano et al., 2018; Zhang, 2020). Taken together, PROCESS is an appropriate method for testing the moderation models in the present study.

Hypothesis 1: Time Spent Playing as Predictor of Interpersonal Support, Loneliness, and Gamer Identity

Hypothesis 1 examined if greater time spent playing MMORPGs was associated with (1a) lower levels of offline interpersonal support and higher levels of offline loneliness, (1b) higher levels of online interpersonal support and lower levels of online loneliness, and (1c) higher levels of gamer identity. Five separate hierarchical regression model included the covariate variables (age and gender) at step one, the predictor variable (time spent playing) at step two, and separately, each of the following outcome variables: online and offline

interpersonal support, online and offline loneliness, and gamer identities. The findings are discussed below and presented in Table 2.

Contrary to expectations, the regression model with online interpersonal support as the outcome variable was not statistically significant, $p = .346$. Time spent playing, age, and gender were not significant predictors of online interpersonal support.

The overall regression model that included offline interpersonal support as the outcome variable was statistically significant, $R^2 = .053$, adjusted $R^2 = .034$, $F(1,145) = 2.717$, $p = .047$. At step one, gender and age did not significantly contribute to the regression model, $F(2, 146) = .529$, $p = .590$. Consistent with Hypothesis 1a, adding time spent playing to the regression model explained an additional 4.6% of variation in offline interpersonal support and this change in R^2 was significant, $p = .009$. Those who reported greater levels of time spent playing tended to report lower offline interpersonal support, $\beta = -1.292$, $t(145) = -2.655$, $p = .009$, $r = -.230$. Gender ($p = .712$) and age ($p = .336$) were not significant predictors.

The regression model that included online loneliness as the outcome variable was not statistically significant, $p = .065$. At step one, gender and age did not significantly contribute to the regression model, $F(2, 146) = 3.008$ $p = .052$. Those who identified as female tended to report greater online loneliness, $\beta = 2.498$, $t(145) = 2.405$, $p = .017$, $r = .195$. Inconsistent with Hypothesis 1b, adding time spent playing to the regression model did not significantly contribute to the variation in online loneliness. Age ($p = .611$) and time spent playing ($p = .247$) were not significant predictors of online loneliness.

Contrary to expectations , the regression model that included offline loneliness as the outcome variable was not statistically significant ($p = .099$). Within this model, time spent playing, age, and gender were not significant predictors of offline loneliness.

The overall regression model that included gamer identity as the outcome variable was statistically significant, $R^2 = .090$, adjusted $R^2 = .080$, $F(1,145) = 5.303$, $p = .002$. At step one, gender and age did not significantly contribute to the model, $F(2, 146) = .282$, $p = .755$. Consistent with Hypothesis 1c, adding time spent playing to the regression model explained an additional 9.4% of variation in gamer identity and this change in R^2 was significant, $p < .001$. Those who reported greater time spent playing tended to report greater scores on gamer identity, $\beta = .864$, $t(145) = 3.882$, $p < .001$, $r = .310$. Age ($p = .474$) and gender ($p = .614$) were not significant predictors of gamer identity.

Hypothesis 2a: Avoidant Attachment as Predictor of Time Spent Playing

A linear regression was used to test Hypothesis 2a, which predicted that higher levels of avoidant attachment would be associated with greater time spent playing, compared to lower levels of avoidant attachment, while controlling for age and gender. The final regression model was significant, $R^2 = .116$, adjusted $R^2 = .104$, $F(1, 145) = 8.412$, $p < .001$. Consistent with Hypothesis 2a, participants who reported greater levels of avoidant attachment also tended to report more time spent playing MMORPGs, $\beta = .183$, $t(145) = 2.333$, $p = .021$.

Hypothesis 2b: Time Spent Playing as Predictor of Interpersonal Support and Loneliness, with Avoidant Attachment as Moderator

It was predicted that greater time spent playing would be associated with lower levels of online and offline interpersonal support, as well as greater online and offline loneliness for participants who reported higher levels of avoidant attachment.

The PROCESS macro (v. 3.5, Hayes, 2018) was used to examine the effect of time spent playing on interpersonal support and loneliness as moderated by avoidant attachment. The independent variables in the regression model included time spent playing, avoidant attachment,

and an attachment x time spent playing interaction term. Age and gender were included as covariates. The outcome variables were online and offline interpersonal support, and online and offline loneliness. The final models for all four of the analyses were found to have statistically significant overall regressions. However, contrary to expectations, the interaction term was not significant in any of the models. Neither gender nor age significantly contributed to the regression models. The findings are discussed below and presented in Table 4 and 5.

The overall regression predicting online interpersonal support that included the predictors of time spent playing, avoidant attachment, and the avoidant attachment x time spent playing interaction term was statistically significant, $F(5, 143) = 4.860$, $p < .001$, $R^2 = .148$. Participants who reported greater levels of avoidant attachment also tended to report lower levels of online interpersonal support. Time spent playing was not a significant predictor.

The overall regression predicting offline interpersonal support that included the predictors of time spent playing, avoidant attachment, and the avoidant attachment x time spent playing interaction term was statistically significant, $F(5, 143) = 10.691$, $p < .001$, $R^2 = .265$. Participants who reported greater levels of avoidant attachment tended to report lower levels of offline interpersonal support. Time spent playing was approaching significance, which suggested a trend that participants who reported spending greater amounts of time playing also tended to report lower levels of offline interpersonal support.

The overall regression predicting online loneliness that included the predictors of time spent playing, avoidant attachment, and the avoidant attachment x time spent playing interaction term was statistically significant, $F(5, 143) = 6.876$, $p = .006$, $R^2 = .163$. Participants who reported spending more time playing tended to report lower levels of online loneliness.

Table 4

Time Spent Playing as Predictor of Online and Offline Interpersonal Support, with Avoidant Attachment as Moderator

	Variable	*B*	95% CI for B		*SE B*	*t*	*p*
			LL	UL			
			Online interpersonal support				
Step 1	Age	-.208	-.681	.265	.239	-0.870	.265
	Gender	-1.303	-4.918	2.312	1.829	-0.713	.477
Step 2	Avoidant attachment	-3.428	-4.967	-1.888	.779	-4.402	.000
	Time spent playing	0.798	-.218	1.815	.514	1.553	.123
Step 3	Interaction (Avoidant attachment X Time spent playing)	0.298	-.367	.962	.336	0.885	.377
			Offline interpersonal support				
Step 1	Age	-0.005	-0.394	0.383	0.196	-0.027	.979
	Gender	1.646	-1.607	4.898	1.645	1.000	.319
Step 2	Avoidant attachment	-4.417	-5.936	-2.898	0.768	-5.749	.000
	Time spent playing	-0.860	-1.741	0.021	0.445	-1.931	.056
Step 3	Interaction (Avoidant attachment X Time spent playing)	0.403	-0.298	1.105	0.355	1.136	.258

Note. CI = confidence interval; LL = lower limit; UL = upper limit.

Table 5

Time Spent Playing as Predictor of Online and Offline Loneliness, with Avoidant Attachment as Moderator

	Variable	*B*	95% CI for B		*SE B*	*t*	*p*
			LL	UL			
			Online loneliness				
Step 1	Age	0.132	-.087	0.351	0.111	1.195	.234
	Gender	1.732	-0.200	3.663	0.977	1.772	.078
Step 2	Avoidant attachment	1.854	0.977	2.732	0.444	4.179	.000
	Time spent playing	-0.551	-1.110	0.007	0.283	-1.952	.053
Step 3	Interaction (Avoidant attachment x Time spent playing)	0.033	-0.391	0.458	0.215	0.155	.877
			Offline loneliness				
Step 1	Age	0.041	-0.183	0.265	0.113	0.364	.717
	Gender	-0.345	-2.148	1.457	0.912	-0.379	.705
Step 2	Avoidant attachment	1.978	1.114	2.842	0.437	4.526	.000
	Time spent playing	0.385	-0.110	0.880	0.250	1.537	.127
Step 3	Interaction (Avoidant attachment x Time spent playing)	-0.233	-0.656	0.191	0.214	-1.085	.717

Note. CI = confidence interval; LL = lower limit; UL = upper limit.

Participants who reported greater levels of avoidant attachment also tended to report higher levels of online loneliness.

The overall regression predicting offline loneliness that included the predictors of time spent playing, avoidant attachment, and the avoidant attachment x time spent playing interaction term was statistically significant, $F(5, 143) = 7.871$, $p < .001$, $R^2 = .191$. Those who reported greater levels of avoidant attachment also tended to report greater levels of offline loneliness. Time spent playing was not a significant predictor.

Hypothesis 3a: Time Spent Playing as Predictor of Interpersonal Support and Loneliness, with Avoidance Coping as Moderator

Hypothesis 3a examined if greater time spent playing MMORPGs would be associated with lower levels of (online and offline) interpersonal support and greater (online and offline) loneliness for participants who reported higher levels of avoidance coping behaviours.

The PROCESS macro (v. 3.5, Hayes, 2018) was used to examine the effect of time spent playing on interpersonal support and loneliness as moderated by avoidance coping. The independent variables in the regression model included time spent playing, avoidance coping, and the avoidance coping x time spent playing interaction term. Age and gender were included as covariates. The outcome variables were online and offline interpersonal support, and online and offline loneliness. The final models for all four of the analyses were found to have statistically significant overall regressions. However, contrary to expectations, the interaction term was not significant in any of the models. Neither gender nor age significantly contributed to the regression models. These findings are discussed below and presented in Table 6 and 7.

The overall regression predicting online interpersonal support that included the predictors of time spent playing, avoidance coping, and the avoidance coping x time spent playing

Table 6

Time Spent Playing as Predictor of Online and Offline Interpersonal Support, with Avoidance Coping as Moderator

	Variable	*B*	95% CI for B		*SE B*	*t*	p
			LL	UL			
			Online interpersonal support				
Step 1	Age	-0.387	-0.881	0.108	0.250	-1.546	.124
	Gender	-2.204	-5.834	1.425	1.836	-1.201	.232
Step 2	Avoidance coping	-1.078	-1.529	-0.628	0.228	-4.732	.000
	Time spent playing	0.850	-0.172	1.871	0.517	1.644	.102
Step 3	Interaction (Avoidance coping x Time spent playing)	0.010	-0.193	0.213	0.103	0.098	.922
			Offline interpersonal support				
Step 1	Age	-.211	-0.586	0.164	1.90	-1.113	.268
	Gender	0.479	-2.653	3.611	1.584	0.302	.763
Step 2	Avoidance coping	-1.306	-1.734	-0.879	0.216	-6.039	.000
	Time spent playing	-0.840	-1.737	0.056	0.453	-1.853	.066
Step 3	Interaction (Avoidance coping x Time spent playing)	0.046	-0.175	0.267	0.112	0.411	.681

Note. CI = confidence interval; LL = lower limit; UL = upper limit.

Table 7

Time Spent Playing as Predictor of Online and Offline Loneliness, with Avoidance Coping as Moderator

	Variable	*B*	95% CI for B		*SE B*	*t*	p
			LL	UL			
			Online loneliness				
Step 1	Age	0.218	-0.019	0.455	0.120	1.822	.071
	Gender	2.386	0.341	4.431	1.034	2.307	.023
Step 2	Avoidance coping	0.472	0.215	0.730	0.130	3.624	.000
	Time spent playing	-0.536	-1.100	0.029	0.286	-1.875	.063
Step 3	Interaction (Avoidance coping x Time spent playing)	0.067	-0.67	0.202	0.068	0.988	.325
			Offline loneliness				
Step 1	Age	0.152	-0.069	0.373	0.112	1.363	.175
	Gender	0.062	-1.592	1.716	0.837	0.074	.941
Step 2	Avoidance coping	0.722	0.485	0.959	0.120	6.021	.000
	Time spent playing	0.328	-0.153	0.809	0.244	1.347	.180
Step 3	Interaction (Avoidance coping x Time spent playing)	-0.045	-0.153	0.063	0.055	-0.828	.409

Note. CI = confidence interval; LL = lower limit; UL = upper limit.

interaction term was statistically significant, $F(5, 143) = 7.312$, $p < .001$, $R^2 = .158$. Those who reported greater levels of avoidance coping tended to report lower levels of online interpersonal support. Time spent playing was not a significant predictor.

The overall regression predicting offline interpersonal support that included the predictors of time spent playing, avoidance coping, and the avoidance coping x time spent playing interaction term was statistically significant, $F(5, 143) = 11.576$, $p < .001$, $R^2 = .249$. Participants who reported greater levels of avoidance coping tended to report lower levels of offline interpersonal support. The predictor of time spent playing was approaching significance, which suggested a trend that participants who spent a greater amount of time playing also tended to report lower levels of offline interpersonal support.

The overall regression predicting online loneliness that included the predictors of time spent playing, avoidance coping, and the avoidance coping x time spent playing interaction term was statistically significant, $F(5, 143) = 5.783$, $p < .001$, $R^2 = .155$. Those who reported greater levels of avoidance coping tended to report greater levels of online loneliness. Time spent playing was approaching significance, which suggested a trend that those who spent more time playing also tended to report lower levels of online loneliness.

The overall regression predicting offline loneliness that included the predictors of time spent playing, avoidance coping, and the avoidance coping x time spent playing interaction term was statistically significant, $F(5, 143) = 9.873$, $p < .001$, $R^2 = .242$. Those who reported greater levels of avoidance coping tended to report greater levels of offline loneliness. Time spent playing was not a significant predictor.

Hypothesis 3b: Time Spent Playing as Predictor of Interpersonal Support and Loneliness, with Social Support Coping as Moderator

Hypothesis 3b examined if greater time spent playing MMORPGs would be associated with higher levels of (online and offline) interpersonal support and lower (online and offline) loneliness for participants who reported higher levels of social support coping behaviours.

The PROCESS macro (v. 3.5, Hayes, 2018) was used to examine the effect of time spent playing on interpersonal support and loneliness as moderated by social support coping. The independent variables in the regression model included time spent playing, social support coping, and the social support coping x time spent playing interaction term. Similar to previous analyses, age and gender were included as covariates. Two additional control variables were included because they were found to be significantly correlated with social support coping: (a) whether the participant was in a relationship with someone who plays online games, and (b) whether the participant plays online games with a significant other. The outcome variables were online and offline interpersonal support, and online and offline loneliness. The final model for three of the analyses were found to have statistically significant overall regressions. However, contrary to expectations, the interaction term was not significant in any of the models. The final model of the regression that included time spent playing, social support coping, and offline loneliness was not statistically significant ($p = .290$). Neither gender nor age significantly contributed to any of the regression models. These findings for the three significant regressions are discussed and presented in (Table 8 and 9).

The overall regression predicting online interpersonal support that included the predictors of time spent playing, social support coping, and the social support coping x time spent playing interaction term was statistically significant, $F(5, 143) = 2.643$, $p = .026$, $R^2 = .082$. Those who

Table 8

Time Spent Playing as Predictor of Online and Offline Interpersonal Support, with Social Support Coping as Moderator

	Variable	*B*	95% CI for B		*SE B*	*t*	*p*
			LL	UL			
			Online interpersonal support				
Step 1	Age	-0.173	-0.649	0.304	0.241	-0.717	.474
	Gender	-1.873	-6.220	2.474	2.199	-0.852	.396
	Gamer partner	-4.189	-11.894	3.516	3.897	-1.075	.284
	Plays with partner	4.109	-3.889	12.108	4.046	1.016	.312
Step 2	Social support coping	0.702	0.222	1.182	0.243	2.890	.004
	Time spent playing	0.479	-0.492	1.449	0.491	0.975	.331
Step 3	Interaction (Social support coping x Time spent playing)	-0.050	-0.262	0.161	0.107	-0.471	.638
			Offline interpersonal support				
Step 1	Age	0.051	-0.419	0.521	2.167	0.138	.891
	Gender	0.299	-3.986	4.584	2.167	0.138	.891
	Gamer partner	-0.660	-8.255	6.934	3.842	-0.172	.864
	Plays with partner	-1.226	-9.111	6.658	3.988	-0.307	.759
Step 2	Social support coping	0.646	0.173	1.119	0.239	2.697	.008
	Time spent playing	-1.243	-2.200	-0.286	0.484	-2.568	.011
Step 3	Interaction (Social support coping x Time spent playing)	-0.063	-0.271	0.146	0.105	-0.594	.553

Note: CI = confidence interval; LL = lower limit; UL = upper limit.

Table 9

Time Spent Playing as Predictor of Online and Offline Loneliness, with Social Support Coping as Moderator

	Variable	*B*	95% CI for B		*SE B*	*t*	*p*
			LL	UL			
			Online loneliness				
Step 1	Age	0.100	-0.164	0.364	0.134	0.751	.454
	Gender	2.005	-0.403	4.413	1.218	1.646	.102
	Gamer partner	1.238	-3.030	5.507	2.159	0.574	.567
	Plays with partner	-2.306	-6.737	2.125	2.241	-1.029	.305
Step 2	Social support coping	-0.368	-0.634	-0.102	0.135	-2.735	.007
	Time spent playing	-0.290	-0.828	0.248	0.272	-1.067	.288
Step 3	Interaction (Social support coping x Time spent playing)	-0.022	-0.140	0.095	0.059	-0.377	.707
			Offline loneliness				
Step 1	Age	0.029	-0.232	0.289	0.132	0.218	.827
	Gender	0.512	-1.864	2.888	1.202	0.426	.671
	Gamer partner	0.648	-3.564	4.859	2.130	0.304	.762
	Plays with partner	-0.599	-4.971	3.774	2.212	-0.271	.787
Step 2	Social support coping	-0.180	-0.443	0.082	0.133	-1.358	.177
	Time spent playing	0.578	0.048	1.109	.268	2.155	.033
Step 3	Interaction (Social support coping x Time spent playing)	-0.021	-0.136	0.095	.059	-0.355	.723

Note: CI = confidence interval; LL = lower limit; UL = upper limit.

reported greater levels of social support coping tended to report greater levels of online interpersonal support. Time spent playing was not a significant predictor.

The overall regression predicting offline interpersonal support that included the predictors of time spent playing, social support coping, and the social support coping x time spent playing interaction term was statistically significant, $F(5, 143) = 3.927$, $p = .002$, $R^2 = .103$. Interestingly, those who reported spending greater time playing tended to report lower levels of offline interpersonal support. Those who reported greater levels of social support coping also tended to report greater levels of offline interpersonal support.

The overall regression predicting online loneliness that included the predictors of time spent playing, social support coping, and the social support coping x time spent playing interaction term was statistically significant, $F(5, 143) = 3.566$, $p = .005$, $R^2 = .102$. Those who reported greater levels of social support coping also tended to report lower levels of online loneliness. Time spent playing was not a significant predictor.

Hypothesis 4 and 5: Correlates of Problematic Gaming Behaviour

Hypothesis 4 examined if problematic gaming behaviour (PGB) would be predicted by factors identified through the pathways model of problematic gambling. Specifically, it was hypothesized that higher PGB would be predicted by higher levels of avoidance coping strategies, antisocial behaviour, and impulsive behaviour. Hypothesis 5 examined if participants with lower levels of interpersonal support, higher levels of loneliness, and higher levels of avoidant attachment would also report higher levels of PGB. Moreover, even after controlling for the effects of avoidance coping, antisocial behaviour, and impulsive behaviour, the effects of these risk factors on PGB were predicted to remain significant. These findings are presented in Table 10.

Table 10

Predictors of Problematic Gaming Behaviour

	Variable	*B*	95% CI for *B*		*SE B*	*β*	R^2	ΔR^2
			LL	UL				
Step 1	Age	0.017	-0.802	0.835	0.414	.003	.47	.047
	Gender	9.259	2.453	16.065	3.444	.217*		
Step 2	Age	0.244	-0.459	0.947	0.356	.048	.338	.291
	Gender	7.398	1.641	13.155	2.912	.174*		
	Impulsive behavior	0.164	-0.072	0.401	0.120	.116		
	Antisocial behavior	0.255	0.043	0.468	0.107	.193*		
	Avoidance coping	1.801	0.887	2.714	0.462	.339**		
Step 3	Age	0.086	-0.616	0.787	0.355	.017	.385	.047
	Gender	6.673	0.834	12.512	2.953	.157*		
	Impulsive behavior	0.173	-0.064	0.409	0.120	.122		
	Antisocial behavior	0.239	0.028	0.449	0.106	.181*		
	Avoidance coping	1.255	0.264	2.247	0.501	.237*		
	Avoidant attachment	0.709	-2.097	3.515	1.419	.040		
	Online interpersonal support	0.289	-0.078	0.655	0.185	.155		
	Offline interpersonal support	-0.363	-0.737	0.011	0.189	-.193		
	Online loneliness	0.504	-0.135	1.143	0.323	.151		
	Offline loneliness	0.086	-0.568	0.739	0.331	.025		

Note. CI = confidence interval; LL = lower limit; UL = upper limit.

* $p \leq .05$. ** $p \leq .001$.

The hierarchical regression model included the covariate variables (age and gender) at step one, the predictor variables related to the Pathways Model (avoidance coping strategies, antisocial behaviour, and impulsive behaviour) at step two, and online and offline interpersonal support, online and offline loneliness, and avoidant attachment at step three. The outcome variable was PGB.

At step one, gender and age contributed significantly to the regression model, and accounted for 4.7% of the variation in PGB, $F(2, 146) = 3.614$, $p = .029$. Male participants tended to report higher levels of PGB ($M = 37.411$, $SD = 23.167$) compared to female participants ($M = 25.132$, $SD = 18.328$), $p = .008$. Age, however, was not a significant predictor, $t(146) = .041$, $p = .968$.

Introducing the step two variables accounted for an additional 29.1% of variation in PGB and this change in R^2 was significant, $F(3, 143) = 14.595$, $p < .001$. Avoidance coping was the strongest predictor of PGB. Those who reported greater levels of avoidance coping tended to report greater PGB scores, $t(143) = 3.897$, $p < .001$. Those who reported greater levels of antisocial behaviour also tended to report greater PGB scores, $t(143) = 2.380$, $p = .019$. Impulsive behaviour was not a significant predictor, $t(146) = 1.373$, $p = .172$.

When all 10 predictor variables were included in step three of the regression model, the regression model was statistically significant, $F(5,138) = 8.643$, $p < .001$; however, the R^2 change was not significant ($p = .067$). Avoidance coping was the strongest predictor of PGB. Those who reported greater levels of avoidance coping tended to report greater PGB scores, $t(138) = 2.503$, $p = .013$. Those who reported greater levels of antisocial behaviour also tended to report greater PGB scores, $t(138) = 2.244$, $p = .026$. Offline interpersonal support was approaching significance, which suggested a trend that participants who reported lower levels of

offline interpersonal support also tended to report greater PGB scores, $t(138) = -1.920$, $p = .057$. Online interpersonal support, (online and offline) loneliness, avoidant attachment, and impulsive behaviour were not significant predictors.

Removal of these nonsignificant predictors resulted in a statistically significant model, $F(5, 138) = 19.953$, $p < .001$, but a nonsignificant R^2 change ($p = .386$). Avoidance coping remained the strongest predictor of PGB, such that those who reported greater levels of avoidance coping tended to report greater PGB scores, $t(138) = 3.561$, $p = .001$. Those who reported greater levels of antisocial behaviour also tended to report greater PGB scores, $t(138) = 2.667$, $p = .009$. Those who reported lower offline interpersonal support also tended to report greater PGB scores, $t(138) = -2.647$, $p = .009$. Contrary to expectations, online interpersonal support, (online and offline) loneliness, avoidant attachment, and impulsive behaviour were not significant predictors, and age did not uniquely account for the variation in PGB scores. The Durbin-Watson value for the regression was 1.999, which met the conservative criteria (between one to three; Field, 2009) for testing the independence of errors.

Further analysis was conducted to delineate between the three types of antisocial behaviour to better understand how these different individual factors might be associated with PGB. When specifically examining the social subscale of antisocial behaviour, those who reported greater levels of the social features of antisocial behaviour also tended to report greater PGB scores, $t(138) = 3.080$, $p = .002$. On the other hand, neither the physical aggression subscale nor the rule-breaking subscale of antisocial behaviour predicted PGB.

In summary, players who spent a greater time playing MMORPGs also tended to more strongly identify with the gamer community, and they reported greater levels of avoidant attachment. The current study also examined avoidant attachment, avoidant coping style, and

social support coping style as potential moderators to the relationship between time spent playing, and either interpersonal support or loneliness; however, they were not found to be significant moderators. That said, greater avoidant coping style was associated with lower interpersonal support and greater loneliness, within MMORPG players' online and offline relationships, and greater social support coping was associated with greater interpersonal support both online and offline. Although players with greater levels of social support coping tended to report lower levels of online loneliness, social support coping did not significantly predict offline loneliness in MMORPG players. Lower levels of interpersonal support from offline relationships were associated with higher levels of PGB, and to a lesser degree, time spent playing. Consistent with expectations, players with higher levels of avoidance coping and higher levels of antisocial behaviour were also more likely to report higher levels of PGB.

A summary of the hypotheses and main findings are found in Table 11.

Content Analyses

The responses to the open-ended questionnaire items were analyzed to understand participants' perceived effects of their gaming behaviour on their online and offline relationships and to supplement the findings from the quantitative analyses. The responses were analyzed using an inductive content analysis approach (Elo & Kyngäs, 2008) to produce a broad description of participants' experiences online and offline, particularly as they related to the target variables in the study.

Two research assistants (RAs) contributed to coding and organizing the data. Both of the RAs had completed a four-year bachelor's degree in psychology through an accredited program in the past year, and they had previous research experience (e.g., gaming and/or mental health-related literature review, participant interview, data collection and analysis). One of the RAs had

Table 11

Summary of Hypotheses and Main Findings

Hypothesis	Supported?	Main Findings
Hypothesis 1a: Participants who spend more time playing MMORPGs were expected to report less interpersonal support and greater loneliness in their offline relationships compared to those who spent less time playing	Partially supported	• Those who spent more time playing reported lower offline interpersonal support • Time spent playing was not associated with offline loneliness
Hypothesis 1b: Participants who spend more time playing were expected to report greater interpersonal support and less loneliness in their online relationships compared to those who spend less time playing.	Not supported	• Time spent playing was not associated with online interpersonal support or online loneliness
Hypothesis 1c: Participants who spend more time playing MMORPGs were expected to report greater identification with the online gamer community.	Supported	• Those who reported greater time spent playing also identified more with gamer identity.
Hypothesis 2a: Participants with higher scores on avoidant attachment would spend more time playing MMORPGs, compared to those with lower scores on avoidant attachment	Supported	• Those who reported greater avoidant attachment also reported greater time spent playing.
Hypothesis 2b: Avoidant attachment style will moderate the relation between time spent playing and interpersonal support, and loneliness. Greater time spent playing will be associated with less interpersonal support and greater loneliness, both online and offline, for participants who report higher levels of avoidant attachment.	Not supported	• Avoidant attachment did not moderate the relation between time spent playing and interpersonal support, or loneliness • Those who reported greater avoidant attachment also reported lower online and offline interpersonal support • Those who reported greater avoidant attachment also reported greater online and offline loneliness • Those who reported more time spent playing also had lower online loneliness.

Hypothesis 3a: Avoidance coping will moderate the relationship between time spent playing and interpersonal support, and loneliness. Greater time spent playing will be associated with less interpersonal support and greater loneliness, both online and offline, for participants who report greater levels of avoidance coping.	Not supported	• Avoidance coping did not moderate the relation between greater time spent playing and online/offline interpersonal support , or loneliness • Greater avoidance coping was associated with lower online/offline interpersonal support • Greater avoidance coping was associated with greater online/offline loneliness
Hypothesis 3b: Social support coping will moderate the relationship between time spent playing and interpersonal support, and loneliness. Greater time spent playing will be associated with greater interpersonal support and less loneliness, both online and offline for participants who report greater levels of social support coping behaviours.	Not supported	• Social support coping did not moderate the relation between greater time spent playing and online/offline interpersonal support, or loneliness • Greater social support coping was associated with greater levels of online and offline interpersonal support and lower levels of online loneliness. • Greater levels of time spent playing was associated with lower levels of offline interpersonal support
Hypothesis 4: Participants with greater avoidance coping strategies, antisocial behaviours, and impulsive behaviours will also report greater PGB	Partially supported	• Avoidance coping was the strongest predictor of PGB. Greater avoidance coping was associated with greater PGB. • Greater antisocial behaviour was associated with greater PGB scores. • Impulsive behaviour did not predict PGB. • Offline interpersonal support was approaching significance.
Hypothesis 5: Participants with lower levels of interpersonal support, higher levels of loneliness, and higher avoidant attachment will also report higher scores on PGB	Partially supported	• Avoidance coping remained the strongest predictor of PGB. Greater avoidance coping was associated with greater PGB. • Greater antisocial behaviour was associated with greater PGB. • Lower offline interpersonal support was a significant predictor of greater PGB.

completed an undergraduate thesis related to online gaming. The other RA had experience as a teaching assistant to a social research methods course and practical experience as a counsellor at a university mental health program.

The first phase of analyses, according to Elo and Kyngäs (2008), involved a close reading of the responses by the principal investigator. This was conducted to better understand the collected data as a whole and to help with the division of the responses into meaningful units. During the preparation phase, it was decided that a meaningful unit included phrases and sentences, rather than a single word, in order to avoid fragmentation (the loss of meaning of text, Graneheim & Lundman, 2004). The analyses only involved the manifest content (e.g., verbal or written responses) because latent content (e.g., nonverbal responses and observable behaviours) was not available through the typed responses by the participants.

A total of nine questionnaire items were analyzed and coded. Although there were seven open-ended questionnaire items, two of the items involved two parts: item five (*Online and Offline Belonging)* and item seven (*Positive and Negative Impact of Ceasing Gaming)*. As a result, the target questions were labeled as follows: Motivations for Playing, Gaming Activities, Online Belonging, Offline Belonging, Evolution of Online Relationships, Evolution of Offline Relationships, Satisfaction with Time Spent Playing, Positive Impact of Ceasing to Play, and Negative Impact of Ceasing to Play. Separate coding schemes were developed for each of these target questions. Close analysis of the responses for Gaming Activities, did not indicate a pattern in how participants ranked the activities in which they usually engaged, and as such, the responses to this item were coded without separate interpretation of the ranks.

The RAs were introduced to the coding rubric and familiarized themselves with the codes and their descriptions. They completed three 60-minute group training sessions, which

involved using the coding rubric to assign codes to a randomly selected subset (25%) of the full sample. The two coders and the principal investigator met as a group to discuss the codes. As typical of an inductive content analysis (Elo et al., 2008), these discussions guided the principal investigator's decisions about adding or omitting codes, as well as tailoring the code descriptions and names in order to be more reflective of the responses. As an example of adding codes, the coders initially coded for Support as it related to the target question about participants' sense of belonging. In the final coding rubric, Support was identified as a theme for Sense of Belonging, and the code Instrumental Support and the code Emotional Support were created as subcategories under this theme. The coders also initially coded for the theme of Shared Time (changes in the way participants spend time with others), as it related to how participants' relationships have changed over time; however, Shared Time was later replaced by two themes that represented salient elements of shared time found in the responses: the theme of Change in Frequency of Shared Time, and the theme of Quality and Depth of Relationship. At the end of their training, interrater reliability between the coders was indicated by an Intraclass Correlation Coefficient of at least 0.70 for each of the nine questionnaire items, which was considered a "substantial" or good degree of agreement between coders (acceptable range is defined as kappa of 0.61-0.81; Cohen, 1960).

The second phase, according to Elo and colleagues (2008), is considered the organizing phase and included the generation of codes, the classification of these codes into broader categories, and the formulation (general conclusion which describes participants' online and offline experiences) based on the findings related to these broader categories. Throughout the remainder of this paper, the broader categories are referred to as *themes* and the subcategories falling under the themes are referred to as *codes*. See Appendix H for the coding rubric, which

includes a description of the themes and sample excerpts for each code. Following the close reading of the material in the first phase, the principal investigator developed a coding rubric, which listed a range of codes, along with descriptions and sample excerpts. The codes were not preconceived categories, but rather, the principal investigator and RAs were guided by the data and codes were freely generated (Elo et al., 2008; Hsieh & Shannon, 2005).

Participant responses could contain multiple meaningful units, and each unit could receive multiple codes. For example, a response that described being motivated to play because they felt a sense of achievement and pleasure from being part of a team working towards a shared goal was coded as falling under the theme of Skill Building and Ranking (Code: Achievement/Progression) and theme of Social Interaction (Code: Teamwork/Camaraderie). That said, if a participant's response to a question contained multiple codes that fell within the same theme, it was only assigned once to the given theme. As such, the participant received a score of one for that given theme. For example, if a participant described being motivated to play for entertainment and as a means to cope with sadness, the response was coded (only once) as falling under the theme of Coping and Mood Improvement (Code: Fun/Entertainment; Coping).

Following the completion of the coding training, each RA independently reviewed and coded each of the nine open-ended questionnaire items for the entire dataset. During this time, they maintained online communication with the principal investigator to monitor their progress and to inform the scheduling of the next group meeting. When the RAs both completed their coding of the full dataset, the two coding records were merged and the principal investigator identified any discrepancies. Then the RAs and the principal investigator all met in person. The team discussed the discrepancies, in order to achieve a consensus, over the period of three, 4-hour sessions. These final themes served as data for the Integrated analyses, which were used to

supplement the quantitative findings related to participants' gaming behaviour and their online and offline relationships.

Motivations for Playing

Four themes emerged from participants' responses about their motivations for playing MMORPGs: *Coping and Mood Improvement*, *Game Design and Structure, Social Interaction*, and *Skill Building and Ranking* (see Table 12). The theme of *Coping and Mood Improvement* was endorsed with the greatest frequency, and it was used to describe responses that included participants' need or desire to improve their present mood by playing MMORPGs (Codes: Fun/Entertainment, Coping). The remaining themes ranked as follows, in order of greatest frequency: *Social Interaction, Skill Building and Ranking,* and *Game Design and Structure*. *Social Interaction* described participants' motivation to engage with other MMORPG players as they completed tasks within the game (Codes: Online Community, Teamwork/Camaraderie). The theme of *Game Design and Structure* captured responses related to participants' experience of pleasure as they interacted with the objects, environments, and characters within the virtual world (Codes: Game Environment, Storyline, Exploration and Immersion). The theme *Skill Building and Ranking* captured participants' motivations to improve game-related skills and/or improve their rank in relation to other players by completing in-game tasks or testing their skills against other players (Codes: Achievement/Progression, Challenge, Competition).

There were also some notable patterns within the themes. Within the theme of *Skill Building and Ranking*, sense of achievement from completing in-game objectives and tasks was endorsed with the greatest frequency (32%). Within the theme of *Social Interactions*, there was also a much larger proportion of participants who reported that they were motivated by their positive

Table 12

Coding Frequencies and Percentages for Motivations for Playing

Theme Code	Frequency (*N = 149)*	Percentage
Coping and mood improvement	84	56.4
Fun/Entertainment	58	38.9
Coping	44	29.5
Social Interaction	78	52.3
Online community	75	50.3
Teamwork/Camaraderie	9	6.0
Skill building and ranking	65	43.6
Achievement/Progression	48	32.2
Challenge	13	8.7
Competition	14	9.4
Game design and structure	40	26.8
Game environment	15	10.1
Storyline	7	4.7
Exploration and immersion	26	17.4

Note. Percentages calculated using the ratio of theme/code frequency to total sample size.

experiences with the online community, in general (50.3%), compared to those who specifically highlighted team-based social interactions (7.4%) as a motivation for playing.

Gaming Activities

Two themes emerged from participants' responses about activities in which they tend to engage when playing MMORPGs: *Interaction with Game Design* and *Interaction with Others* (see Table 13). *Interaction with Game Design* was endorsed with a greater frequency compared to *Interaction with Others*. The theme *Interaction with Game Design* was used to describe responses that included participants engaging with the interactive virtual world in a way that was created within the game by the game designers (Codes: Plot, Explore, Achievement). The theme *Interaction with Others* captured activities that were dependent on the presence of other players within the game, which may include competitive or cooperative involvement (Codes: Teamwork, Versus, Chat).

Online Belonging

Three themes emerged from participants' responses about factors contributing to their sense of belonging within their online relationships. *Communication* was endorsed with the greatest frequency, followed by *Shared Vision,* and finally, *Support* (see Table 14). The *Communication* theme described participants' perceived pleasant exchanges with, or responses from other players (Codes: Chatting, Friendliness/Warmth). The theme of *Shared Vision* captured participants' responses to invitations from others to work together or participants' sense that others share their same goals or interests (Codes: Party Invite, Team/Camaraderie, Shared Interests). Party Invite had both positive and negative attributes (i.e., receiving and losing an invite), and as such, the participant responses were more closely examined to see whether it should be classified into separate codes. Given that only one participant reported losing an

Table 13

Coding Frequencies and Percentages for Gaming Activities

Theme Code	Frequency (*N = 149)*	Percentage
Interaction with game design	126	84.6
Plot	4	2.7
Explore	18	12.1
Achievement	122	81.9
Interaction with others	120	80.5
Teamwork	82	55.0
Versus	44	29.5
Chat	73	49.0

Note. Percentages calculated using the ratio of theme/code frequency to total sample size.

Table 14

Coding Frequencies and Percentages for Online Belonging

Theme Code	Frequency (*N = 149)*	Percentage
Communication	41	27.5
Chatting	17	11.4
Friendliness/Warmth	24	16.1
Shared vision	60	40.3
Party Invite	32	21.5
Team/Camaraderie	26	17.4
Shared interests	10	6.7
Support	54	36.2
Instrumental support	42	28.2
Emotional support	9	6.0
Recognition	8	5.4

Note. Percentages calculated using the ratio of theme/code frequency to total sample size.

invitation and the remaining participants (n = 32) reported receiving invitations, no additional analyses were conducted. *Support* was the theme used to describe other players' concern and appreciation for the participants' progress towards in-game tasks or concern for the participants' overall well-being (Codes: Instrumental Support, Emotional Support, Recognition).

When describing how other people online have made them feel like they belonged, participants responses highlighted different types of support. Within the theme of *Support*, a larger proportion of participants (28.2%) reported that receiving technical support with in-game tasks from other players contributed to feeling like they belonged when spending time online. Other participants reported that receiving emotional support (6.0%) or recognition of their in-game skills (5.4%) contributed to their sense of belonging online.

Offline Belonging

Similar to Online Belonging, three themes emerged from participants' responses about factors contributing to their sense of belonging within their offline relationships. *Communication* was endorsed with the greatest frequency, followed by *Shared Vision,* and finally, *Support* (see Table 15). Similar to the theme of *Communication* for online belonging, the theme of *Communication* for offline belonging described participants' pleasant exchanges with, or responses felt from others offline. Unlike the theme of Communication for online belonging, however, this theme also included participants' perceived limited opportunities for social exchanges offline and the degree of acceptance communicated by others in their offline interactions (Codes: Chatting, Friendliness/Warmth, Acceptance, Limited Opportunities). The theme of *Shared Vision* captured participants' responses to invitations from other people outside of the game to work towards a shared goal, or participants' belief that others share their same goals or interests (Codes: Invitation/Shared Time, Shared Interests). Invitation had both positive

Table 15

Coding Frequencies and Percentages for Offline Belonging

Theme Code	Frequency (*N = 149*)	Percentage
Communication	63	42.3
Chatting	31	20.8
Friendliness/Warmth	28	18.8
Acceptance	9	6.0
Limited opportunities	2	1.3
Shared vision	59	39.6
Invitation/Shared time	44	29.5
Shared interests	18	12.1
Support	29	19.5
Instrumental support	11	7.4
Emotional support	21	14.1

Note. Percentages calculated using the ratio of theme/code frequency to total sample size.

and negative attributes (i.e., receiving and losing an invite), and as such, the participants' responses were more closely examined to see whether it should be classified into separate codes. Given that only one participant reported losing an invitation and the remaining participants (N = 42) reported receiving invitations, no additional analyses were conducted. *Support* was the theme used to describe others' concern and appreciation for participants' progress towards personal goals, or assistance received from other players related to participants' emotional or mental well-being (Codes: Instrumental Support, Emotional Support).

When describing how other people offline have made them feel like they belonged, participants' responses highlighted different types of support, which was similar to the findings related to online sense of belonging. Within the theme of *Support*, however, a larger proportion of participants (14.1%) reported that receiving emotional support contributed to their sense of belonging online, compared to receiving tangible support with tasks or activities (7.4%).

Evolution of Online Relationships

Five themes emerged from participants' responses about how their online relationships have changed over time. *Quality and Depth* was endorsed with the greatest frequency, followed by *Change in Frequency of Shared Time, Conversation Topics, Identity/Personality*, and finally, *Priority/Interest Shift* (see Table 16). The *Quality and Depth* theme described changes in participants' level of intimacy and trust within their relationships (Codes: Improved, Declined, Variable). The *Frequency of Shared* theme described changes in the time participants spent with other players (Codes: Increased, Decreased, Variable). The theme of *Conversation topics* was used to describe changes in the topics that participants discussed with others (Codes: Personal, General, Game-related, Politics, Jokes, Occupation, Other Interests). *Identity/Personality* was the

Table 16

Coding Frequencies and Percentages for Evolution of Online Relationships

Theme Code	Frequency (*N = 149*)	Percentage
Quality and depth	49	35.0
Improved relationship quality	38	25.5
Declined relationship quality	9	6.0
Variable relationship quality	1	0.67
Change in frequency of shared time	32	22.9
Decreased shared time	16	10.7
Increased shared time	11	7.4
Variable shared time	4	2.7
Conversation topics	27	19.3
Personal	10	6.7
General	8	5.0
Game-related	6	4.0
Politics	4	2.7
Jokes	3	2.0
Occupation	3	2.0
Other interests	2	1.3
Identity/Personality	25	17.9
Maturity	9	6.0
Openness/Reservation	16	10.7
Knowledge/Cognition	2	1.3
Shaping	2	1.3
Priority/Interest shift	16	11.4
School	8	5.4
Game	6	4.0
Work	5	3.4
Finance	1	0.7

Note. Percentages calculated using the ratio of theme/code frequency to total sample size.

theme used to describe changes in participants' identity, personality, or preferences, which had an impact on their relationships (Codes: Maturity, Openness/Reservation, Knowledge/Cognition, Shaping). *Priority/Interest Shift* was the theme used to describe changes in participants' life priorities or interests, in relation to how they spent their time playing.

When asked how their online relationships have changed over time, participants distinguished between changes in the quality of these relationships and the time they spent on these relationships. Within the theme of *Quality and Depth*, a larger proportion of participants (25.5%) described noticing an improvement in the quality of their online relationships and very few participants (6%) experienced a decline in the quality of these relationships. This was not the case for *Frequency of Shared Time*. There was a smaller gap between the proportion of participants who reported an increase (10.7%) in time spent on online relationships and those who reported a decrease (7.4%) in shared time.

Evolution of Offline Relationships

Five themes emerged from participants' responses about how their offline relationships have changed over time. *Quality and Depth* was endorsed with the greatest frequency, followed by *Change in Frequency of Shared Time, Conversation Topics, Priority/Interest Shift,* and finally, *Identity/Personality* (see Table 17). The theme *Quality and Depth* was defined as changes in participants' level of intimacy and trust within their offline relationships. The codes within this theme were similar to participants' description of the changes in the quality and depth of their online relationships, with the addition of a sense of consistency in offline relationships (Codes: Improved, Declined, Variable, Consistent). The *Frequency of Shared* theme described changes in the time participants spent with other people offline (Codes: Decreased, Variable, Increased). The theme of *Conversation topics* was used to describe changes in the topics that

Table 17

Coding Frequencies and Percentages for Evolution of Offline Relationships

Theme Code	Frequency (*N = 149*)	Percentage
Quality and depth	61	43.6
Improved relationship quality	26	17.4
Declined relationship quality	13	8.7
Variable relationship quality	13	8.7
Consistent relationship quality	9	6.0
Change in frequency of shared time	29	20.7
Decreased shared time	16	10.7
Variable shared time	7	4.7
Increased shared time	6	4.0
Conversation topics	17	12.1
General	7	4.7
Occupation	5	3.4
Other interests	2	1.3
Jokes	1	0.7
Personal	1	0.7
Politics	1	0.7
Priority/interest shift	33	26
School	13	8.7
Work	8	5.4
Hobby	7	4.7
General	4	3.4
Finance	1	0.7
Identity/personality	31	22.1
Openness	17	11.4
Maturity	6	4.0
Confidence	3	2.0
Knowledge/Cognition	2	1.3
Shaping	1	0.7
Unspecified	1	0.7

Note. Percentages calculated using the ratio of theme/code frequency to total sample size.

participants discussed with others offline. The codes falling within this theme were similar to the online conversation topics participants described, with the exception that participants only described changes in their game-related discussions within their online relationships (Codes: Personal, General, Game-related, Politics, Jokes, Occupation, Other Interests). *Identity/ Personality* was the theme used to describe changes in participants' identity, personality, or preferences, which had an impact on their offline relationships. The codes for this theme were similar to participants' reported changes in their identity and personality, within the context of their online relationships; the exceptions were that participants only described changes in their level of confidence within their offline relationships and one participant stated that their personality had changed but did not elaborate on their response (Codes: Maturity, Confidence, Openness/Reservation, Knowledge, Shaping, Unspecified). *Priority/Interest Shift* was the theme used to describe changes in participants' life priorities or interests, in relation to how they spent their time playing. The codes falling within this theme were similar to participants' priority-related changes, as observed within the context of their online relationships; the exception was that participants only described changes in their game activity priorities within their online relationships (Codes: School, Finance, Hobbies, Work, Game, General).

Similar to participants' responses about their online relationships, participants distinguished between changes in the quality of their offline relationships and the time they spent on these offline relationships. Within the theme of *Quality and Depth*, a larger proportion of participants (17.4%) described noticing an improvement in the quality of their offline relationships and fewer participants (8.7%) experienced a decline in the quality of these relationships. In terms of *Frequency of Shared Time*, a larger proportion of participants reported

an increase (10.7%) in time spent on online relationships compared to those who reported a decrease (4%) in shared time.

Satisfaction with Time Spent Playing

Five themes emerged from participants' responses about factors contributing to their degree of satisfaction with the time they spent playing. *Time Management* was endorsed with the greatest frequency, followed by *Sense of Control, Social, Comparisons,* and finally, *Health* (see Table 18). *Time Management* was used to describe the proportion of time participants spent on gaming relative to other activities and commitments (Codes: Responsibilities/Occupation, General Productivity, Hobby/Entertainment).

Sense of Control was the theme used to describe participants' sense of control over their gaming behavior, and their emphasis on the intentionality of their gaming behaviour. The *Social* theme described the impact of their gaming behaviour on their social interactions and relationships, or lack thereof. The theme of *Comparisons* captured participants' descriptions of how their gaming behaviour compared to other gamers and/or how their recent gaming behaviour compared to their own behaviours in the past (Codes: Comparison to Others, Comparison to Past Behaviour). *Health* was used to describe the impact of their gaming behaviour on their physiological and mental health (Codes: Physical Health, Mental Health). The themes *Sense of Control* and *Social* were not composed of multiple codes.

When asked to elaborate on their current level of satisfaction, participants used self- and other-focused observations as bases for comparison. Within the theme of *Comparisons*, a larger proportion of participants (10.7%) described noticing a reduction in the time they spent playing over time, and they contrasted their playing time with the gaming behaviours of other online players (2.0%).

Table 18

Coding Frequencies and Percentages for Satisfaction with Time Spent Playing

Theme Code	Frequency (*N = 149*)	Percentage
Time management	75	50.3
Responsibilities/Occupation	39	26.2
General productivity	14	9.4
Hobby/Entertainment	22	14.8
Sense of control	44	29.5
Social	25	16.8
Comparisons	19	12.8
Comparison to others	3	2.0
Comparison to past behaviour	16	10.7
Health	16	10.7
Physical health	5	3.4
Mental health	13	8.7

Note. Percentages calculated using the ratio of theme/code frequency to total sample size.

Ceasing to Play: Positive and Negative Impact

Four themes emerged from participants' responses about areas in their life that would be positively impacted if they were to stop playing MMORPGs. *Time Management* was endorsed with the greatest frequency, followed by *Health, Interpersonal,* and finally, *Finance* (see Table 19). *Time Management* was used to describe opportunities for spending more time on other activities or commitments rather than gaming (Codes: Productivity, Occupation, Hobbies, Substitution). *Health* captured the implications of participants' gaming behaviour on their physiological or psychological well-being (Codes: Physical Health, Mental Health). The remaining two themes were not composed of multiple codes. The theme of *Interpersonal* captured the benefits of having more time and energy for the development or maintenance of interpersonal relationships. The theme *Finance* captured the financial advantages of not having any gaming expenses or the benefits of allocating more time and effort to activities that contribute to monetary gain.

When asked to describe the positive impact of ceasing to play MMORPGs, participants distinguished between physical and mental health. Within the theme of *Health*, a larger proportion of participants (20.1%) predicted that they would spent more time on physical activity, and/or notice an improvement in their physical fitness, compared to those who predicted that they would experience reduced stress and mood problems (8.7%).

On the other hand, five themes emerged from participants' responses about areas in their life that would be negatively impacted if they were to stop playing. *Interpersonal Loss* was endorsed with the greatest frequency, followed by *Health, Decline of Entertainment, Time Management*, and finally *Loss of Achievement* (see Table 20). The theme of *Interpersonal Loss* captured disruptions to online relationships, and loss of opportunity to connect with new people.

Table 19

Coding Frequencies and Percentages for Positive Effects of Ceasing to Play MMORPGs

Theme Code	Frequency (*N = 149*)	Percentage
Time management	101	67.8
Productivity	25	16.8
Occupation	43	28.9
Hobbies	24	16.1
Substitution	9	6.0
Health	43	28.9
Physical health	30	20.1
Mental health	13	8.7
Interpersonal	40	26.8
Finance	5	3.4

Note. Percentages calculated using the ratio of theme/code frequency to total sample size.

Table 20

Coding Frequencies and Percentages for Negative Effects of Ceasing to Play MMORPGs

Theme Code	Frequency (*N = 149*)	Percentage
Interpersonal loss	58	38.9
Health	57	38.3
Physical health	5	3.4
Mental health	52	34.9
Decline of entertainment	51	34.2
Time management	13	8.7
Occupation	3	2.0
Substitution	10	6.7
Loss of achievement	6	4.0

Note. Percentages calculated using the ratio of theme/code frequency to total sample size.

Health captured loss of gaming as a coping strategy, both as a source of pleasure, and as a means to avoid urges to engage in behaviours that could be detrimental to their health (Codes: Physical Health, Mental Health). *Decline of Entertainment* was used to describe the decline or loss of an important source of entertainment and pleasure. The theme of *Time Management* described reduced productivity at school or work, and the disadvantage of having more time for equally undesirable or less desirable behaviours and activities (Codes: Occupation, Substitution). The theme *Loss of Achievement* captured the decline or loss of sense of pride from completing in-game achievements. The themes *Decline of Entertainment and Loss of Achievement* were not composed of multiple codes.

Similar to the findings related to the positive impact of ceasing to play MMORPGs, participants distinguished between negative effects on their physical and mental health. Within the theme of *Health*, a larger proportion of participants (34.9%) predicted that they would experience increased stress and mood problems, compared to those who predicted a decline in their physical health (3.4%).

Integrated Analyses

I conducted the Pearson chi-square analyses to explore the relations between scores on the PGB measure and time spent playing, and the themes to participant responses to each of the open-ended questions. Separate analyses were conducted for each of the open-ended questions: motivations for playing, in-game activities, sense of online and offline belonging, satisfaction with the time they spend gaming, changes in their online and offline relationships over time, and perceived positive and negative changes should they cease playing. A median split approach was conducted to create two levels (high score group and low score group) for PGB and for time spent playing. Categorical variables were created based on the presence (1) or absence (0) of a

specific theme in a participants' response to a question. Chi-square analyses were conducted to examine the relation between the categorical variables: PGB (high and low) and Theme (presence or absence), as well as Time Spent Playing (high and low) and Theme (presence or absence). The likelihood ratio and Fisher's exact test values were considered for the analyses, however, these alternatives to Pearson's chi-square were not warranted because of the study's substantial sample size and because the expected frequencies were greater than five (Field, 2009).

Problematic Gaming Behaviour

Problematic gaming behaviour scores were associated with themes in participants' responses to questions about sense of belonging in their offline community, changes in their online relationships over time, their satisfaction with time spent playing, and the negative impact of ceasing playing. When asked whether other people offline have made them feel like they belonged, those who reported greater levels of PGB were less likely (39.8%) to agree with the statement compared to those with lower levels of PGB (60.2%), $\chi^2(1; N = 149) = 6.387, p = .011$, $OR = .284$ (95% $CI = .102, .787$).

When asked about how other people offline have made them feel like they belonged, participants who reported greater levels of PGB were less likely (17.2%) to provide responses that indicated the feeling of *s*upport compared to those with lower levels of PGB (82.8%), χ^2 (1; $N = 149) = 10.681, p = .001$, $OR = .202$ (95% $CI = .072, .563$).

When describing how their online relationships have evolved over time, those who reported greater levels of PGB were less likely (28.1%) to report that they noticed a change in the amount of time they spent with other people, compared to those with lower levels of PGB (71.9%), χ^2 (1; $N = 149) = 4.319, p = .038$, $OR = .412$ (95% $CI = .176, .965$). A closer look at

the codes falling under *Change in Frequency of Shared Time* (i.e., Increased, Decreased, Variable) indicated that those who reported greater levels of PGB were less likely (9.1%) to report that they spent less time on their online relationships, compared to those with lower levels of PGB (90.9%), χ^2 (1; N = 149) = 5.965, p = .015, *OR* = .112 (*95% CI* = .014, .901), whereas the other two codes were not significantly associated with PGB scores.

Those who reported greater levels of PGB were less likely to report satisfaction with the time they spent playing, r = .226, p = .006, t(147) = 17.001, p < .001, compared to those with lower PGB. When asked to elaborate, those with greater levels of PGB were less likely (25%) to report feeling a sense of control over their gaming behaviour, χ^2 (1; N = 149) = 9.421, p = .002, *OR*= .303 (*95% CI* = .139, .663), compared to those with lower PGB (75%). Moreover, those who reported greater levels of PGB were also less likely (29.3%) to contrast their current gaming behaviour to either their past behaviours, or the gaming behaviours of other players, χ^2 (1; N = 149) = 8.642, p = .003, *OR*= .355 (*95% CI* = .177, .715), compared to those with lower PGB (70.7%).

Lastly, when asked about the negative impact of ceasing to play MMORPGs, those who reported greater levels of PGB were more likely (62.7%) to report that they expected a decline in their entertainment, χ^2 (1; N = 149) = 10.697, p = .001, *OR* = 3.170 (*95% CI* = 1.568, 6.408), compared to those with lower PGB (37.3%).

Time Spent Playing

Participants who reported greater time spent playing MMORPGs were more likely (55.4%) to report playing motivations related to improving their avatar's skills and rank compared to those with lower time spent playing (44.6%), χ^2(1; N = 149) = 4.415, p = .036, *OR* = 2.017 (*95% CI* = 1.045, 3.896).

When asked how other players have made them feel like they belonged, participants who reported greater time spent playing MMORPGs were more likely (52.9%) to report that chatting with other players made them feel like they belonged, compared to those with lower time spent playing (47.1%), $\chi^2(1; N = 149) = 4.413, p = .036, OR = 2.040$ (*95% CI* = 1.045, 3.983).

When asked how their online relationships have changed over time, participants who reported greater time spent playing MMORPGs were more likely (63%) to describe an increase in the breadth of topics they discussed in online relationships compared to those with lower time spent playing (37%), $\chi^2(1; N = 149) = 3.990, p = .046, OR = 2.367$ (*95% CI* = 1.002, 5.593).

Lastly, when asked about the negative impact of ceasing to play MMORPGs, those who reported greater time spent playing were more likely (100%) to describe that they would feel a reduced sense of achievement compared to those with lower time spent playing (0%), $\chi^2(1; N = 149) = 7.447, p = .006, OR = 1.097$ (*95% CI* = 1.019, 1.181).

Motivation for Playing

Given the finding that participants who reported greater time spent playing were more likely to endorse *Skill Building and Ranking* motivations for playing, and they were more likely to emphasize social themes such as *Communication* and *Conversation Topics*, additional analyses were conducted to examine participants' achievement and social-based motivations for playing. Pearson chi-square analyses were conducted to explore the relations between motivation (i.e., *Skill Building and Ranking*; *Social*) and the following variables: PGB, coping, attachment, impulsive behaviour, antisocial behaviour, online and offline interpersonal support, and online and offline loneliness. A median split approach was conducted to create two levels (high score group and low score group) for these variables. Separate analyses were conducted to examine the

relations between motivation and the themes to participant responses to each of the open-ended questions.

Skill Building and Ranking. When asked whether they agreed with the statement "I think I need to spend less time playing MMORPGs", participants who endorsed *Skill Building and Ranking* motivation were less likely to Strongly Disagree (23.5%), Disagree (42.9%), and Somewhat Disagree (21.7%) compared to those who did not endorse *Skill Building and Ranking* motivation (76.5%, 57%, and 68.4% respectively), $\chi^2(6; N = 149) = 13.347, p = .038$.

When asked how their online relationships have changed over time, participants who endorsed *Skill Building and Ranking* motivation were more likely (68.8%) to describe a shift towards prioritizing their offline occupation and in-game achievements over online relationships compared to those who did not endorse *Skill Building and Ranking* motivation (31.3%), $\chi2(1; N = 149) = 4.601, p = .032, OR = 3.219$ (*95% CI* = 1.058, 9.789).

When asked how their offline relationships have changed over time, participants who endorsed *Skill Building and Ranking* motivation were less likely (21.7%) to report a shift towards prioritizing their occupation over offline relationships compared to those who did not endorse *Skill Building and Ranking* motivation (78.3%), $\chi^2(1; N = 149) = 4.601, p = .032, OR = 3.219$ (*95% CI* = 1.058, 9.789).

When asked about how other people online have made them feel like they belonged, participants who endorsed *Skill Building and Ranking* motivation were more likely (55.6%) to report the feeling of support compared to those who did not endorse *Skill Building and Ranking* motivation (44.4%), $\chi^2(1; N = 149) = 4.903, p = .027, OR = 2.143$ (*95% CI* = 1.086, 4.228).

The *Skill Building and Ranking* motivation was not significantly associated with participant scores on PGB, coping, attachment, impulsive behaviour, and antisocial behaviour, online and offline interpersonal support, and online and offline loneliness.

Given the literature on achievement-based motivation, further analyses were conducted to closely look at the reports from participants who endorsed the code *Achievement/Progression* within the theme of *Skill Building and Ranking* when describing their motivations for playing MMORPGs. Participants who provided responses that fit within the *Achievement/Progression* code reported greater time spent playing (M = 20.406, SD = 17.878) compared to participants who did not endorse *Achievement/Progression* (M = 12.134, SD = 14.572) in their responses, $t(149) = -3.005$, $p = .003$, *Mann-Whitney U* = 3236.

Moreover, participants who reported *Achievement/Progression* motivations also reported greater offline loneliness (M = 14.958, SD = 7.190) compared to participants who did not endorse *Achievement/Progression* (M = 12.535, SD = 5.951) in their responses, $t(149) = -2.169$, $p = .032$, *Mann-Whitney U* = 2920.

A comparison of PGB scores also indicated that participants who reported *Achievement/Progression* motivations also reported greater PGB (M = 4.669, SD = 2.403), compared to participants who did not endorse *Achievement/Progression* (M = 3.394, SD = 5.503) in their responses, $t(149) = -2.990$, $p = .003$, *Mann-Whitney U* = 3171.

Social Interaction. Similar analyses were conducted to examine those who endorsed the *Social Interaction* motivation. When asked to explain their reasons for agreeing or disagreeing with the statement "I think I need to spend less time playing MMORPGs", participants who endorsed the *Social Interaction* motivation were more likely (75%) to report feeling a sense of control over their gaming behaviour compared to those who did not endorse *Social Interaction*

motivation (25%), $\chi^2(1; N = 149) = 12.843, p < .001, OR = 4.0$ (*95% CI* = 1.826, 8.763). Moreover, participants who endorsed *Social Interaction* motivation were more likely (63.8%) to contrast their current gaming behaviour to either their past behaviours, or the gaming behaviours of other players compared to those who did not endorse *Social Interaction* motivation (36.2%), $\chi^2(1; N = 149) = 4.986, p = .026, OR = 2.149$ (*95% CI* = 1.093, 4.225).

When asked how their online relationships have changed over time, participants who endorsed *Social Interaction* motivation were more likely (63.0%) to report an increase in support from others compared to those who did not endorse *Social Interaction* motivation (37.0%), $\chi^2(1; N = 147) = 3.825, p = .050, OR = 1.970$ (*95% CI* = .994, 3.905). Moreover, participants who endorsed *Social Interaction* motivation were also more likely (70.4%) to report an increase in the breadth of topics discussed with others online compared to those who did not endorse *Social Interaction* motivation (29.6%), $\chi^2(1; N = 149) = 4.293, p = .038, OR = 2.536$ (*95% CI* = 1.032, 6.232).

When asked to identify the negative impact of ceasing to play MMORPGs, participants who endorsed *Social Interaction* motivation were more likely (62.8%) to expect a decline in their social opportunities or the quality of their online relationships compared to those who did not endorse *Social Interaction* motivation (37.2%), $\chi^2(1; N = 149) = 8.890, p = .003, OR = 2.742$ (*95% CI* = 1.402, 5.362). Moreover, participants who endorsed *Social Interaction* motivation were also more likely (60%) expect a decline in their productivity levels compared to those who did not endorse *Social Interaction* motivation (40%), $\chi^2(1; N = 149) = 7.136, p = .008, OR = 2.583$ (*95% CI* = 1.276, 5.230).

Social Interaction motivation was not significantly associated with participant scores on PGB, coping, attachment, impulsive behaviour, antisocial behaviour, online and offline

interpersonal support, and online and offline loneliness. However, *Social Interaction* motivation was associated with time spent playing. When grouped based on time spent playing (i.e., high vs. low amount of time), participants who endorsed *Social Interaction* motivation were more likely to be in the high group (55.7%) compared to those who did not endorse *Social Interaction* motivation (44.3%), $\chi^2(1; N = 149) = 6.162, p = .013, OR = 2.315$ (*95% CI* = 1.187, 4.517).

Avoidance Coping

When asked whether other people offline had made them feel like they belonged, participants who reported greater avoidance coping were less likely to select "*yes*" (36%) compared to those who had lower levels of avoidance coping (63.3%), $\chi^2(1; N = 149) = 13.254, p < .001, OR = .145$ (*95% CI* = .046, .460). When asked to elaborate, however, participant responses were not significantly related to their scores on avoidance coping. Avoidance coping was not found to be significantly associated with participants' responses on the other open-ended questionnaire items.

Avoidant Attachment

When asked how other people offline had made them feel like they belonged, participants who reported greater avoidant attachment were more likely (70%) to report that other people offline had not made them feel like they belonged compared to those with lower avoidant attachment (30%), $\chi^2(1; N = 149) = 5.387, p = .020, OR = .313$ (*95% CI* = .113, .866).

When asked how their online relationships have changed over time, participants who reported greater avoidant attachment were more likely (66.7%) to report an increase in the breadth of topics discussed with others online compared to those with lower avoidant attachment (33.3%), $\chi^2(1; N = 149) = 5.497, p = .019, OR = 2.784$ (95% CI = 1.158, 6.695). Within the same questionnaire item, participants who reported greater avoidant attachment were also more

likely (72.0%) to report that their online experiences have contributed to their personal growth and it has contributed to improvements in how they relate to others compared to those with lower avoidant attachment (28.0%), $\chi^2(1; N = 149) = 7.975, p = .005$, O*R* = 3.681 (95% CI = 1.433, 9.455).

When asked areas in their life that would be positively impacted if they were to stop playing MMORPGs, participants who reported greater avoidant attachment were less likely (30.0%) to expect improvements in their interpersonal relationships compared to those with lower avoidant attachment (70.0%), $\chi^2(1; N = 149) = 5.849, p = .016$, O*R* = .391 (95% CI = .180, .848).

Antisocial Behaviour

When asked how other people offline have made them feel like they belong, participants who reported antisocial behaviour were less likely to (20.7%) report feeling supported by others compared to those with lower antisocial behaviour (79.3%), $\chi^{2(}1; N = 149) = 5.382, p = .020$, O*R* = .330 (95% CI = .125, .868).

When asked about their degree of satisfaction with their time spent gaming, participants who reported greater antisocial behaviour tended to report greater satisfaction, $r = .183, p = .026$. When asked to elaborate, participants who reported greater antisocial behaviour were less likely (27.6%) to contrast their current gaming behaviour to either their past behaviours, or the gaming behaviours of other players compared to those with lower antisocial behaviour (72.4%), $\chi^2(1; N = 149) = 5.728, p = .017$, O*R* = .425 (95% CI = .210, .863).

CHAPTER IV

Discussion

The current study aimed to better understand the online and offline interpersonal experiences of adult MMORPG players and to identify interpersonal risk and protective factors for developing problematic gaming behaviours. More specifically, the primary objective of this study was to examine whether time spent playing MMORPGs, avoidant attachment, and coping style would be related to interpersonal support and loneliness, and whether this generalizes to both online and offline experiences. The second objective was to examine risk factors related to levels of problematic gaming behaviour (PGB). In the current study, a comparison of players' experiences online and offline indicated that although there were some parallels between the two domains in terms of players' interpersonal support and loneliness, players' interpersonal gains within one domain may not necessarily compensate for deficits within the other domain. The current findings offer insight into the link between gaming behaviours and individual factors, such as motivation for playing, avoidant attachment, coping style, and antisocial behaviours. These findings also highlight the importance of understanding how players engage with online games, rather than overall time spent playing, as a way to predict their risk for developing greater levels of PGB. These findings are discussed in five sections that encompass the main themes emerging from the results: time spent playing, avoidant attachment, coping style, player motivations, and problematic gaming behaviour.

Time Spent Playing

Given the literature on the interpersonal experiences of online players, it was expected that more time spent gaming would be associated with less interpersonal support, greater loneliness within their offline relationships, and greater interpersonal support and less loneliness

within their online relationships. Those who reported greater time spent playing were also expected to report greater identification with the online gaming community. The findings were mixed. Compared to other online players, those who spend more time playing felt more strongly connected to their online community and they received less interpersonal support within their offline relationships. However, greater time spent playing was not linked to greater offline loneliness, greater online interpersonal support, nor was it linked to less loneliness within players' online relationships.

Interestingly, spending more time playing online may not necessarily translate to increased opportunities for online interpersonal support from other players, nor did the game provide a space for players to feel less lonely. This suggests that online and offline relationships may not be interchangeable and that relationships made within the context of an online game may be qualitatively different in ways that have an effect on players' perceived sense of support from others. It may be that players feel supported in their online relationships, but not necessarily in ways that would traditionally contribute to their perceived sense of social well-being.

For example, Burke and Kraut (2016) examined the differences between three types of online communication with Facebook friends: (1) targeted, composed (e.g., original text for a specific person); (2) stylized or "one-click" (e.g., like, thumbs up); and (3) composed, broadcast communication (e.g., status update for a wide audience). Participants who received more communication from people with whom they rated as having a stronger tie also reported better well-being, but only if the messages were original texts created specifically for them rather than a status update for a larger audience. Receiving more overall communication was not associated with changes in well-being.

Furthermore, Best et al. (2015) suggest that the value of online friendships may be better understood at a collective level and in large numbers. Having a greater number of online friends was associated with both having better well-being and having greater negative online experiences. However, having a larger online social network was only beneficial when participants received online interpersonal support during a time of crisis, whereas having a greater number of online friends exacerbated participants' distress when they did not receive support from their large online network during a crisis. Qualitative interviews suggested that participants felt their online friendships mostly contributed to their perceived social support, social status, and belonging, with each of these three factors contributing to their overall well-being. The authors suggested that large online social networks, as a collective, may produce similar emotional responses that are available in individual offline friendships. Thus, participants in the present study may feel a stronger tie to the collective gamer community but factors such as the type of online communication received from other players, and whether they have received interpersonal support within these large networks may influence perceived availability of online interpersonal support and perceived online loneliness.

Another possible explanation is that, as individuals become more invested in the game and the online community, they experience a reduction in time spent on existing supportive offline relationships. Concurrently, investing more time on gaming may not allow for enough time to develop supportive online relationships, despite identifying as a gamer who belongs to an online community. These findings are consistent with existing literature that suggests that video game players who spend the most time online identify more strongly with the gamer community (De Grove et al., 2015), but that those who spend more time playing also reported fewer confidants and lower emotional support (Kowert et al., 2014).

Overall, it would seem that the way players engage with the game and engage with other online players may be more important, compared to total time spent playing, when it comes to predicting interpersonal support and loneliness across both online and offline domains. In the present study, participants' ability to benefit from their online relationships was associated with their motivations for playing, avoidant attachment, and avoidant coping, and social support coping.

Player Motivations

Given the literature on the different types of player motivations for engaging in online video games, and to supplement the findings from the main analyses, content analyses were conducted on participants' responses to the open-ended question about their motivation for playing. The findings suggested that players who were more motivated to play MMORPGs out of interest in creating and maintaining online interpersonal relationships may spend more time playing without losing their sense of control over their gaming behaviour. By engaging in more intentional play, these socially-motivated players tended to be more satisfied with the time they spent playing MMORPGs. On the other hand, players that were motivated by skill building or ranking, particularly those who are motivated by their sense of achievement from MMORPGs, tended to have greater offline loneliness and they were at higher risk for greater PGB, compared to those who were less motivated by achievement.

The content analyses indicated that participants had social and nonsocial motivations for playing, which may impact whether they choose to spend time with others online, as well as the quality of these interactions. Although MMORPGs provide players with the platform to access to a large online social network, players have the freedom to engage in different levels of social interaction. Social interaction was the second most frequently endorsed motivation for playing.

This theme encompassed participants' interest in meeting new people, establishing new and maintaining existing connections through chatting, and spending time with others online. Participants in the study who identified having social motivations for playing also found value in coordinating and playing with other players, as a team, in order to meet a common goal. Previous studies have also referred to sociability as a motivation factor for playing online (Williams et al., 2008), and identified "social gamers," players characterized by their lower motivations for playing alone and their view of gaming as a primarily social activity (Westwood & Griffiths, 2010).

Given that participants who reported having social motivations for playing prioritized online interactions and actively engaged in in-game activities that reinforced their stronger ties to the online community, they may have had more opportunities for increasing their online social network or strengthening their online social bonds. Although there was no evidence that participants who endorsed social motivations for playing were significantly different from those who did not endorse social motivations in terms of their ratings on interpersonal support and loneliness across online and offline relationships, participants qualitatively reported benefitting from these online interactions. More specifically, participants who endorsed social motivations for playing were more likely to report that their online relationships have changed to include greater support and more meaningful conversations with other people online, compared to those who are not socially motivated. Moreover, when asked about the negative impact of ceasing to play, the responses from players who are socially motivated to play were more likely to include a decline in the quality of their interpersonal relationships, which further emphasized the importance of these social relationships to online players.

Participants who were socially motivated to play also tended to report greater time spent playing, compared to those who were not socially motivated. Similarly, Li and colleagues (2015) found that experiencing social gratification was the strongest predictor of whether participants intended to continue playing social network games. In their study, social gratification was achieved through engaging in interactions and establishing personal connections with others online. Their findings showed that players benefited from having their social needs met when they received social support through the game, which in turn, motivated them to continue playing.

Overall, participants who were socially motivated were less likely to perceive a need to reduce their overall playing time, compared to those who were not socially motivated to play. Socially-motivated players even expected an indirect decline in their performance at work or at school (e.g., due to increased stress without gaming) should they choose to reduce the time they spent gaming. The current findings suggested that they attributed their satisfaction with their gaming time to having a stronger perceived sense of control. Moreover, they were actively engaged in evaluating their gaming in reference to others around them and to their past gaming behaviours. As such, socially-motivated players may be engaging in more intentional playing of MMORPGs and other factors outside of players' social motivation for playing may better predict their online and offline interpersonal support and loneliness.

On the other hand, individuals who are less socially motivated to play may engage in activities that are less likely to directly impact their online loneliness and access to online interpersonal support. In the current study, coping and mood improvement was the most frequently endorsed nonsocial motivation for playing MMORPGs. Coping and mood improvement referred to playing as a means to deal with unpleasant emotions and problems, as

well as playing for enjoyment and entertainment. This comes as no surprise, as much of the early literature on online gaming has found data supporting the use of games for escapism and avoidance. When participants were grouped based on quantitative reports of time spent playing, however, those who played more frequently described motivations related to skill building and ranking (i.e., experience of pleasure from game-related achievements, challenges, and competitions) compared to those who spent less time playing. Moreover, participants who were motivated by skill building and ranking tended to perceive a need to reduce their overall playing time. They described that their relationships had changed over time, such that they tended to shift their focus on gaming, rather than offline responsibilities (i.e., school, work), while also spending less time on developing online relationships due to a shift towards prioritizing improving in-game status and juggling their offline occupations. As players with low social motivations spend more time on in-game activities that involve earning achievements, facing challenges, and competing with other players, they may be less focused on other activities that may reduce loneliness or interpersonal support, across both online and offline settings.

A closer look the achievement code within the theme of skill building and ranking indicated that players who focus on in-game achievements, rather than more social activities, may experience fewer online social benefits. In the present study, participants who specified that they were motivated by a sense of achievement spent greater time playing, had greater offline loneliness, and were more likely to have high levels of PGB, compared to those without achievement-related motivations. This is similar to the *achievement* motivation identified by Williams et al. (2008), which was also associated with greater time spent playing in their study. Consistent with the findings from Williams and colleagues, when asked about the negative impact of ceasing to play, loss of achievement was most frequently endorsed by participants in

the current study who spent greater time playing. Given that greater time and effort is required to improve their avatar's knowledge, skills, resources, and prestige; individuals with achievement-related motivations might experience stronger pressure or reinforcement for increasing time spent pursuing activities related to the end-goal of improving their avatar's in-game value rather than spend time on social interactions.

Players' motivations may be maintained by specific thoughts and behaviours, which, in turn, may contribute to the persistence of consequences related to their gaming behaviour. Tan et al. (2017) investigated negotiation strategies, which are strategies that players use to reduce perceived barriers to participating in enjoyable activities, as they related to motivations for playing MMORPGs. For example, interpersonal constraints (e.g., lack of online friends) and intrapersonal constraints (e.g., judgments about own suitability for gaming) might be addressed by interpersonal negotiation strategies, such as trying to meet new people or joining an online group. Their findings showed that players' confidence in their ability to use negotiation strategies increased their social motivation and, in turn, their use of interpersonal negotiation strategies. Motivations related to achievement and escapism were not associated with interpersonal negotiation strategies, but they were associated with cognitive strategies, which involved use of self-justifications for the importance of playing. Therefore, players who have less confidence in their ability to make connections online may be playing MMORPGs for nonsocial reasons (e.g., achievement, escapism), which gives them less reason to engage in social strategies as they continue to spend more time on MMORPGs. Players' confidence in making these connections may also be influenced by their avoidant attachment, avoidance coping, and social support coping, which are further described below.

Avoidant Attachment

Given the literature on the role of attachment in adult relationships, the prediction was that greater avoidant attachment would be associated with greater time spent playing. In addition, it was predicted that greater time spent playing would be associated with lower levels of interpersonal support and greater loneliness, both online and offline, for participants who reported higher levels of avoidant attachment. There was no evidence for the moderating role of attachment. However, greater avoidant attachment was also associated with lower interpersonal support and greater loneliness, and these findings were consistent across both online and offline domains. Greater avoidant attachment was also associated with greater time spent playing.

These current findings showed that, individuals with greater avoidant attachment tend to spend more time playing online and, regardless of the domain, experience poorer social outcomes compared to those with lower avoidant attachment. Contrary to previous work suggesting that individuals who experience difficulties in social situations would turn to online opportunities for social support and connection (social compensation hypothesis; Valkenburg & Peter, 2007), online experiences of individuals with high levels of avoidant attachment may mimic their offline experiences. The literature on adult attachment style suggests that high avoidant attachment is associated with greater hesitance to become close or intimate with others (Brennan et al., 1998), which, in turn, may limit opportunities for strengthening social bonds. As such, online environments for players with high avoidant attachment may serve as an extension of their offline social environments, and they may not be spending their time online developing their social network despite having access to a large population of online players.

Although there was no evidence for the relation between avoidant attachment and social motivations for playing based on the interviews, the content analyses suggested that, compared

to participants with lower avoidant attachment, those with greater avoidant attachment were more likely to report that other people offline have not made them feel like they belonged. When asked to describe the possible advantages of reducing the time they spent playing, participants with lower avoidant attachment also tended to describe improvements in their relationships; however, this was not the case for participants with higher levels of avoidant attachment. One possible explanation is that participants do not perceive time spent playing as having such a strong influence on their interpersonal life. The findings may also be indicative of a perceived focus towards other, more important life domains aside from social life. Despite spending greater time playing MMORPGs and spending time using in-game communication features, high avoidant attachment players may not be engaging with others online in a way that promotes deeper connections with others.

Individuals with greater avoidant attachment may also spend more time playing when they are feeling unpleasant emotions and less likely to play when experiencing pleasant emotions (Kowert & Oldmeadow, 2015), which may influence their motivations for playing and their effectiveness in social interactions. Previous research has found that individuals who have greater avoidant attachment tend to have lower online bonding social capital and they are less likely to be interested and less likely to engage in social media use (Lee, 2013; Lin, 2015). Considering that bonding social capital is characterized by receiving and providing emotional support within a particular social group, it makes sense then that these high avoidant attachment players also feel a weaker sense of belonging. Bonding social capital has been found to be associated with players' use of several strategies that promote playing MMORPGs, such as making time to play and self-justifying the importance of playing, whereas bridging capital (developing new, weak ties that promote exploration of new experiences and perspectives) was

associated with only interpersonal strategies (e.g., meet new people online, join online group; Tan et al., 2017). Based on these previous findings, it may be that individuals with greater avoidant attachment still engage in strategies that contribute to increasing social interactions, however, having fewer success with developing offline relationships that they find meaningful may decrease their motivation and confidence in their ability to use strategies that promote more meaningful online relationships.

Taken together, players' online social experiences may mimic their offline social experiences: those with greater avoidant attachment reported poorer interpersonal support and loneliness both online and offline compared to those with lower avoidant attachment. Although participants with greater avoidant attachment were more likely to report greater time spent playing MMORPGs, they seemed to be less likely to use this time to capitalize on online connection. Those with greater avoidant attachment also reported a weaker sense of belonging offline and they were less likely to expect that reducing their time spent playing would result in an improvement in their offline relationships; which may contribute to players' reduced expectations for social success and reduced motivation to engage in social interactions.

Coping Style

Given that coping behaviours have long been associated with social and psychological outcomes, it was predicted that coping style would moderate the relation between time spent gaming and social outcomes. Specifically, it was predicted that greater time spent playing would be associated with greater perceived greater interpersonal support and less loneliness, both online and offline for participants who report higher levels of social support coping behaviours. It was also predicted that greater time spent playing was would be associated with less interpersonal support and greater loneliness, both online and offline, for participants who report higher levels

of avoidance coping behaviours. Although there was no evidence for the moderating role of coping style, both social support coping and avoidance coping were associated with players' online and offline social outcomes. Specifically, participants with greater social support coping style tended to report greater interpersonal support from both their online and offline relationships, and they reported lower online loneliness. Greater avoidance coping was associated with lower interpersonal support and greater loneliness in participants, within their online and offline relationships.

These findings suggest that social support coping behaviours are adaptive across both online and offline settings and, as expected, they are linked to players' access to supports within their relationships. However, the relation between social support coping and loneliness presented differently in players' online and offline relationships. Although players' social support coping behaviours are linked to experiencing less loneliness online, players' offline relationships do not share the same benefits. On the other hand, greater avoidance coping was consistently linked to poorer social outcomes for players, regardless of the domain. These findings are further discussed below.

Social Support Coping

Players who use social support coping behaviours may feel more supported by their online community through the features available in MMORPGs. In-game chat features and team-based objectives promote social interactions between players, whereas the perpetuity of MMORPGs can foster the development of long-term relationships and deeper bonds between players. Various underlying mechanisms that promote seeking social support offline may also contribute to social support seeking online. For example, a meta-analysis conducted on 124 studies related to coping suggested that individual personality characteristics (i.e., extraversion)

has been found to be associated with social support seeking coping behaviours (Connor-Smith & Flachsbart, 2007). Furthermore, individuals who seek support from their offline friends and are successful in having their needs met may also be more likely to expect the same in their online relationships, and thus, they may be more likely to seek similar supports when they play MMORPGs. The similarities between participants' responding about their online and offline interpersonal support may then be due to the overall benefits of engaging in social support coping behaviour, which is generally known to be an adaptive response to stress.

Interestingly, greater social support coping was associated with lower online loneliness for MMORPG players, but there was no significant association with offline loneliness. Use of strategies such as approaching others for support with instrumental tasks and emotional difficulties, may be helpful to reducing loneliness when online, but it may not extend to offline relationships for MMORPG players. Previous studies with similar findings have suggested that this may be the result of players spending more time and energy on online relationships while devoting fewer resources to offline relationships, especially as players spend more time playing (Limke-Mclean, 2018). However, it is also possible that MMORPG players who engage more often in social support coping strategies, but unfortunately have access to a narrower offline social network, may find solace through a broad network of online players. A small number of participants reported having limited opportunities for communication with regards to their sense of belonging, offline, a theme that was absent in responses to online experiences. Given the social features of MMORPGs, such as the built-in chat systems and access to other players any time of day (Chan & Vorderer, 2006), players who experience offline loneliness and who have the skills to engage others for social support may feel less lonely when playing the game. In the open-ended questions, participants reported feeling a greater sense of online belonging when:

they had pleasant exchanges with other players, they pursued the same goals or interests as other players, and they felt that other players expressed appreciation and concern for their well-being. These same qualities were endorsed when participants described their sense of belonging offline; however, instrumental and emotional support from others were less frequently endorsed when thinking about their offline relationships compared to their online relationships.

Players with greater social support coping styles may also be at an advantage when it comes to engaging others to help them navigate the endless tasks or challenges within the game, and as such, opportunities for teamwork and collaboration may be contributing to less loneliness when online. Participants reported that they felt like they belonged when they received help from other players with their understanding of the game and their in-game goals. Given the strong evidence for sense of belonging as a basic psychological need that may contribute to feelings of social isolation and loneliness (Baumeister & Leary, 1995), participants' heavy emphasis on the importance of receiving instrumental support may suggest that having the skills to seek social support with in-game tasks may contribute to less loneliness. As they continue to face endless challenges through the game, players' sense of belonging may be strengthened as they continue to successfully engage the online community during times when they are struggling with navigating in-game tasks. On the other hand, players who engage in less social support coping strategies may find themselves to be more isolated from other players, despite being surrounded by a large network of individuals online, which results in feeling lonelier when they are online.

Avoidance Coping

Avoidance coping has long been associated with poorer physiological and psychological functioning, and previous studies have found that individuals who engage in more avoidant behaviours offline were also less likely to report that they engage in online activities that would

promote connecting with others in a way that is meaningful to them (Seepersad, 2004). Individuals who are motivated to play online games in order to avoid or escape from offline problems tend to experience poorer overall psychological well-being (i.e., experience of pleasure, engagement, and meaning in their life; Kaczmarek & Drazkowski, 2014), which in turn, may impact players' experiences both online and offline. Use of video games as a form of an avoidance coping strategy, for example, has been found to contribute to greater social and occupational problems, as well as greater symptoms of stress, depression, and anxiety (Loton et al., 2016; Waugh et al., 2020). The offline disadvantages of having a greater avoidance coping style may also contribute to online problems, as individuals continue their avoidance strategies while playing online. Playing video games as a coping strategy has also been shown to reduce players' opportunities to develop more adaptive coping strategies (Young, 2009). This may be particularly true for MMORPG players, given the indefinite goals and objectives found in MMORPGs, which may be used as a means to continuously avoid unpleasant emotions and situations.

Taken together, players' motivations for playing, avoidant attachment, and coping style may better predict the quality of players' online and offline relationships, compared to time spent playing. Although spending more time on MMORPGs did not necessarily equate to lower levels of loneliness or greater interpersonal support, players reported benefitting from a strengthened sense of belonging with their online community. MMORPGs expose individuals to a larger social pool and create situations that would allow for communication and collaboration between players; however, individual factors may promote or hinder players' ability to successfully navigate the online social environment. In general, players who show less avoidant attachment, are more socially motivated to play online, as well as engage in more social support coping

behaviours and fewer avoidance coping behaviours, may have an online advantage over other players when it comes to making new connections and maintaining deeper bonds.

Problematic Gaming Behaviour

Problematic gaming behaviour (PGB) refers to a continuum ranging from a few symptoms of distress related to video game consumption to clinicially significant impairment. Given that previous research has reported some similarities between the features of pathological gambling and clinicially significant distress related to playing video games, the current study used pathological gambling literature as a guide to understand the features of PGB. Specifically, PGB was predicted to be associated with pathological gambling predictors, such as avoidance coping, antisocial behaviour, and impulsive behaviour. Given that previous research has suggested that online and offline relationships may contribute to the development of PGB and given the built-in social features of MMORPGs, it was also predicted that avoidant attachment, along with interpersonal support and loneliness, both online and offline, would predict PGB above and beyond the predictors found in pathological gambling literature.

Findings indicated that players who engage in greater avoidance coping, and greater antisocial behaviour and those who have less offline interpersonal support, are at greater risk of having higher levels of PGB. There were parallels between the IGD features proposed in the *DSM-5* (APA, 2013) and the responses of participants with greater PGB regarding the reasoning behind their dissatisfaction with the time they spent playing MMORPGs, which included playing games while avoiding emotions, responsibilities, and other activities. Although players with greater antisocial behaviour tend to be more satisfied with the time they spent playing, compared to those with less antisocial behaviour, they also tended to engage in less self- and other-evaluation when it comes to gaming behaviour, which may be linked to their risk for higher

PGB. Further evidence was also found for the difference between online and offline relationships, such that players with greater PGB experienced less interpersonal support and poorer sense of belonging in their offline relationships, but there was no such link between PGB and online interpersonal factors. Lastly, players' impulsive behaviours were not linked to greater PGB. These findings are further discussed below.

Avoidance Coping

Avoidance coping was the strongest predictor of PGB among all the factors examined in the study, which suggests that individuals who tend to engage in avoidance strategies (e.g., avoiding instrumental tasks, and avoiding thinking about a problem) when experiencing difficulties also tend to experience greater distress related to their gaming behaviours. There is further evidence of this in the responses to the open-ended questions, which highlighted parallels between participants' perceived issues with their gaming behaviour and the DSM-5 symptom components of Internet gaming disorder, such as preoccupation, escape, problems, and displacement (APA, 2013). Specificially, participants who reported greater PGB were less likely to be satisfied with the time they spent playing, and they described disatisfaction related to thinking about playing while engaged with school or work, playing the game as a means to forget about problems, continuing to play despite negative consequences, and spending less time on other important activities in order to play games.

Given that avoidance coping involves refraining from thinking about problems and from engaging in instrumental tasks related to the problem, it tends to interfere with occupational and social activities, which is consistent with the features of PGB. As individuals engage in greater avoidance coping, they may also experience long-term problems in their online and offline relationships. There is evidence of this in participants' reports about sense of belonging and the

negative impact of ceasing to play MMORPGs. When participants were grouped based on their PGB scores, those with greater PGB described disatisfactions related to their gaming interference with their studies, work, financial goals, and opportunities for more meaningful connections. When asked about the aversive impact of ceasing to play MMORPGs, those with greater PGB were significantly more concerned about losing a source of entertainment, compared to participants with lower PGB, which further emphasizes their nonsocial motivations for playing. Some participants also described gaming as a coping mechanism or a leisurely activity that does not contribute to benefits outside of the game. Participants who scored higher on PGB also reported a poorer sense of belonging offline, and they were less likely to describe receiving support from other players, which is consistent with previous findings that suggested that individuals who are more prone to use of avoidance coping strategies are less likely to report perceiving their online interactions as meaningful (Seepersad, 2004). Overall, participants who tended to use more avoidance coping were more likely to play as an avoidant coping strategy as opposed to having social motivations for playing, which may limit their opportunities for developing supportive online relationships while also disrupting their occupational responsibilities.

Antisocial Behaviour

Greater antisocial behaviour also predicted greater PGB, which suggests that underlying mechanisms that promote violating societal norms, harm of others, and/or destruction of others' rights or personal property may also predispose individuals to engage with MMORPGs in a maladaptive way. Individuals who tend to exhibit socially aggressive behaviours in their offline life may be attracted to some of the features of MMORPGs, which include competitions against other players for personal gain. In-game competitions may be reinforced by in-game rewards,

such as acquisition of rare items, access to exclusive content, improved avatar skills, and increased social status or rank on the leaderboards. MMORPGs also provide a space where the repercussions for violating societal norms may seem less aversive for some individuals because it does not seem to directly infringe on their offline life in the short-term. Studies that have shown that greater aggression and greater narcissism were associated with problematic gaming (Kim et al., 2008). Other studies have demonstrated that greater scores on physical and verbal aggression predicted higher scores on pathological Internet use (Caplan et al., 2009). Therefore, individuals who engage in more offline antisocial behaviours may have an underlying vulnerability that contributes to maladaptive responses both online and offline.

Considering that previous studies have observed deficits in error-monitoring in individuals with higher levels of antisocial behaviours (Chang, 2010; Fabbro, 2018), players with greater antisocial behaviour may be more at risk for PGB because they are generally less engaged in evaluating and self-monitoring their relationships and gaming behaviours. Compared to those with less antisocial behaviour, participants with greater antisocial behaviour reported greater satisfaction with their time spent gaming. In their responses to the open-ended questions, they were less likely to justify their gaming behaviour by comparing their gaming behaviours to past behaviours, or to the gaming behaviours of other players. Those who reported greater antisocial behaviour were also less likely to describe social support when evaluating their offline sense of belonging, compared to those with less antisocial behaviour. Players with greater antisocial behaviour may place less emphasis on receiving offline interpersonal support when evaluating their offline relationships. Thus, individuals with greater antisocial behaviour and less offline support may find it more rewarding to play MMORPGs compared to engaging with

others offline, and their socially maladaptive approaches to using MMORPGs may place them at greater risk for exacerbating existing vulnerabilities.

Offline Interpersonal Support

Having limited access to offline interpersonal support outside of the online community was the only interpersonal variable that was associated with greater PGB after controlling for the effects of the traditional predictors found in the pathological gambling literature. As such, individuals with less offline interpersonal support tended to report greater PGB compared to those with greater support from offline relationships.The findings underscore that offline and online relationships are not interchangeable, as having greater interpersonal support online was not associated with lower PGB.

This is not to say, however, that online relationships do not influence social outcomes in MMORPG players. Players derive a sense of belonging and receive instrumental and emotional support from their online communities. Rather, individuals who feel less supported by their offline relationships are generally at a higher risk for maladaptive engagment with MMORPGs, as characterized by greater levels of the symptoms of Internet gaming disorder: preoccupation with the game, the need to increase playing time, distress when game access is restricted, occupational and social problems, persistent playing despite perceived consequences, desire to escape from problems, loss of interest in other hobbies, deception of others regarding amount of playing, and uncessful attempts to control playing behaviour (Internet gaming disorder; APA, 2013).

Impulsivity

Contrary to expectations, impulsive behaviour did not predict PGB; however there was some evidence that self-control might be an important factor in predicting PGB. The content

analyses suggested that having a sense of self-control when it comes to participants' gaming behaviours improved their satisfaction with the time they spent on playing. Interestingly, those with higher PGB were less likely to mention self-control in their responses to the open-ended questions. Studies on impulsivity has distinguished between two aspects of self-regulation: self-regulation assessment (e.g., an individual's tendency to judge both merits and demerits of their behaviours) and locomotion (e.g., an individual's tendency to move from one state or goal to another; Shalev & Sulkowski, 2009). Based on this, online players with better self-regulation may be more actively engaged in evaluating their gaming behaviours while also feeling more confident in their ability to switch to or from playing; and thus, players with better self-control are actively choosing to play rather than playing as an avoidant coping strategy.

Overall, the findings from the quantitative and content analyses suggest that players with greater avoidance coping, greater antisocial behavours, and lower offline interpersonal support may be at greater risk for higher PGB levels. The findings also suggest that although players may broaden their opportunities for making new connections online as they spend more time playing, it does not translate to their offline relationships. Effectiveness in online social environments may depend on players having greater social motivations for playing, lower avoidant attachment, and greater social support coping behaviours.

Limitations and Future Research Directions

The current study had several limitations, which should be addressed in future research. First, the data were self-reported and retrospective in nature, which can pose some risks for accuracy, and the crosssectional data do not allow for causal inference. For example, the present study found that greater antisocial behaviour and avoidant coping were significantly associated with greater risk for PGB, but the current study does not provide information about the direction

of these effects. One interpretation is that those who have greater antisocial tendencies or engage in more avoidance coping may be more predisposed to maladaptively engaging with online video games, compared to those with less propensity for antisocial and avoidance coping behaviours. However, it is also possible that greater PGB may exacerbate antisocial and avoidance coping behaviours in online gamers as players continue to receive in-game rewards or earn achievements for more socially aggressive behaviours. In future studies, a prospective and longitudinal approach should be used to allow for causal inferences and to improve our understanding of the development of PGB.

Second, although the current study addressed the need for including a measure of respondents' playing time in investigating problematic behaviours (Wittek, 2016), individuals who have poorer self-monitoring and attention skills may underreport the amount of time they spend playing. Poor self-monitoring may also result in reduced awareness of how gaming behaviour may interfere with one's daily living, occupation, and relationships. Thus, individuals with higher levels of PGB may have been underreporting their gaming frequency and the degree of disruption to their daily functioning. Social desirability and memory biases may also impact participants' self-reports. It would also be helpful to use alternative methods for measuring time spent gaming, such as asking participants to report on their gaming time history logs. Including multiple responders (e.g., participants' family/household members) to measures of participants' gaming behaviour and time spent playing may also help with the reliability and validity of the findings.

Third, PGB was operationally defined as a continuous variable and the current study did not implement a cut-off score for identifying individuals experiencing clinically significant distress related to online gaming. Although this approach allowed for the observation of the

gaming experiences of a spectrum of MMORPG players, and included participants who may meet the criteria for IGD, the findings from the current study alone cannot be used to generalize to clinical populations. Given the similarities between PGB and problem gambling, investigation into IGD and possible comorbid disorders (e.g., problem gambling, ADHD, mood disorders) would further inform the diagnostic features of IGD and contribute to differential diagnosis. Future research may look into recruiting individuals who report clinically significant levels of distress related to gaming and incorporate other sample groups, such as individuals with comorbid disorders, for comparison.

Fourth, the findings about the relation between players' social outcomes and their motivations for playing, avoidant attachment, and coping style would be better supported with data pertaining to participants' bridging and bonding social capital. The current study asked participants to consider individuals with whom they communicate or spend time the most online, and then do the same for their offline individuals; however, it did not ask participants to estimate the total number of individuals with whom they regularly connect nor were they asked to rate how close they felt to these individuals. Including a measure of social capital would allow for more direct investigation into possible links between the size of their social networks, strength of bond within these relationships, and how participants are engaging with MMORPGs.

Fifth, the inclusion of alternative measures of interpersonal support and loneliness may further inform the relation between participants' motivations for playing and their online relationships. The content analyses suggested that having social motivations for playing relates to receiving greater support from other people online, and to having the expectation that ceasing to play would result in a decline in the quality of their relationships. However, the quantitative measures used in the current study did not suggest significant differences in interpersonal

support and loneliness between the two groups (i.e., social motivation, non-social motivation). Other measures may better capture players' feelings of support in their online relationships. For example, a measure of online instrumental support online may include items related to receiving help from other players on an in-game task.

Gamer identity may further inform such investigation into players' social outcomes. The present study found that gamer identity was linked to time spent playing. It is possible that the degree to which participants identify as a gamer and identify with the gamer community has an impact on their sense of belonging, interpersonal support from others, and loneliness. Future research should examine the role of gamer identity in predicting interpersonal risk factors related to PGB.

Lastly, future studies may look further into the qualitative experiences of individuals who use MMORPGs as an avoidance coping strategy. The findings from the current study indicated that avoidance coping was associated with poorer interpersonal support, loneliness, and greater PGB, and understanding the underlying mechanisms maintaining avoidance coping behaviours would contribute to understanding the development of PGB. For example, examining gaming behaviour as it relates to perceived self-control and trait and behavioural impulsivity may provide insight regarding the use of MMORPGs as a short-term, adaptive coping strategy as opposed to a long-term, maladaptive coping strategy.

Conclusion and Practical Applications

The present study found that motivations for playing, coping style, and attachment style have an impact on the way individuals engage with MMORPGs. Specifically, having greater social motivations for playing, having less avoidant attachment, engaging in greater social support coping, and engaging in less avoidance coping behaviours may contribute to players'

ease in making new connections online. Although there were some parallels to findings about online and offline experiences with regards to interpersonal support and loneliness, online and offline relationships, and their benefits were not interchangeable. Time spent gaming may not translate to better online relationships because players might not prioritize in-game social activities, and their online relationships may not provide the same quality of support as their offline relationships. Furthermore, strategies successfully used for reducing online loneliness, for example, may not easily translate to offline environment because the features of MMORPGs (e.g., chat systems, tasks promoting teamwork) may facilitate the development of online interactions in ways that are not usually available to players in their offline environments. These findings do not undermine the role of online relationships in MMORPG players' social outcomes, but rather highlights their specific contributions to players' sense of belonging from their online community and their value as a source for instrumental and social support for online players.

The study also extends previous literature on "excessive playing" of video games, by examining the two commonly used measures for this construct: time spent playing and problematic gaming behaviour (PGB). PGB represented maladaptive, excessive game play as evidenced in the findings from the content analyses that linked greater PGB to the following: less satisfaction with time spent playing; preoccupation with the game; a tendency to play as a means to forget about problems, disruptions to players' occupations, responsibilities, and other activities; and the urge to continue to play despite perceived problems. Although greater time spent playing was associated with greater avoidant attachment and greater identification with the gamer community, time spent playing alone did not explain players' social outcomes, and understanding how players spent their time online was more important. More important than

time spent playing, factors such as avoidance coping, antisocial behaviour, and offline interpersonal support play a key role in predicting PGB.

Avoidance coping and antisocial behaviour predicted players' level of risk for developing PGB. Avoidance coping was the strongest predictor of higher levels of PGB, and it was consistently associated with poorer outcomes in the current study. The negative impact of playing MMORPGs becomes two-fold as individuals engage in perpetual gaming as a means to avoid instrumental tasks and emotional difficulties. In doing so, these individuals may exacerbate occupational and social problems while reducing opportunities for developing more adaptive coping strategies, which, in turn, promotes more avoidance and playing. To a lesser degree, antisocial behaviour may predict higher levels of PGB in MMORPG players. Players with greater antisocial behaviour may be less engaged in self-monitoring their relationships online and offline, and less engaged in evaluating their gaming behaviour, which may place them at a greater risk for developing PGB. Considering that both avoidance coping and antisocial behaviour were associated with less interpersonal support, both online and offline; these findings further suggest that MMORPG players at risk for PGB may be ineffectively responding to others offline, and the online MMORPG environment may serve as an extension of these offline environments.

The findings contribute to the gaming literature and yield clinical applications. Overall, the study provided a more balanced view of the interpersonal relationships of MMORPG players by investigating both adaptive and maladaptive outcomes. It also addressed the need for inclusion of coping style in models predicting outcomes in relation to PGB (Loton, 2016). By looking at coping style and attachment style as predictors, we learned the that online environments are linked to sense of belonging and social support. Various studies have

investigated online gaming behaviour in adults while grouping together individuals who play different types of games, which may be problematic for generalizability of the findings. The current study addresses the need for research focusing specifically MMORPG players and their experiences (Wittek et al., 2016; Rosencranz et al., 2017). Existing research on motivations for playing online video games was extended in the current study in order to examine the relation between social and nonsocial motivations and how players engaged with MMORPGs. The study also provides some insight to the experiences of gamers who "excessively play" and yet do not report significant negative outcomes (Kuss, 2012) by comparing the role of time spent playing and PGB in predicting online and offline social outcomes in MMORPG players. Lastly, the study contributed to the mental health literature related to gaming by demonstrating the importance of avoidance coping, antisocial behaviour, and offline interpersonal support in predicting PGB.

Understanding individual motivations, rewards, and consequences may inform initiatives for prevention and treatment of individuals experiencing significant distress related to their gaming behaviour. In a clinical setting, health professionals may use the findings from the study to further inform their assessment interviews with patients experiencing significant social, occupational, and health problems related to their online gaming. For example, a case formulation that includes information about coping behaviours, antisocial behaviours, and interpersonal support may provide a more holistic view of the specific mechanisms contributing to patients' problems, as well as the factors that may be facilitating the maintenance of their maladaptive gaming behaviour. The current findings may also contribute to developing screeners that may be used to identify individuals at higher risk for developing higher levels of PGB.

This research may also inform game developers seeking to improve user experiences. By building on existing game structures that promote social interactions and by supporting

individuals who are more hesitant to get close to other players, developers may expand their audience reach and attract more socially-motivated players while also promoting adaptive social behaviours. A shift towards rewarding prosocial behaviours in gamers (e.g., unlocking achievements based on helping behaviours) and a shift away from rewarding antisocial behaviours (e.g., moderating communication lines to reduce persistent verbal aggression) would create a more supportive online community for users and promote healthier video game engagement. Given that the MMORPG players in the current study expressed that they valued the support they received from the online community and some reported having limited social opportunities offline, players may benefit from the integration of their online relationships into their offline world. For example, video game companies or gaming organizations could organize or promote more offline social events for their users, which may help with the transference of players' online supports into their offline social networks.

Considering the growing population of children, adolescents, and adults who are engaging in online video games, understanding the nature of players' online social interactions within the context of their offline interactions may contribute to the development of programs for promotion of healthier engagement with online video games.

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APPENDICES

Appendix A
List of Measures

Measure	Construct	Citation	# of items	Variable Type
Demographics	gender, age, marital status, ethnicity, family income, and psychiatric history	N/A	11 items	Independent
Online and Offline activities	Time spent playing MMORPGs, other video games, other online activities, offline activities Age started playing video games, and preferred video games.	N/A	7 items	Independent: *total hours played*
IGD Scale	Problematic gaming behaviour based on DSM-5 criteria	Lemmens, Valkenburg, & Gentile, 2015)	27 items	Dependent
Online and offline relationships	Identify and distinguish between individuals whom they share an online and/or offline relationship	N/A	N/A	Independent
ISEL**	<u>Social Relatedness:</u> perceived availability of social support Subscales: *appraisal, sense of belonging, tangible*, self-esteem**	Cohen, Mermelstein, Kamarck, & Hoberman, 1985	<u>40 items:</u> 10 appraisal 10 belonging 10 tangible* 10 self-esteem*	Dependent, Independent
SELSA-S**	<u>Social Relatedness:</u> loneliness Subscales: *family*, romantic*, and social loneliness*	DiTommaso, Brannen, & Best, 2004	<u>30 items:</u> Online (5 social, 5 family*, 5 romantic*) Offline (5 social, 5 family*, 5 romantic*)	Dependent, Independent

Note. IGD Scale = Internet Gaming Disorder Scale; ISEL = Interpersonal Support Evaluation List; SELSA-S = Social and Emotional Loneliness Scale for Adults – Short Form
* Measures will not be included in main analyses.
** Participants complete this for both online and offline relationships.

Measure	Construct	Citation	# of items	Variable Type
SIC	Gamer identity	Kowert & Oldmeadow, 2015	4 items	Independent
ECR-RS**	Avoidant attachment Anxious attachment*	Fraley, Heffernan, Vicary, & Brumbaugh, 2011	9 global 9 offline* 9 online*	Independent
Brief COPE	Coping (*avoidance* and social *support)* Subscales: active coping, planning, instrumental social support, emotional social support, denial, substance use, behavioural disengagement, venting, positive reframing, humour, religion, acceptance, self-blame, self-distraction	Carver, 1997	<u>28 items:</u> 2 active coping* 2 planning* 2 instrumental social support 2 emotional social support 2 denial 2 substance use 2 behavioural 2 disengagement 2 venting 2 positive reframing* 2 humour* 2 religion* 2 acceptance* 2 self-blame* 2 self-distraction	Independent
BIS-11	Impulsive behaviour	Patton et al., 1995	30 items 8 attentional 11 motor 11 non-planning	Independent
STAB	Antisocial behaviour	Burt & Donnellan, 2009	32 items 10 physical aggression 11 social aggression 11 rule-breaking	Independent
Qualitative Questionnaire	Motivation for playing; sense of belonging; perceived changes in relationships; satisfaction with time spent gaming; gaming-related benefits and problems	N/A	9 items	Qualitative

Note. SIC = Social Identity with the Community of Gamers; ECR-RS = Experience in Close Relationships Revised; BIS-11 = Barratt Impulsiveness Scale 11; STAB = Subtypes of Antisocial Behavior Questionnaire

* Measures will not be included in main analyses.

** Participants complete this for both online and offline relationships.

Appendix B

Pilot Study Participant Feedback Questionnaire

We are interested in learning about any problems you may have had when completing the questionnaire. This includes issues with understanding the instructions, providing a response to the items, and technological problems. Please answer the following items to help us improve the quality of our questionnaire.

1. Did you find the questionnaire instructions were clear and easy to understand? Please explain.

2. What were some of the challenges you experienced when completing this questionnaire? Please provide some examples.

3. You were asked to list the initials of people you spend time with the most online and offline. In later sections of the questionnaire, we showed you the initials of specific people with whom you spend time mostly online or mostly offline.

    a. Was the person(s) we selected as your *exclusively or almost exclusively online* relationship someone you spend time with mostly online? Please explain.

    b. Was the person(s) we selected as your *exclusively or almost exclusively offline* relationship someone you spend time with mostly outside of the game (e.g. school, work, neighbourhood)? Please explain.

    c. Based on your experience, how might this section of the questionnaire be improved to better identify the person(s) with whom you spend time with mostly online or mostly offline?

4. You were also asked to answer questions (related to loneliness, support, and belonging) about your online or offline relationships.

    a. What were some problems you had with answering the items based on your relationship with the person(s) we selected as your *exclusively or almost exclusively online* relationship?

    b. What were some problems you had with answering the items based on your relationship with the person(s) we selected as your *exclusively or almost exclusively offline* relationship?

    c. Based on your experience, how might this section of the questionnaire be improved to help you better distinguish between your online and offline relationships?

5. The last section of the survey asked you to type in a response describing and explain why you play MMORPGs, your views on belonging in your online and offline relationships, and the impact playing MMORPGs has had in your relationships and your life.
    a. Did you find that the instructions were clear and easy to understand? Please explain.
    b. What were some of the challenges you experienced when completing this section? Please provide some examples.
    c. Based on your overall experience, how might the questionnaires be improved?

Appendix C
Demographic Questionnaire

Please answer the following questions about yourself by selecting the appropriate choice and/or using the space provided:

Age: ____
Gender: __
Country of Residence: __

Ethnicity:
☐Aboriginal (e.g., Inuit, Metis, North American Indian)
☐Arab/West Asian (e.g., Armenian, Egyptian, Iranian, Lebanese, Moroccan)
☐Black (e.g., African, Haitian, Jamaican, Somali)
☐Asian (e.g., Chinese, Filipino, Korean, Japanese)
☐White (Caucasian)
☐Latin American
☐Other (please specify) _____

Primary Language Spoken in home: _____

Marital status:
☐ Single (never married)
☐ Married
☐ Divorced/separated
☐ Common-law
☐ Widowed
☐Other:

Are you currently in a romantic relationship(s)?
☐ Yes
☐ No
B. IF YES, please specify the number of months and years you have been in this relationship
_____years _____months
C. Does this person(s) play online video games?
☐ Yes
☐ No

D. Do you play online video games with this person(s)?
☐ Yes
☐ No

Income (select one):
☐less than $5 000
☐$5 000 to $9 999
☐$10 000 to $19 999
☐$20 000 to $29 999
☐$30 000 to $39 999
☐$40 000 to $49 000

☐$50 000 to $59 999
☐$60 000 to $69 999
☐$70 000 to $79 999
☐$80 000 to $89 999
☐$90 000 to $99 999
☐$100 000 or more

Please indicate your **highest** education level (select one):

☐ No certificate, diploma or degree
☐ High School certificate or equivalent
☐ Apprenticeship/Trades certificate
☐ College/CEGEP certificate or diploma
☐ University certificate or diploma
☐ University Degree
☐ Post-Bachelor's degree (e.g.,Master's, Ph.D)
☐ Other (please specify):

Please indicate your **current** occupation (select one):

☐Art, culture, recreation and sport
☐Business, finance and administration
☐Health
☐Homemaker
☐Management
☐Natural and applied science or related occupations
☐Processing, manufacturing, and utilities
☐Sales and Service
☐Social Science, Education, Government, or Religion
☐Student
☐Trades, transport and equipment operator or related occupation
☐ Unemployed
☐ Other (please specify): __

Have you ever been diagnosed with a developmental, behavioural, or mental disorder?
☐Yes ☐No

B. If YES, please check all that apply

☐Gambling Disorder
☐Substance Abuse Disorder
☐Oppositional Defiant Disorder (ODD)
☐Attention Deficit-Hyperactivity Disorder (ADD/ADHD)

☐Reading Disability or Reading Disorder (Dyslexia)
☐Math Disability or Math Disorder
☐Generalized Anxiety Disorder (GAD)
☐Separation Anxiety Disorder
☐Social Anxiety
☐Specific Phobia
☐Obsessive Compulsive Disorder (OCD)
☐Major Depression or Depression
☐Bipolar Disorder
☐Other (please specify): _____

Appendix D

Playing history and preference

1. At what age did you first begin playing video games? _____
2. List and rank the top three games you spend the most time playing.

1.
2.
3.

3. In a week, how many hours on average do you usually play Massively Multiplayer Online Role Playing Games (MMORPGs; e.g., World of Warcraft, Final Fantasy XIV, The Elder Scrolls Online)?

4. Who do you usually play MMORPGs with?

Appendix E
Online and Offline Activities

We are interested in learning about the time you spend on other online and offline activities. For the following sections, please select the activities you engage in, and estimate the amount of time you spend on each activity.

Time Spent on Other Video Games
Here is a list of other video game genres. Check the genres that you usually play, and indicate the *average number of hours per week* you spend playing each one.

Video Game Genre	**Average hours played per week**
☐ Action-adventure (e.g., Uncharted, The Last Guardian)	
☐ Online versions of board/card games (e.g., Scrabble, Solitaire)	
☐ Driving (e.g., Forza Horizon 3, Trackmania Turbo)	
☐ First-person shooter (e.g., Battlefield, Half-Life 2, Far Cry 4)	
☐ Other shooter (e.g., Rise of the Tomb Raider, Ghost Recon Wildlands)	
☐ Gambling (e.g., Poker, Blackjack)	
☐ (Video) Roleplaying Games (RPG, e.g., Dark Souls 3, Final Fantasy XV)	
☐ Platform (e.g., Inside, Super Mario)	
☐ Puzzle (e.g., The Witness, Quadrilateral Cowboy and Superhypercube)	
☐ Real-Time Strategy (e.g., Total War: Arena, Starcraft II)	
☐ Other strategy (e.g., Civilization, Rollercoaster Tycoon)	
☐ Rhythm (e.g., Guitar Hero, Dance Dance Revolution)	
☐ Sports (e.g., NBA 2K17, FIFA 17)	
☐ Other Please specify: _____	

Time Spent on Other Online Activities
Here is a list of other online activities. Check the online activities you usually engage in, and indicate the *average number of hours per week* you spend on each one.

Online Activities	**Average hours played per week**
☐ Facebook	
☐ Twitter	
☐ Instagram	
☐ Snapchat	
☐ YouTube	
☐ Pinterest	
☐ Dating sites (e.g., Match.com, eHarmony)	
☐ Adult sites (e.g., Pornhub, Xvideos)	
☐ Online shopping (e.g., Amazon, Alibaba)	
☐ News/Magazine (e.g., New York Times Online, Globe and Mail Online)	
☐ Other Please specify: _____	

Time Spent on Offline Game-related and Roleplaying Activities
Here is a list of some offline game-related and roleplaying activities. Check the activities you usually engage in, and indicate the *average number of hours per week* you spend on each one.

Offline Activity	**Average hours played per week**
☐ Board games (e.g., Scrabble, Solitaire)	
☐ Tabletop Role Playing Games (Tabletop RPGs, e.g., Dungeons & Dragons)	

☐ Live action role-playing (LARPs)	
☐ Society for Creative Anachronism (SCA)	
☐ Cosplay events	
☐ Other Please specify: _____	

Appendix F
Online and Offline Relationships

We are interested in understanding which individuals outside your family (if any) you spend time with the most online and offline.

> By ***spending time with others online*** we mean having an exchange (e.g. chatting through text or using your mic) with another person or a group on an online game.
> By ***spending time with others offline*** we mean having an exchange with another person or a group face-to-face.

Individuals You Interact with Online
Think about the people you interact with **through online video games**. Please list the initials of the individuals who you communicate or spend time with the most online. For each person, (1) identify whether you first met online or offline, (2) rate the extent to which you spend time **offline** with this person, and (3) identify whether you consider them to be someone you interact with mostly online or offline.

Initials	Where you first met	How much time do you spend with them **offline**?					Do you consider this person to be an online or offline friend?
		Never or Almost Never spend time **offline**	Occasion-ally spend time **offline**	Equal time spent offline and online	Often spend time **offline**	Always or Almost Always spend time **offline**	
1.	Online/ Offline						Online /Offline
2.	Online/ Offline						Online /Offline
3.	Online/ Offline						Online /Offline
4.	Online/ Offline						Online /Offline
5.	Online/ Offline						Online /Offline
6.	Online/ Offline						Online /Offline
7.	Online/ Offline						Online /Offline

Individuals You Interact with Offline
Think about the people you interact with **face-to-face** (e.g., work, school, neighbourhood). Please list the initials of the individuals who you communicate or spend time with the most, face-to-face. For each person, (1) identify whether you first met online or offline, (2) rate the extent to which you spend time **online** with this person, and (3) identify whether you consider them to be someone you interact with online or offline.

Initials	Where you first met	How much time do you spend with them **online?**					Do you consider this person to be an online or offline friend?
		Never or Almost Never spend time **online**	Occasionally spend time **online**	Equal time spent offline and online	Never or Almost Never spend time **online**	Always or Almost Always spend time **online**	
8.	Online/ Offline						Online /Offline
9.	Online/ Offline						Online /Offline
10.	Online/ Offline						Online /Offline
11.	Online/ Offline						Online /Offline
12.	Online/ Offline						Online /Offline
13.	Online/ Offline						Online /Offline
14.	Online/ Offline						Online /Offline

Appendix G

Open-Ended Questions

In this project, we are interested in learning about the experience of adults who play MMORPGs.

First, we would like to learn about what motivates you to play MMORPGs.

1. List some of the reasons why you play MMORPGs.
2. List some of the activities (e.g. solo quests, with your guild, leveling up or pursuing achievements, chatting with others) that you engage within the game, and rank them in order of importance to you.

In this section, we would like to learn about how you think, feel, and act around people in MMORPGs compared other people outside of online games (e.g. school, work, neighbourhood).

3.
    a. Have other players in MMORPGs made you feel welcome or like you belong? Yes/No
    b. Provide specific examples.
4.
    a. Have other people outside of video games (e.g., school, work, neighbourhood) made you feel welcome or like you belong? Yes/No
    b. Provide specific examples.

5. Think of the first time you started playing MMORPGs.
    a. Have your relationships with other MMORPG players (e.g., time you spend together, topics you talk about) changed over time? If so, in what ways?

    b. Now, think of your relationships with other people offline (e.g., school, work, neighbourhood). Have your relationships with with *other people offline* (e.g., school, work, neighbourhood) changed over time? If so, in what ways?

In the next section, we would like to learn about your thoughts about the time you spend playing MMORPGs.

6. Some people feel they need to spend less time on MMORPGs, whereas others feel they spend just the right amount of time on online video games.
    a. Please rate the extent to which you believe the following statement best describes your thoughts about the time you spend playing MMORPGs.

"I think I need to spend less time playing MMORPGs"	1 = Strongly disagree 2 = Disagree 3 = Somewhat disagree 4 = Neither agree or disagree 5 = Somewhat agree 6 = Agree 7 = Strongly agree

b. Explain why you feel this way.

7. Imagine you completely stopped playing MMORPGs.
   a. In what positive ways would your everyday life be different?
   b. Explain why these would be positive changes.
   c. In what negative ways would your everyday life be different?
   d. Explain why these would be negative changes.

Appendix H
Coding Descriptions

1. Motivation for Playing

List some of the reasons why you play MMORPGs.

Theme	Code	Description	Example
Coping and Mood Improvement	Fun/ Entertainment	Playing for enjoyment and entertainment, and to ease boredom.	"Fun, easy way to spend time if I'm bored." "They are very entertaining to play."
	Coping	Playing as a means to deal with unpleasant emotions and problems.	"It helps me destress myself after a long day of classes. I get to talk to people online that I don't know of and have alongside with them so that way I don't get lonely" "They're an escape? If I'm having a bad day, or if I need to destress and free my mind, I log on and play."
Social Interaction	Online community	Interest in chatting with others online, including friends, family, and new people.	"The #1 reason I play these types of games is to basically chill with the same group of people I meet up with everyday. We're basically on the same schedule and we just 'get' each other's ticks and quirks." "Diverse community that can be hilarious and serious simultaneously."
	Teamwork/ Camaraderie	Coordinating with others (e.g. team, party, guild) to meet a common goal.	"I really enjoy work[ing] together for a common goal, and the feeling when you and a bunch of other people do a hard achievement is really amazing." "I enjoy playing with others towards a common goal (complete a dungeon or raid)"
Skill Building and Ranking	Achievement/ Progression	Sense of achievement, or progress towards the game's goals. Goals may include strengthening avatar skills and	"I enjoy playing MMORPGs because of the progress of leveling up a character and becoming more powerful in the game. I gain more items and experience"

		acknowledgement of player growth through in game-rewards (e.g. trophies, items, clothing, unlocking new game content).	"Progression, having a single character that is my own, getting stronger and being able to show off the items that I get."
	Challenge	Thrill of facing a challenge, or pleasure from devising a strategy to solve a problem.	" Require a sort of strategy and thinking element that a lot of RPG's and FPS's can't use" "The primary reason that I play MMORPGs is for the challenge"
	Competition	Competing with other players within the game, in a solo or team-based setting.	"I enjoy competing with my friends to make my character the most fashionable" "I enjoy the fun of ganking and playing vs other players, i love the competitive side of mmorpgs."
Game Design and Structure	Game Environment	Reason for playing is explicitly linked to features of the game environment. These include: unpredictability, high definition graphics, programming of non-playable characters in the game, and accessibility of the game.	"I enjoy the random nature of the game. The only constant thing is how the game starts." "The graphics are one of the things in a game that make me want to play it. If I think character designs and the MMORPG world look cool [I'll] give it a try."
	Storyline	Interest in the plot or storyline of the games. Enjoyment from seeing the character stories unfold.	"I secondarily play specific MMORPGs for the story content and lore of the worlds." "They tell a story, I enjoy being part of those stories."
	Exploration/ Immersion	Deriving pleasure from having the freedom to create and explore in the game. This includes immersion and	"You can be whoever you want and do whatever you (within the parameters of the game)." "The sense of adventure"

		exploration of the game world using an avatar.	

2. Gaming Activities

List some of the activities (e.g. solo quests, with your guild, leveling up or pursuing achievements, chatting with others) that you engage within the game, and rank them in order of importance to you.

Theme	Code	Description	Example
Interaction with Game Design	Plot	Pursuing tasks that contribute to unfolding the storyline of the game.	"following the story line" "Story progression quests"
	Explore	Creating different identities and exploring in-game spaces through a personalized avatar.	"I mostly go to dungeons missions and go exploring on my own till I level up or getting certain shadows to recruit in my team" "Exploring different areas within a game is exciting."
	Achievement	Working towards in-game goals, including strengthening avatar skills and earning rewards (e.g. trophies, items, clothing, unlocking new game content).	"Leveling up or pursuing achievements is mostly the only reason why I play MMORPGs style games." "Grinding (solo and in a party)"
Interaction with Others	Teamwork	Coordinating with a team to meet a common goal.	"play with guild (leveling up skills)" "Working with my guild, training, and competing together with friends (usually in pvp)"
	Versus	Competing with other players in a solo or team-based setting.	"Playing PvP in a competitive setting with online friends" "Arena PvP; Open world PvP; Structured PvP"

	Chat	Chatting with other players.	"chatting with other people online that I do not know who see interest in a quest or skill that I identify with" "Chatting with others because i like to make new friends"

3. Online Belonging

Have other players in MMORPGs made you feel welcome or like you belong? Provide specific examples.

Theme	Code	Description	Example
Communication	Chatting	Frequency, degree, or quality of communication with others.	"Chatting about silly stuff" "I don't usually talk to other players in MMORPGs, I mostly keep to myself."
	Friendliness/ Warmth	Degree of friendliness or warmth expressed by other online players or groups.	"Always nice to me even when they don't know me." "My current guild leader for example, he's extremely helpful and just a warm person to learn from."
Shared Vision	Party Invite	Receiving, accepting, or losing invitations from other players to be a part of a team.	"Inviting me to parties unsolicited" "I got kicked out of my guild."
	Team/ Camaraderie	Degree of involvement (e.g. teamwork, responsibility) with a group towards a shared goal.	"Being asked to join a group to complete a quest. Being asked to do an important task during the quest" "When I am engaged in a quest or am pursuing an achievement with other players, I feel a connect and feel like I belong to a group. I feel accepted."
	Shared Interests	Degree to which participants felt that other players shared their interests (i.e. in-	"Most MMORPGs I play have people who share similar interests with me. Fantasy/RPG [sic] videogames are my thing and most of my offline friends are not super into them so when I play MMORPGs I have someone to talk to

		game, hobbies, fantasy, jokes).	about these interests. I read a lot of fantasy novels as well and a lot of people in these games also read those books so it's nice to talk to others about it." "They have the same mentality towards gaming and pvp"
Support	Instrumental Support	Degree of support participants felt they received from the other players towards a personal quest or achievement (e.g. provision of information, money, or items).	"Every so often I will be lost on a particular quest or mechanic of a game and I'll just ask around the general area. There has always been someone willing to help or show me how." "When first playing online, I had asked the chat on how to complete a task and I was replied with vulgar language"
	Emotional Support	Degree of support participants felt they received from other players related to the participants' emotional or mental well-being.	"My guild in WoW currently has been very accommodating of my battle with depression." "Whenever I play with other players, I feel like they don't care about me personally but care about what I can provide them (i.e. they don't care how I'm doing, but care that I can heal a dungeon for them)."
	Recognition	Degree to which participants felt recognized, praised, or appreciated by other players.	"Friends encourage me to make the best character I can be. They point out my strong traits to aid them on journeys." "I was invited to play with strangers because they thought I was good at the game."

4. Offline Belonging

Have other people outside of video games (e.g., school, work, neighbourhood) made you feel welcome or like you belong? Provide specific examples.

Theme	Code	Description	Example
Communication	Chatting	Frequency, degree, or quality of communication with others.	"Introducing themselves to me first, engaging in friendly small-talk etc." "I'm more socially inept than most people, and it is harder for me to understand social cues or how to properly hold a conversation in real time."
	Friendliness/ Warmth	Degree of friendliness or warmth from others.	"Most people greet you or ask how you are doing, but there are a few people that you meet that are rude or inconsiderate." "On campus there [sic] is a warm feeling, everyone smiles"
	Acceptance	Degree of acceptance of the participant's self/identity by other players	"My boyfriend and his family open their home to me and his family considers me an in-law already." "I often feel judged for not being heterosexual"
	Limited Opportunities	Limited opportunities for making connections offline.	"I don't meet a lot of new people, as someone who works from home." "Since I spend most, if not all, of my free time gaming I don't have much to belong to."
Shared Vision	Invitation/ Shared Time	Receiving or losing invitations from other people to spend time together.	"I hang out with friends, we invite each other over to spend quality time with each other." "Occasionally have invited me out but not too often."

	Shared Interests	Degree to which the participant felt that other people shared their interests (i.e. in-game, hobbies, fantasy, jokes).	"Sharing common interests isn't very common for me, but it has happened in the past. Not many people I know like the things I do, like anime or games." "I typically surround myself with people who share a lot of different interests in common with me besides video games."
Support	Instrumental Support	Degree of support from others to help with tangible or physical tasks and goals (e.g. daily living, work, school, and occupation).	"My friends at work quickly helped me learn all the essential tasks needed to work efficiently" "Starting a new job, same thing, lots of help, lots of advice, and some friendly tips for how to handle the work place."
	Emotional Support	Degree of support participants felt they received from others related to the participants' emotional or mental well-being.	"…went out of his way to sit next to me and start a conversation about how the situation was stressful, but we would end up being successful. Our conversation increased my confidence" "reassure me when I'm feeling blue."

5a. Evolution of (Online) Relationships

Think of the first time you started playing MMORPGs. Has your relationships with other MMORPG players (e.g., time you spend together, topics you talk about) changed over time? And, if so, in what ways?

Theme	Code	Description	Example
Quality and Depth	Improved Relationship Quality	Improved intimacy or trust in relationships	"We have shared many milestone moments such as graduations (we watched a livestream for someone) and weddings." "playing videogames together has made us more comfortable around each other and has had a positive impact on our relationships, both online and offline. When we do quests together and set off on

			adventures I feel like we all really connect and forge meaningful bonds. We learn about each other more through the choices we make within the game."
	Declined Relationship Quality	Decline in intimacy or trust in relationships	"yes. my relationship with other players have grown distant and wary. there are trust issues and everyone just solos and does their own thing" "yes, most of the players I met in the beginning are no longer my friends, we have drifted apart."
	Variable Relationship Quality	Variable changes in intimacy and trust in relationships	"I met [name redacted] on a D&D MMORPG and quested together for a while before trading emails, and other social media contracts. We ended up dating for 2 years, long distance. We recently broke up but we're still friends and regularly play league of legends together still."
Frequency of Shared time	Decreased Shared Time	Decrease in time spent with others	"Im prefer playing solo, i Interact the less as possible woth other players." "Time spent decreases as school and work become more serious for both parties."
	Increased Shared Time	Increase in time spent with others	"When I first started playing I chat with people at all but as time when on I started talking a lot more and doing much more coordinated activities such as raiding." "a friend i met playing MMORPG is one of my best friends today, gaming turned into texting, texting to phone calls, phone calls to face time and then now we see each other once a year. We learned that we had much more in common than just gaming, ex. music, movies, likes-dislikes etc. Now i'm more open to getting to know people online"
	Variable Shared Time	Variable changes in amount of time spent together	"I have been friends with some of the people for many years now, and as we get older and our lives change along with us, obviously our conversations and the amount

			of time we can spend with each other changes." "They do change if either I or they stopped/rarely play the game meaning I don't talk to them as often"
Conversation Topics	Personal	Discussion of topics related to personal life	"Well, as with every friendship, it evolves, it shifts from talking about the game, to what upcoming games are we excited about, to life, dreams and wishes." "My relationships with other MMORPG players shifted from talking about the game to talking about our personal lives."
	General	General shift in topics discussed	"They have naturally changed because I've matured as a person. Initially I was actually more social because I was a curious kid. I still chat around with people however, just different topics" "Talking about our daily lives are subject to change with different things happening to us in real life."
	Game-related	Discussion of topics related to current game, or other games	"Yes, when I play MMORPGs with my friends, it is another conversation topic that we are able to talk about." "Originally we would only talk about gaming content, however, it changed to real world topics"
	Politics	Discussion of topics related to politics	"Since I first started playing MMO's I would say the topics of discussion have changed. Such as talking about the game itself, to things like, politics, or life events." "The topics have changed from when I was younger to more adult conversations like politics, post-secondary schooling."
	Jokes	Participating in sharing jokes or conversations that	"We also form inside jokes through MMORPG games"

		emphasize sense of humour	"Individuals grow and start discussing more interesting and serious concepts instead of juvenile jokes"
	Occupation	Discussion of topics related to school, work, and/or career	"Topics discussed changed as I got older, we started to talk about school more as we all got older" "Yes, I matured more and we talk about school and work"
	Other Interests	Discussion of topics related to other interests	"Topics usually stay the same, usually about anime/manga, and even other games." "Topics changed as I change interests."
Individual Development	Maturity	Participant's level of maturity	"We matured together" "I'm more mature for one."
	Openness/ Reservation	Change in degree of openness to connecting with other players	"I ... actively pursue meaningful relationships instead of just getting better gear. "Back then, I saw players as numbers. Just random people playing the same game as I do. After years of playing, I have come to realize that players should be valued as people, and online with offline have really minor differences. I've come to meet much better personalities in games, than I have in real life."
	Knowledge/ Cognition	Improvement in level of knowledge or cognitive abilities	"Yes they tend to change the more I play a game, because I am more knowledgeable in the terminology of the game." "I have become more wise"
	Shaping	Significant past relationship experiences contributed to a shift in perspective	"In the beginning I was much more open to talking in the open chats, but after having bad experiences I stopped doing that. Instead, I talk to my friends while playing the games." "at first I was very friendly and naive. I once was coerced into a relationship with a much older woman who was my guild

			leader just because I was the only one being nice to her and I didn't know how to say no. Now I'm more independent, I can and do say no often. I try not to be an asshole to people but with the continuing rise in trolls and other jerks you need to be on the offensive."
Priority/ Interest Shift	School	Shift in prioritizing school over gaming	"When I started playing video games at the age of 12 I had so much more time on my hands. School work wasn't a lot and I didn't work at the time. Slowly as I'm getting older where school work is more intense and I work a lot I've began to phase out gaming completely because of the fact that I just don't have the spare time I once did." "What I talked about when I was 10 years old changed drastically compared to now that I am in university."
	Game	Shift in in-game activity priorities	Times change, and so do the games. Many people are more focused on grinding the game out and quickly burning out, rather than playing for the fun of the game. "As I've become more dedicated to hardcore raiding and other such activities, I've formed new friendships and spend more time in those sorts of communities, instead."
	Work	Shift in prioritizing employment over gaming	"I still chat around with people however, just different topics and we may spend less time together because of other responsibilities (e.g. work)" "Time spent together on MMORPG's has gone down in the recent years just because of the more responsibilities that are given to you as you enter University and the working world.
	Finance	Shift in finance priorities	"The time I've spent on MMORPGs has certainly gone down since I started, simply

			because I no longer wanted to spend as much money on the game as I was before"

5b. Evolution of (Offline) Relationships

Think of the first time you started playing MMORPGs. Now, think of your relationships with other people offline (e.g., school, work, neighbourhood). Have your relationships with <u>other people offline</u> (e.g., school, work, neighbourhood) changed over time? If so, in what ways?

Theme	Code	Description	Example
Quality and Depth	Improved Relationship Quality	Improved intimacy or trust in relationships	"Over the past few years the relationships I have offline has grown at an extreme pace. I've been able to learn more about those around me and been able to be there for them as emotional support." "With my best friend for example, we have supported each other through a variety of challenges in a positive way which then strengthened our relationship."
	Declined Relationship Quality	Decline in intimacy or trust in relationships	"They seem more distant than the people online and I feel like we are not really friends anymore" "people grow more distant as well. people tend to keep to themselves. no one is willing to make the first move."
	Variable Relationship Quality	Variable changes in intimacy and trust in relationships	"I have friends that I have grown closer too and others that have drifted apart." "Relationships with other people have been cut off or formed as people grow older, move away, and obtain different interests."
	Consistent Relationship Quality	Consistent level of intimacy and trust in relationships	"Honestly compared to my online relationships my offline ones have remained almost the same." "No, my relationships with others are stable and long-term."

Frequency of Shared Time	Decreased Shared Time	Decrease in time spent with others	“I have tried to maintain more of my friendships with people offline. However, work and school have resulted in a reduction in my free time. As a result, I don't socialize as much as I used to.” “Some of my friends are very ambitious with their studies, some have cultural difficulties/restrictions, and some just don't simply have the time. When we do make plans, they most of the time fall through. Either something came up for me or for them.”
	Variable Shared Time	Variable changes in amount of time spent together	“Yes, the more I talk with people, the more I learned about them. This caused me to be better friends with some people.” “yes, I've lost contact with several close friends and reconnected with people I knew in early high school and formed closer friendships than I had with them before losing [sic] touch.”
	Increased Shared Time	Increase in time spent with others	“Most of my friends I see on a regular basis have known eachother for years. In that time we've all been through a lot and have many similarities.” “Like I said I spend more time socializing in person”
Conversation Topics	General	Change in conversation topic (unspecified)	“I was exhausted from keeping all these conversations alive so one day I stopped and waited for someone to start a conversation with me. It never happened.” “we are often changing… the topics we talk about as the world changes and as we change.”
	Occupation	Discussion of topics related to school, work, and/or career	“the conversations are much more geared around school, future aspirations, what I'm doing with my future.” “As we got older we started to talk about school related things more often”
	Other Interests	Discussion of topics related to other interests	“My main group of friends now has multiple group chats, we hang out often and do activities together (dnd, wine tasting, parties)”

	Jokes	Participating in sharing jokes or conversations that emphasize sense of humour	"I still joke around"
	Personal	Discussion of topics related to relationships and offline issues	"the topics changed as we got a little older and went through some difficulties in life." "Conversations have changed from what is [sic] going on in the present to what may happen in the future (i.e. jobs, relationships, moving, etc.)"
	Politics	Discussion of topics related to politics	"…the conversation topics have changed to more adult topics (politics…)"
Individual Development	Openness	Change in degree of openness to connecting with other players	"I have become more outspoken than I was before, and I am more likely to talk to people now than I would have a couple of years ago." "I've become a bit more insular as I've aged."
	Maturity	Participant's level of maturity	"It has changed as I have matured." "As I get older, I grow more as an individual and my thoughts and lifestyle changes."
	Confidence	Improved confidence	"I am much more confident with having conversations with strangers and family/friends." "I became more confident as I grew older, so it's less devastating to me when I don't fit in socially. That feels more liberating to me because I don't feel such heavy pressure to conform and assimilate like I did as a youth."
	Knowledge/ Cognition	Improvement in level of knowledge or cognitive abilities	"I know how to lead people and manage resources on group projects better." "After I started playing MMO's and getting into online social spaces, I have been able to improvise better and think faster on how to act and what to say instead of struggling like I usually do in sudden social situations I was not expecting."

	Shaping	Significant past relationship experiences contributed to a shift in perspective	"…a lot of breakups made me colder towards others"
	Unspecified	Unspecified changes to individual development	"My…personality has changed a lot over time."
Priority/ Interest Shift	School	Shift in prioritizing school over gaming	"…there is a lot less time for leisure with school." "In some ways relationships now have more to do with having similar interests relating to school"
	Work	Shift in prioritizing employment over gaming	"However, work… [has] resulted in a reduction in my free time." "Less free time after graduating from school and starting work."
	Game	Shift in in-game activity priorities	"I usually distance myself from most people due to my hobbies" "Relationships with other people have been cut off or formed as people …obtain different interests."
	Finance	Shift in finance priorities	"Video games as expensive now and I rather spend that money doing something with my buddies."

6. Satisfaction with Time spent playing

Some people feel they need to spend less time on MMORPGs, whereas others feel they spend just the right amount of time on online video games.

Please rate the extent to which you believe the following statement best describes your thoughts about the time you spend playing MMORPGs. Explain why you feel this way.

"I think I need to spend less time playing MMORPGs"	1 = Strongly disagree 2 = Disagree 3 = Somewhat disagree 4 = Neither agree or disagree 5 = Somewhat agree 6 = Agree 7 = Strongly agree

Theme	Code	Description	Example
Time management	Responsibilities/ Occupation	Impact of gaming on offline responsibilities and occupation (e.g. school, work), or lack thereof.	"I feel like I spend an acceptable amount of time playing online games since they don't interfere with my responsibilities such as school, work, and also my social life" "I could use a portion of this time working on myself. Doing things such as working out more or learning a new language."
	General Productivity	Desire to spend more/less time on other, unspecified activities outside of gaming.	"I get the feeling I should go out more due to feeling like I'm not being productive at times" "While I do spend a large amount of my free time playing MMORPGs, I feel that I spend enough time doing other activities aside from playing MMORPGs that I maintain a balance between these things."
	Hobby/ Entertainment	Implications of engaging in gaming as a hobby or leisurely activity.	"I feel this way because in reality video games of any sorts is a complete leisure activity that will bring myself no good unless I peruse it in a professional manner." "I play when I [sic] have the spare time and everything else that needed to be completed is complete"
Sense of Control		Sense of control over one's	"I feel that if I wanted to stop playing I could."

		gaming behaviour.	"I don't play for a long time and I control my hours or minutes played."
Social		Impact of gaming behaviour on social interactions, or lack thereof	"It has not had a negative effect on my relationships with others" "Most of my free time goes to chatting with online friends and playing MMO's with friends due to difficulties with people in real life, and I was often miserable being alone"
Comparisons	Comparison to Others	Comparison of gaming behaviour to others people's gaming behaviour	"I am not addicted to playing MMORPG's like some others who cannot let it go and allow it to take over their lives." "I don't feel I spend an excessive amount compared to some people. For my age, at 30, I spend around 4 hours a day in an MMO."
	Comparison to Past Behaviour	Self-comparison of current and past gaming behaviour	"If you go 3-4 years back in time I'd say I do need to spend less time playing MMOs, but this isn't true anymore because I have other responsibilities that take enough of my time, leaving a varying amount of time free to spend in my favorite hobby, which is gaming." "I don't play too much anymore, in the past I would definitely agree I played too much, but these days it is [sic] rare to get 10 hours a week."
Health	Physical Health	Impact of gaming on participant's physical health.	"It's not good for your eyesight to stay on the computer so much. Mostly I'm considering the health aspects of this hobby." "I could use a portion of this time working on myself. Doing things such as working out more…"
	Mental Health	Impact of gaming on participant's mental health.	"I simply play to relax or escape a bad day for a while. It doesn't feel to me that it is something I HAVE to do."

			"I have been able to balance out the amount of hours I spend with both I spend with those online and those offline without it taking an emotional toll on me"

7a. Positive Changes

Imagine you completely stopped playing MMORPGs. In what positive ways would your everyday life be different? Explain why these would be positive changes.

Theme	Code	Description	Example
Time Management	Productivity	Increase in productivity in other, unspecified life domains	"I could potentially find more productive activities to do during the time that I currently spend playing games." "I'd be more productive. I'd be able to get more things done"
	Occupation	Increase in time for school and work	"more time to study and focus on school; my grades in school would improve" "I would have more time to focus on school, and getting a part-time job."
	Hobbies	Increased time available for other hobbies or interests.	"They would be positive because I could try a new hobby in the time I spent playing the games." "I suppose I would probably spend more time on other hobbies I have such as reading…It may give me the chance to broaden my horizons by trying a new activity or reading about something that inspires me."
	Substitution	Increased time spent playing other types of video games (e.g. non-MMORPG)	"This gives me more free times to play other games I enjoy more." "Just might play other types of games"
Health	Physical Health	Improvement of physical well-being and fitness.	"more sleep…I would be more energized and focused"

			"I have put on some weight, so with more time and no games I could get out and exercise"
	Mental Health	Improvement in emotional well-being	"Less stress from cramming in schoolwork" "Be able to experience reality fully, focused more in tasks due to less distraction, learn more about myself"
Interpersonal		Increased time for improving and/or maintenance of interpersonal relationships	"I get to do things like going out with friends and just spending quality time on your own without the constant notification that someone wants to play with you" "I would have more time to commit to my relationships offline…strengthen relationships with my family and friends."
Finance		Impact on finances	"work more hours at my job to save more money" "Money to be spent in other places"

7b. Negative Changes

Imagine you completely stopped playing MMORPGs. In what negative ways would your everyday life be different? Explain why these would be negative changes.

Theme	Code	Description	Example
Interpersonal Loss		Decline in quality of interpersonal relationships	"I would know that I am letting down my offline friends and miss them. I have known these people since I was young, so if I cut them out of my life it would hurt them, and I would feel awful." "My everyday life would be different as I [sic] would not have friends from countries all over the world, and would not know about other cultures."
Health	Physical Health	Decline of physical well-being and fitness.	"I'd be bored more often. I could see myself gaining weight because of boredom." "way too much time to do bad things… smoke, drink etc"

	Mental Health	Decline in emotional well-being	"I imagine I would be very unhappy. Almost to the point that it would be detrimental to my health." "MMO's are a sort of escape to a second home to me"
Decline of Entertainment		Decline in level of entertainment	"Less excitement would lead to a bland life where I sit around after school wondering what to do with my free time." "Less fun or free time. Important to spend time to relax and enjoy yourself."
Time Management	Occupation	Decline in level of performance in occupation	"I won't have a method to relax during studying or working, it will disturb me. Lower my efficiency of working or studying" "I might be distracted from class thinking about playing games"
	Substitution	Increase in time for similar activities, or less desirable activities	"possibly watch more TV…More TV means I am transitioning my wasting time into another activity [sic]" "No change, just might play other types of games. Less social games maybe"
Loss of Achievement		Loss of sense of achievement	"I am proud of some of the achievements I have in certain games, a few of them took a lot of effort and many nights of frustrating wipes." "I feel like MMORPGs gave me a sense of dedication and being proud of myself for what I achieved."

VITA AUCTORIS

NAME:	Aranda Christine Wingsiong
PLACE OF BIRTH:	Manila, Philippines
YEAR OF BIRTH	1990
EDUCATION:	St. Martins Secondary School, Mississauga, ON, 2008
	York University, B.A., Toronto, ON, 2012
	University of Windsor, M.A., Windsor, ON, 2015