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Need satisfaction, passion and wellbeing effects of videogame play prior to and during the COVID-19 pandemic

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ABSTRACT

Since the outbreak of COVID-19, reports have shown a significant rise in videogame engagement due to stay-at-home and quarantine restrictions, which has led to further concerns regarding the wellbeing impacts of videogames. Due to the challenges and stressors associated with living in a pandemic, it is even more crucial now to understand how engagement with videogames influence players' wellbeing. This study, therefore, utilises Self-Determination Theory and the Dualistic Model of Passion to explore the relationships between people's need satisfaction (and frustration), passion for videogames, and wellbeing prior to and during the COVID-19 pandemic. Findings showed that, during both periods, in-game need satisfaction could lead to either harmonious or obsessive passion for videogames, while frustration of needs through important life domains was more likely to determine an obsessive passion. The findings also highlighted significant differences in wellbeing outcomes seen prior to and during the COVID-19 pandemic, suggesting that videogame engagement may play an important role in improving players' vitality and lowering psychological distress during this time.

1. Introduction

Videogames continue to grow as one of the most popular forms of entertainment worldwide for people of all ages and genders (Brand, Jervis, Huggins, & Wilson, 2019; WEPC, 2020). Given the popularity, researchers aim to understand how videogames influence the wellbeing of players, with much of the earlier research focused on the possible links between violent videogame content and aggression, and more recent research focused on exploring problematic game play (Anderson, 2004; Anderson & Bushman, 2001; Griffiths, Kuss, Lopez-Fernandez, & Pontes, 2017; Przybylski & Weinstein, 2019). Of particular relevance is the Diagnostic and Statistical Manual of Mental Disorders (fifth edition; DSM-5), which recently included Internet Gaming Disorder as a diagnosis warranting further clinical research (American Psychiatric Association, 2013), as well as the World Health Organisation (WHO) including Gaming Disorder in the latest edition of the International Classification of Diseases (World Health Organization, 2018). However, there have been concerns from researchers that the inclusion of these diagnoses are premature (Aarseth et al., 2017; van Rooij et al., 2018). While the inclusion of a disorder in these manuals may help in developing and validating treatment for problematic videogame play, there is the potential that underlying issues that catalyze problematic game play are not being addressed (Billieux et al., 2017). Additionally, the inclusion of such classifications are putting highly engaged yet healthy players at risk of misdiagnosis (Aarseth et al., 2017; Charlton & Danforth, 2010; Kardefelt-Winther et al., 2017).

There is also growing evidence that argues for the benefits of videogame play (Granic, Lobel, & Engels, 2014; Halbrook, O'Donnell, & Msetfi, 2019). Videogames have been shown to improve mood and positive emotions (Bowman & Tamborini, 2012; Russoniello, O'Brien, & Parks, 2009), help players cope with and manage stressors (Collins, Cox, Wilcock, & Sethu-Jones, 2019; Iacovides & Mekler, 2019; Reinecke, 2009); and can foster positive relationships (Hernandez et al., 2014; Wohn, Lampe, Wash, Ellison, & Vitak, 2011). Furthermore, there is a growing amount of research that aims to move beyond considering just the amount or frequency of videogame play, but also the characteristics and orientation of game play itself, using theories such as Self-Determination Theory (SDT) and the Dualistic Model of Passion (DMP) to understand how satisfaction (and frustration) of important psychological needs and passion for videogame play influence players' wellbeing (Johnson et al., 2022; Lafrenière, Vallerand, Donahue, & Lavigne, 2009; Przybylski & Weinstein, 2019; Przybylski, Weinstein,

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Ryan, & Rigby, 2009; Ryan, Rigby, & Przybylski, 2006). Understanding how videogame play affects the wellbeing of people who play games is arguably even more important now due to the outbreak of the Coronavirus disease 2019 (COVID-19). As people's lives have been restricted due to government stay-at-home and quarantine regulations, videogame usage has significantly increased (Balhara, Kattula, Singh, Chukkali, & Bhargava, 2020; Shanley, 2020; Stephen, 2020).

The current study sought to further understand the relationships between satisfaction and frustration of important psychological needs, both through videogame play and important life domains (e.g., work or study), passion for videogame play, and wellbeing. Data collection commenced prior to the onset of the COVID-19 pandemic but the onset of the pandemic presented an opportunity to explore how these relationships differed in the context of stress, anxiety, and social isolation associated with this event (Brooks et al., 2020; Riva, Mantovani, & Wiederhold, 2020; Schimmenti, Billieux, & Starcevic, 2020; Son, Hegde, Smith, Wang, & Sasangohar, 2020). By comparing the data collected prior to and during the pandemic, we were able to explore and compare how need satisfaction and frustration, passion for videogame play, and wellbeing relate in the presence and absence of a major worldwide stressor and associated isolation.

1.1. COVID-19 and videogame play

COVID-19 was first identified in December 2019 in Wuhan, China and spread at an unprecedented rate. By March 2020, the rapid spread of the disease led the WHO to declare it as a global pandemic (World Health Organization, 2020b), with many governments around the world enforcing strict stay-at-home and spatial distancing restrictions to limit individual contact in hopes of preventing further spread of the virus. Many institutions and venues have been closed or restricted, further limiting social interactions (Abel & McQueen, 2020). Inevitably, these restrictions, along with people's fears and concerns regarding COVID-19, have caused a significant amount of stress and anxiety among people worldwide (Brooks et al., 2020; Cao et al., 2020; Li, Wang, Xue, Zhao, & Zhu, 2020; Riva et al., 2020; Schimmenti et al., 2020; Son et al., 2020).

During difficult times like this, people tend to look for ways to cope and manage their stress and anxiety; however, the restrictions in place have limited the outlets upon which people can rely (Ko & Yen, 2020). Due to their accessibility during this time, many have described using videogames as a form of escapism to alleviate the stressors and difficulties that come along with their living situation (Balhara et al., 2020; Kiraly et al., 2020; Ko & Yen, 2020). During COVID-19, reports showed a massive increase in videogame engagement. In the U.S, there was a reported 75% increase in online videogame activity (Shanley, 2020), live streaming platforms (e.g., Youtube, Twitch) saw a 10% increase in viewership, and the leading game distributor, Steam, recorded its highest ever number of concurrent users, at 20 million people (Stephen, 2020).

There has been a growing concern regarding the increase in videogame engagement during COVID-19. While playing videogames has been shown to be an adaptive coping method (Russoniello et al., 2009), some have reported concerns about its potential to become maladaptive if it develops into a habitual and problematic way of managing stress (King, Delfabbro, Billieux, & Potenza, 2020; Ko & Yen, 2020). There is some supporting evidence for this concern, which suggests that during difficult life situations videogames may prevent people from directly dealing with life's challenges and could be perceived as an obstacle to optimal functioning (Iacovides & Mekler, 2019), particularly when one's confidence to handle such difficult life challenges is low (Caro & Popovac, 2020). When this is the case, videogames may be used as a distraction and a maladaptive means of regulating emotions (Caro & Popovac, 2020). However, videogames may also provide benefits during difficult life situations by helping people manage their stress and emotions in adaptive ways, fostering positive social connections and facilitating personal change (Iacovides & Mekler, 2019).

There is also preliminary evidence suggesting that videogames may be helpful in reducing stressors specifically related to the pandemic by helping to enhance mood and social connectedness (Kleinman, Chojnacki, & El-Nasr, 2021; Marston & Kowert, 2020; Riva et al., 2020). The WHO has also made statements regarding videogame play during this time, indicating their stance that videogames may be used as a way to relax, but should be undertaken in balance with "off-line activities" (World Health Organization, 2020a). Understandably though, there is still limited research regarding COVID-19 and videogame engagement. Due to already mixed views about videogame engagement and wellbeing, it is critically important to begin exploring how people engage with videogames during such a stressful and complicated time, and how their engagement influences wellbeing. To do so, this study aims to utilise SDT and the DMP to understand how important psychological needs are met through videogames and other important life domains, and how passions for videogames further impact people's overall wellbeing, both prior to and during the COVID-19 pandemic.

1.2. Self-Determination Theory

SDT is an overarching framework for human motivation that is made up of six mini-theories to explain how different social and cultural factors either facilitate or undermine people's motivation and, in turn, affect overall wellbeing (Deci, 1976; Deci & Ryan, 2000, 2008; Ryan & Deci, 2002, 2017). Central to SDT is the Basic Psychological Needs Theory, which specifies three basic psychological needs that are required to be met in order to thrive (Deci & Ryan, 1985, 2000). These psychological needs include autonomy (i.e., the ability to freely make decisions which are in line with one's values and interests), competence (i.e., feeling capable of effectively managing one's own environment), and relatedness (i.e., having meaningful relationships). According to SDT, people will innately seek ways to satisfy these needs, however the ability to do so depends largely on factors in one's social environment (Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013).

When one's social environment facilitates their ability to satisfy their psychological needs, the likelihood of experiencing optimal levels of psychological and physical health is greater. Research has linked satisfied needs with numerous positive outcomes, including positive affect (Martela & Ryan, 2016; Shen, Liu, & Wang, 2013; Verner-Filion & Vallerand, 2018; Wilson, Longley, Muon, Rodger, & Murray, 2006), greater vitality (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011; Chen, Assche, Vansteenkiste, Soenens, & Beyers, 2015; Costa, Cuzzocrea, Gugliandolo, & Larcan, 2016; DeHaan, Hirai, & Ryan, 2016), higher self-esteem (Deci et al., 2001; Ilardi, Leone, Kasser, & Ryan, 1993), and enhanced life satisfaction (Chen, Vansteenkiste, et al., 2015). However, when one's social environment fails to support their psychological needs, they will be more likely to experience lower levels of need satisfaction, which has been linked to adverse outcomes such as negative affect (Shen et al., 2013; Wilson et al., 2006), burnout (Schultz, Ryan, Niemiec, Legate, & Williams, 2015), and perceived stress (Neufeld, Mossière, & Malin, 2020).

There are times, however, when people may be exposed to substantially more controlling or rejecting social environments that can severely thwart one's psychological needs. This is known as need frustration and it can have particularly damaging consequences (Vansteenkiste & Ryan, 2013). Need frustration is distinguished from low levels of need satisfaction as, while low need satisfaction can hinder optimal functioning, thwarted needs are more likely to result in greater negative consequences, such as ill-health, vulnerability and, in some cases, psychopathology (Vansteenkiste & Ryan, 2013). Furthermore, while it has been suggested that need frustration and low need satisfaction reside on separate continuums (Sheldon & Hilpert, 2012), there is evidence to suggest they can co-exist (Liga et al., 2018; Warburton, Wang, Bartholomew, Tuff, & Bishop, 2020).

The debilitating consequences of need frustration occur when

someone is continually exposed to thwarting environments. When this happens, they are not able to develop the necessary resources and skills needed to function effectively. Thwarted needs can also increase the risk of experiencing immediate negative consequences, such as lower well-being, and can lead to the development of need substitutes (e.g., over-reliance on an activity to meet psychological needs), or compensatory behaviours (e.g., active defiance to self-control, resistance to engage in socially accepted activities, or compulsively following strict routines; Vansteenkiste & Ryan, 2013). Engagement in need substitutes or compensatory behaviours may provide immediate feelings of satisfaction, however such feelings are often only momentary. When exhibited over a long period, substitution and compensation can develop into cycles of increasing vulnerability (Vansteenkiste & Ryan, 2013).

1.3. Dualistic Model of Passion

The DMP is a theory that provides a motivational perspective on passion (Vallerand et al., 2003). According to this theory, passion is defined as a highly valued and self-defining activity in which a person invests a lot of their time and energy. The DMP distinguishes between two types of passion: harmonious passion (HP) and obsessive passion (OP). HP is characterised by a motivation to engage in a passionate activity freely. When people are harmoniously passionate, the passionate activity is accommodated effortlessly into their lives (Vallerand et al., 2003). HP has also been associated with benefits, such as experiencing positive emotions, greater flow, and enhanced life satisfaction (Forest, Mageau, Sarrazin, & Morin, 2011; Lalande et al., 2017; Salama-Younes & Hashim, 2018; Vallerand et al., 2003). Conversely, OP is characterised by rigid engagement in a passionate activity. When people experience OP, they are likely to feel compelled to engage in the activity, often overlooking or causing conflict with other important life aspects (Vallerand et al., 2003). In contrast to HP, OP has been associated with more adverse outcomes, such as greater negative affect, burnout, and feelings of shame (Lalande et al., 2017; Vallerand et al., 2003, 2006; Verner-Filion & Vallerand, 2018).

Passions also provide an opportunity for people to satisfy their basic psychological needs of autonomy, competence and relatedness. Passionate activities satisfy these needs as they allow people to feel autonomy when engaging in them freely. They can help people develop skills over time, allowing for feelings of competence, and they can be shared with others to facilitate fulfilling relationships (Deci & Ryan, 2000; Vallerand, 2010). An important determinant of the kind of passion experienced is the extent to which these needs are met outside the passionate activity (e.g., through one's general life; Lalande et al., 2017). HP has been associated with higher levels of general life need satisfaction, while OP has been linked to lower levels of daily life need satisfaction (Johnson et al., 2022; Lalande et al., 2017; Przybylski et al., 2009).

In terms of need frustration, there is still limited research regarding its association with passion. However, there is some early evidence to suggest that frustration of one's needs is more likely to predict an OP, in turn leading to more maladaptive outcomes. For instance, in a study by Orsini, Tricio, Tapia, and Segura (2019), it was found that while need satisfaction was more strongly associated with HP (over OP) among dental students' passion for their study, frustration of the students' needs was positively associated with OP and negatively associated with HP. They also determined that HP was more likely to result in more effective deep study strategies, while OP was more likely to lead to less effective surface-level study strategies. Additionally, in a paper by Tóth-Király, Bőthe, Márki, Rigó, and Orosz (2019), need satisfaction through one's general life was in fact not related to HP across a number of activities (such as Facebook use, mobile gaming, watching television), but was shown to be negatively related to OP. Notably though, it appeared as though need frustration in life played a more influential role in predicting OP for these activities than a lack of need satisfaction. Their findings highlight the important role general life need satisfaction may play in preventing OP, as well as indicating that both a lack of need satisfaction and thwarted needs are potential risk factors for developing OP. Their findings also demonstrated that those with HP were more likely to experience adaptive outcomes in comparison to those with an OP (Tóth-Király et al., 2019).

1.4. Basic psychological needs and passion in the context of videogame play

SDT has been applied to the context of videogame passion and has offered insights into player experiences and motivations, and has provided salient information on healthy and unhealthy engagement with videogames (Przybylski, Weinstein, Murayama, Lynch, & Ryan, 2012). Videogames have been shown to satisfy the three basic psychological needs as they are activities that can be intrinsically motivating. They allow for autonomy as they can be engaged in voluntarily, offer choices, and are designed in an appealing way for many players (Cuthbert, Türkay, & Brown, 2019; Reer & Krämer, 2018; Ryan et al., 2006). Competence is satisfied through videogames as players are able to work through challenges while often receiving positive feedback and rewards (Ryan et al., 2006), and relatedness can be met as many games provide players with an environment that supports social interactions, either through connections with other players or non-player characters (Reer & Krämer, 2018; Ryan et al., 2006; Tyack & Wyeth, 2017).

Satisfaction of needs through videogames has also been shown to lead to numerous positive outcomes, such as greater game enjoyment and experiences of wellbeing (Kosa & Uysal, 2021; Przybylski et al., 2009; Ryan et al., 2006; Türkay, 2013; Vella, Johnson, & Hides, 2013, 2015). However, recent evidence has suggested that need satisfaction through videogames may predict dysfunctional game play behaviours, particularly if the needs in general life are not fulfilled. Though if these general life needs are met, they may act as a protective factor against developing these dysfunctional videogame play habits (Bender, Gentile, & Douglas, 2020; Wu, Lei, & Ku, 2013).

HP and OP for videogames have also been linked to psychological need satisfaction. A study by Przybylski et al. (2009) utilised both SDT and the DMP to explain the motivation and wellbeing outcomes of different videogame passions and found that higher need satisfaction in daily life was associated with a more HP for videogames, suggesting that when people have satisfied their needs outside of their engagement with videogames, they play more from a sense of volition. Low need satisfaction in daily life, on the other hand, linked to OP indicating that when people fail to satisfy their needs in daily life, videogame play can become a compensatory activity that they feel compelled to engage in, in order to meet their important psychological needs. They also found evidence to support the notion that HP for videogames is related to more positive outcomes (e.g., greater game enjoyment and energy), whereas OP is related to more negative outcomes (e.g., less game enjoyment and greater tension).

Johnson et al. (2022) expanded on this work by using SDT and the DMP to explore how two sources of need satisfaction (i.e., through general life and videogame engagement) influence a person's passion for videogame play. Their findings indicated that in-game need satisfaction was likely to lead to both HP and OP, while low levels of general life need satisfaction was more likely to determine an OP (over HP) for videogames. Supportive of previous research (e.g., Abdelati & Salama-Younes, 2016; Lalande et al., 2017; Verner-Filion & Vallerand, 2018), Johnson et al. (2022) found that OP was associated with lower levels of wellbeing (specifically lower vitality). However, contradictory to previous work that has linked HP to greater wellbeing (e.g., Lalande et al., 2017; Verner-Filion & Vallerand, 2018), HP for videogames in Johnson et al.'s (2022) study was only associated with greater levels of problematic videogame play behaviours. Mixed findings regarding the relationship between passion and wellbeing are evidenced throughout the videogame literature. For example, while Johnson et al.'s (2022) study found no relationship between HP and wellbeing (specifically

satisfaction with life and vitality), findings from Lafrenière et al. (2009) showed positive associations between these variables.

There are also gaps in the literature regarding the role that need satisfaction and frustration play in the context of videogames and wellbeing. For instance, much of the research has focused solely on exploring need satisfaction through either videogame engagement or general life (Mills, Milyavskaya, Mettler, & Heath, 2018; Mills, Milyavskaya, Mettler, Heath, & Derevensky, 2018; Przybylski et al., 2009; Ryan et al., 2006; Sterling, 2017; Vella, Johnson, & Hides, 2015), yet to our knowledge there has not been any studies that have explored the additional role of need satisfaction through other important areas of people's lives. Additionally, there is a limited number of studies on the role of need frustration in the context of videogames. There is some growing evidence to suggest that the frustration of needs plays a role in the development of dysfunctional videogame play (Kosa & Uysal, 2021; Mills, Milyavskaya, Heath, & Derevensky, 2018; Mills, Milyavskaya, Mettler, & Heath, 2018; Przybylski & Weinstein, 2019; Tóth-Király et al., 2019). As need frustration has been shown to lead to an over-reliance on other activities in an effort to make up for thwarted needs in one's daily life (Vansteenkiste & Ryan, 2013), it is reasonable to expect that need frustration could lead to problematic and obsessive styles of engagement (e.g., OP) in activities such as videogame play.

In Tóth-Király et al.'s (2019) paper (see section 1.3), they also explored people's passion for online videogame play and found that (in contrast to all other activities they investigated i.e., Facebook use, Television series watching, mobile gaming) need satisfaction outside the context of the passionate activity (i.e., need satisfaction from general life) was positively associated with HP, suggesting that need satisfaction in general life may lead to a healthy engagement with games. In contrast to this, and consistent with research outside the context of videogames (e.g., Lalande et al., 2017) Tóth-Király et al. (2019) found that a lack of need satisfaction in general life was associated with OP. In this case suggesting that OP for videogames may be a compensatory response to a relative lack of need satisfaction in other life contexts. Importantly, expanding previous research and consistent with the other activities they investigated, they also found that need frustration in general life was even more strongly related to OP than a lack of need satisfaction. Thus suggesting that while both low levels of need satisfaction and need frustration in general life are associated with OP, the latter may be a more impactful risk factor.

Following Tóth-Király et al.'s (2019) work, a recent paper by Kosa and Uysal (2021) focused on exploring need frustration specifically met through videogame engagement. Their findings confirmed that in-game need satisfaction and in-game need frustration were in fact distinct constructs. They additionally found evidence which indicated that, while in-game need satisfaction was more likely to result in positive outcomes (e.g., greater in-game concentration, satisfaction with videogame play, adaptive resolution of in-game problems, and vitality), in-game need frustration was more likely to lead to maladaptive outcomes (e.g., escapism motivations, problematic videogame engagement, giving up when frustrated, and greater daily stress). Findings from these studies (Kosa & Uysal, 2021; Tóth-Király et al., 2019) have provided important insights into the relationship between need frustration and videogame passion, however more research is needed in order to comprehensively understand the role of need frustration on players' wellbeing.

1.5. Current study

This research project involved two studies; study one was conducted prior to the onset of the COVID-19 pandemic (December 2019 to early March 2020), while study two was conducted during the COVID-19 pandemic (April to June 2020). Both studies aimed to fill current gaps within the literature regarding need satisfaction and frustration, passion for videogame play, and player wellbeing, as well as to provide much needed knowledge on videogame engagement during the COVID-19 pandemic. Specifically, they aimed to provide a comprehensive understanding of the relationship between two sources of need satisfaction (met through videogame play and through important life domains), need frustration through important life domains, passion for videogame play, and different wellbeing and ill-being indicators. The second study was particularly concerned with exploring these relationships within the context of the COVID-19 pandemic.

For the purpose of these studies, important life domains refer to working or studying. These were chosen as important life domains as many people engage in either or both of these as major occupations. Additionally, to our knowledge, neither of these sources of need satisfaction have been explored in this context. With regard to the wellbeing outcomes, a number of both wellbeing (satisfaction with life and vitality) and ill-being (problematic videogame play and psychological distress) measures were explored due to the varied results that exist in the literature regarding the wellbeing impact of videogame passion. To help us explore these relationships, a number of hypotheses and research questions were formulated.

Based on the findings of previous research (Johnson et al., 2022; Lalande et al., 2017), which found that need satisfaction through videogame play is related to both HP and OP, the following Hypothesis was formed:

Hypothesis 1. The satisfaction of psychological needs (autonomy, competence, and relatedness) met through videogame engagement will predict both HP and OP for videogames.

Similarly, based on previous research (Johnson et al., 2022; Lalande et al., 2017), which found that OP acts as a compensatory response to the lack of psychological needs being met in general life, the following was hypothesised:

Hypothesis 2. A lack of satisfaction of the psychological needs met through important life domains will predict an OP for videogames.

Based on recent research exploring need frustration in the context of videogames (e.g., Mills, Milyavskaya, Heath, & Derevensky, 2018; Mills, Milyavskaya, Mettler, & Heath, 2018; Tóth-Király et al., 2019), which indicated its positive relationship with OP (a potentially similar compensatory response), the following Hypothesis was formulated:

Hypothesis 3. Frustration of psychological needs met through important life domains will predict an OP for videogames.

While there is mixed evidence regarding the relationship between passion and specific wellbeing indicators in the context of videogames, there is still sufficient evidence throughout the literature (both within and outside the context of games) to suggest that HP is more likely to result in positive outcomes, while OP is more likely to result in negative outcomes (Lafrenière et al., 2009; Lalande et al., 2017; Przybylski et al., 2009; Vallerand et al., 2003, 2006). Based on this, the following hypotheses were formulated:

Hypothesis 4a. HP for videogames will be associated with improved wellbeing outcomes (i.e., satisfaction with life and vitality), and reduced ill-being outcomes (i.e., problematic videogame play and psychological distress).

Hypothesis 4b. OP for videogames will be associated with reduced wellbeing outcomes (i.e., satisfaction with life and vitality), and increased ill-being outcomes (i.e., problematic videogame play and psychological distress).

We also wanted to explore all of these relationships in the context of the COVID-19 pandemic, so the following research question was generated:

Research Question: To what extent do the previous hypotheses (H1-4) apply in the context of the COVID-19 pandemic?

2. Study 1

Study one consisted of data collected before the COVID-19

pandemic. This study received ethics approval by the Queensland University of Technology's Human Research Ethics Committee (approval number 1900000933).

2.1. Method

2.1.1. Participants and procedure

Participants were recruited through videogame related online forums and groups (e.g., Facebook, Reddit), class announcements, mailing lists, and snowballing methods. Participants had to be over the age of 17, had to have an interest in videogames, and had to either work or study. Interested participants were asked to respond to the invite and had to provide consent before completing the online survey. To compensate participants, they were offered the chance to win one of four $50USD Amazon gift vouchers. A total of 326 participants were recruited, however a number of them did not meet the eligibility criteria ($n = 20$), provided implausible or invalid responses (such as impossibly large game play hours, e.g., average 120 h of game play a week; $n = 2$), or did not complete the majority of the study ($n = 92$), which left a final sample of 212 participants (see Table 1 for participant information).

2.1.2. Measures

All scales in the survey used either a five- or seven-point scale, with the higher scores indicating higher levels of the construct. Each scale was tested for reliability using Cronbach's Alpha, which was analysed using SPSS version 27.

2.1.2.1. Demographic and videogame experience questions. The survey included questions to obtain data on participants' age, gender identity, and employment/study status. There were also questions regarding participants' videogame engagement, including how often they played (daily, weekly, monthly etc.), their average weekly play time, and to what extent they identified as a gamer.

2.1.2.2. Need satisfaction met through videogame engagement. Need satisfaction through videogame engagement was measured with an adapted version of the Basic Psychological Needs Satisfaction and Frustration (BPNSF) scale (Chen, Assche, Vansteenkiste, Soenens, & Beyers, 2015; Chen, Vansteenkiste et al., 2015). For this variable, only the need satisfaction subscale was used. It comprised 12 items and was measured on a five-point Likert scale. A similar adaptation of this scale has been used reliably in previous research (e.g., Przybylski & Weinstein, 2019). Examples of the adapted items included, "I feel a sense of choice and freedom *when playing videogames*," and "*When playing videogames*, I feel capable at what I do." Responses were combined and showed good scale reliability (Chronbach's $\alpha = 0.89$).

2.1.2.3. Need satisfaction and frustration met through important life domains. As mentioned, important life domains refer to working or studying. This was measured using the full BPNSF scale (work domain version; Chen, Vansteenkiste et al., 2015; Schultz et al., 2015), which comprised 24 items. Items were adapted to refer to both work and study. Participants were asked to think about their engagement at work or study, or if they engaged in both of these activities, they were asked to think about the one that occupied more of their time. Participants' responses were on a five-point Likert scale to items such as, "*When working/studying*, I feel my choices express who I am." Responses for each subscale were combined and each showed good scale reliability for both need satisfaction (Chronbach's $\alpha = 0.90$) and need frustration (Chronbach's $\alpha = 0.89$). A five-point scale was used in order to maintain consistency between both versions of need satisfaction scales (i.e., videogames and important life).

2.1.2.4. Passion for videogame play. Passion for videogame play was measured using an adapted version of the Obsessive and Harmonious Passion scale (Vallerand, 2010), which comprised 12 items. Participants responded on a seven-point Likert scale to items such as, "*Playing videogames* is well integrated in my life," (HP) and "I have the impression that *videogames* have control over me," (OP). The adapted version of this scale has been used reliably in previous research (e.g., Johnson et al., 2022). Responses for each subscale were combined and each showed good scale reliability; HP (Chronbach's $\alpha = 0.82$), and OP (Chronbach's $\alpha = 0.83$).

Table 1
Participant information for study 1 and 2.

	Study 1			Study 2		
Gender	*n*	Percentage		*n*	Percentage	
Male	120	56.6%		248	75.4%	
Female	84	39.6%		74	22.5%	
Non-Binary	5	2.4%		5	1.5%	
Prefer not to answer	2	.9%		2	.6%	
No Response	1	.5%		–	–	
Average videogame engagement	*n*	Percentage		*n*	Percentage	
Play every day	146	68.9%		250	76.0%	
Play at least once a week	59	27.8%		73	22.2%	
Play at least once a month	7	3.3%		6	1.8%	
Employment*	*n*	Percentage		*n*	Percentage	
Currently employed	171	80.7%		218	66.3%	
Currently studying	88	41.5%		144	43.8%	
Age (in years)	Range	*M*	*SD*	Range	*M*	*SD*
	17–65	28.36	9.14	17–57	27.44	8.49
Weekly videogame engagement (in hours)	Range	*M*	*SD*	Range	*M*	*SD*
	1–75	15.48	13.00	1–90	20.43	14.89

Participant information provided for both study 1 and 2 to allow for easy comparison. Study 1 $N = 212$. Study 2 $N = 329$. *Participants were able to answer yes to both currently working and currently studying. Descriptive data analysed using SPSS version 27.

2.1.2.5. Satisfaction with life. To measure satisfaction with life as an indicator of wellbeing, the Satisfaction with Life scale (Diener, Emmons, Larsen, & Griffin, 1985) was used, which consisted of five items. Responses were measured on a seven-point Likert scale and included items such as, "The conditions of my life are excellent." Responses were combined and showed good scale reliability (Chronbach's α = 0.87).

2.1.2.6. Subjective vitality. To measure vitality as an indicator of wellbeing, the Subjective Vitality scale (Ryan & Frederick, 1997) was used, which comprised seven items. Responses were measured on a seven-point Likert scale and included items such as, "I have energy and spirit." Responses were combined and showed good scale reliability (Chronbach's α = 0.87).

2.1.2.7. Problematic videogame play. To measure problematic videogame play as an indicator of ill-being, the Addiction subscale of the Addiction-Engagement Questionnaire (Charlton & Danforth, 2007) was used. This subscale consisted of 13 items. Responses were measured on a seven-point Likert scale and included items such as, "I feel a sense of power when I am playing videogames." Responses were combined and showed good scale reliability (Chronbach's α = 0.79).

2.1.2.8. Psychological distress. To measure psychological distress as an indicator of ill-being, the K6 questionnaire (Kessler et al., 2002) was used, which comprised 6 items. Participants were asked to think about how they felt during the past thirty days (e.g., how often they had felt nervous, hopeless etc.) and responded on a five-point Likert scale, ranging between "none of the time" to "all of the time". Responses were combined and showed good scale reliability (Chronbach's α = 0.87).

2.2. Data analysis

To assess the hypotheses related to study one (H1-4), a path analysis was conducted using Mplus version 8.3. Model fit was evaluated using the recommendations made by Hu and Bentler (1999) who suggest models should have a standardized root mean square residual (sRMR) below 0.080 and a root mean square error of approximation (RMSEA) below 0.60. Model fit was also evaluated using recommendations made by (Kline, 2016) who suggests good model fit should have a comparative fit index (CFI) and Tucker-Lewis Index (TLI) values above 0.95.

Based on findings from previous research (Johnson et al., 2022; Lalande et al., 2017), this path analysis regressed both passions on in-game need satisfaction (H1), and OP with important life need satisfaction (H2). Additionally, based on previous findings suggesting that need frustration would predict more maladaptive outcomes and engagement with passionate activities (Mills, Milyavskaya, Heath, & Derevensky, 2018; Mills, Milyavskaya, Mettler, & Heath, 2018; Tóth-Király et al., 2019), the path analysis regressed OP on need frustration in important life domains (H3), however as this is still a new area of research, the model also regressed HP on important life domain need frustration to allow for this possible relationship. Regarding the wellbeing outcomes (H4), and informed by the current literature (Lafrenière et al., 2009; Lalande et al., 2017; Przybylski et al., 2009; Vallerand et al., 2003, 2006), the path analysis regressed all wellbeing and ill-being outcomes on both HP and OP for videogames. Lastly, given evidence that need satisfaction and frustration can directly influence wellbeing (Bartholomew et al., 2011; Chen, Vansteenkiste, et al., 2015; Deci et al., 2001; DeHaan et al., 2016; Kosa & Uysal, 2021; Martela & Ryan, 2016; Przybylski et al., 2009; Ryan et al., 2006; Tay & Diener, 2011; Verner-Filion & Vallerand, 2018), we allowed the model to freely estimate all pathways between need satisfaction/frustration (both through videogame play and important life domains) and each wellbeing and ill-being outcomes. The model showed good model fit to the observed data according to the recommended cutoff criteria: $\chi 2\ (33) = 630.454$, $p < .0000$; sRMR = 0.012; RMSEA = 0.019; CFI = 1.000; TLI = 0.996.

3. Results

The means, standard deviations, and value ranges for each measure in the study are presented in Table 2. All bivariate correlations were analysed with Pearson's *r* and are shown in Table 3.

In the path analysis model (Fig. 1), need satisfaction through videogame play was positively related to both HP and OP, as well as to problematic videogame play. Need satisfaction through important life domains was not correlated to either passions, however it was positively associated with both wellbeing outcomes. Need frustration through important life domains, however, was positively related to OP and psychological distress. It was also negatively related to both wellbeing measures. HP for videogames did not show any relationships to either wellbeing outcomes or psychological distress; however, it was negatively related to problematic videogame play. Similarly, OP was not related to either wellbeing outcomes or psychological distress; however, it was positively related to problematic videogame play. Finally, the covariation between the outcome measures (i.e., measures of wellbeing) indicate an acceptable level of discriminant validity (all being below 0.80; Gana & Broc, 2019; Kline, 2016).

3.1. Discussion

The aim of this study was to model the relationships between different sources of need satisfaction (through videogame play and important life domains), need frustration through important life domains, passion for videogames, and different wellbeing outcomes. Overall, the results indicated that in-game need satisfaction was (while related to both passions) more strongly related to the harmonious and balanced form of passion for videogames. The more obsessive and rigid form of passion, on the other hand, was more likely to be a result of frustrated needs in important life domains (as opposed to just low need satisfaction), highlighting the impactful role that thwarted needs play in the development of OP.

In regards to wellbeing, it appears as though need satisfaction and

Table 2
Means, standard deviations, and minimums and maximums of all variables in study 1 and 2.

Study 1				
Variable	*M*	*SD*	Min.	Max.
In-Game Need Satisfaction*	3.78	.74	1.08	5.00
Important Life Domain Need Satisfaction*	3.45	.78	1.17	5.00
Important Life Domain Need Frustration*	2.74	.86	1.00	4.83
Harmonious Passion**	4.99	1.13	1.67	7.00
Obsessive Passion**	2.75	1.27	1.00	7.00
Satisfaction with Life**	4.24	1.38	1.00	7.00
Vitality**	3.74	1.22	1.00	7.00
Problematic Videogame Play**	2.93	.96	1.00	6.38
Psychological Distress*†	14.46	5.56	6.00	30.00
Study 2				
Variable				
In-Game Need Satisfaction*	3.69	.66	1.42	5.00
Important Life Domain Need Satisfaction*	3.34	.69	1.27	5.00
Important Life Domain Need Frustration*	2.77	.79	1.00	4.58
Harmonious Passion**	4.97	.97	1.33	7.00
Obsessive Passion**	2.62	1.12	1.00	6.17
Satisfaction with Life**	4.42	1.38	1.00	7.00
Vitality**	3.79	1.17	1.00	6.43
Problematic Videogame Play**	2.99	.94	1.00	6.31
Psychological Distress*†	13.68	4.86	6.00	28.00

Values are provided for both study 1 and 2 to allow for easy comparison. Study 1 $N = 212$. Study 2 $N = 329$ (with the exception of Vitality which had $n = 327$ due to two participants missing the scale items). *all variables as indicated were measured on a five-point Likert scale. ** all variables as indicated were measured on a seven-point Likert scale. † Sum provided for K6 to measure psychological distress in order to facilitate comparison to other samples.

Table 3
Bivariate correlations between all variables in study 1.

Variable	1	2	3	4	5	6	7	8	9
1. In-Game Need Satisfaction	–	.110	.122	.654**	.366**	-.044	.109	.287**	.107
2. Important Life Domain NS	.110	–	-.614**	.067	-.088	.508**	.445**	-.135*	-.344**
3. Important Life Domain NF	.122	-.614**	–	.132	.359**	-.528**	-.399**	.286**	.605**
4. Harmonious Passion	.654**	.067	.132	–	.317**	-.045	.075	.159*	.150*
5. Obsessive Passion	.366**	-.088	.359**	.317**	–	-.193**	-.033	.656**	.260**
6. Satisfaction with Life	-.044	.508**	-.528**	-.045	-.193**	–	.508**	-.214**	-.557**
7. Vitality	.109	.445**	-.399**	.075	-.033	.508**	–	-.095	-.491**
8. Problematic Videogame Play	.287**	-.135*	.286**	.159*	.656**	-.214**	-.095	–	.187**
9. Psychological Distress	.107	-.344**	.605**	.150*	.260**	-.557**	-.491**	.187**	–

$N = 212$. ** correlation significant at the 0.01 level (2 tailed). * correlation significant at the 0.05 level (2 tailed). NS = Need Satisfaction. NF = Need frustration.

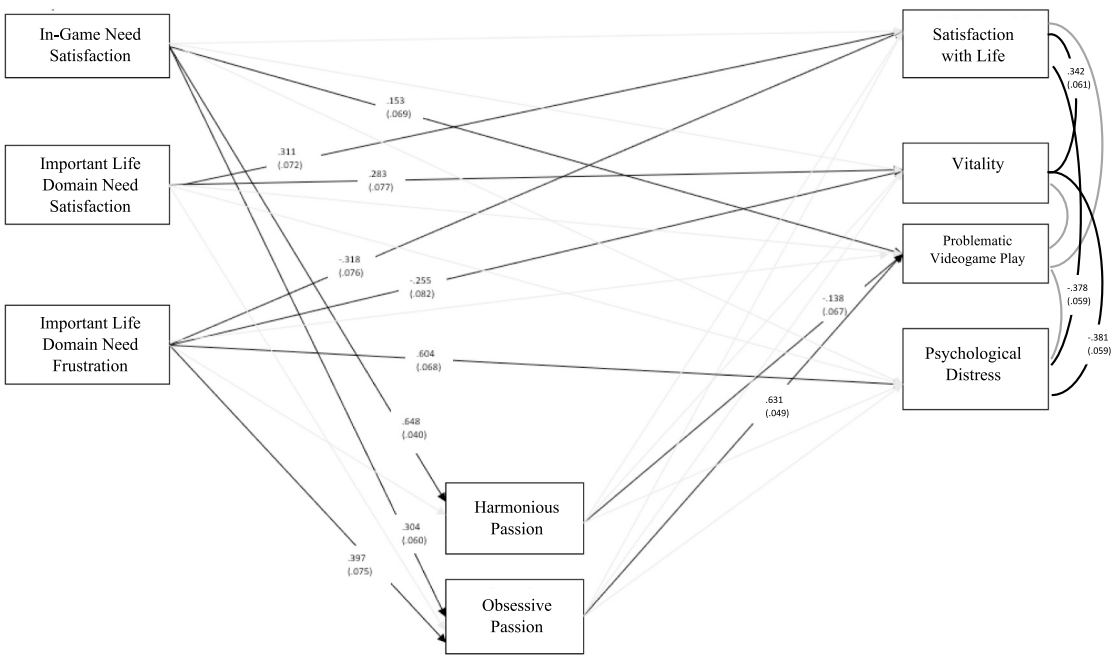

Fig. 1. Path analysis model of study one data (prior to COVID-19 pandemic). Standardized beta coefficients are provided with standard error values in parentheses for the significant pathways. All beta coefficients and standard error values for the non-significant pathways are provided in Appendix A (in supplementary material). Pathways significant at $p < .05$ are shown in black, and non-significant pathways are shown in grey. Fit indices are provided in section 2.2.

frustration play a more impactful role than passion in influencing one's experience of wellbeing (i.e., one's satisfaction with life, vitality, and psychological distress). It is perhaps because the source of need satisfaction and frustration is coming from an important life domain (e.g., work or study) that its effect on wellbeing may attenuate the influence of one's passion for videogames. However, this passion was still shown to be significantly impactful on individuals problematic videogame behaviours, with OP potentially leading to a greater likelihood of these behaviours occurring. These findings support the notion that dysfunctional game play would be driven by an OP for videogames, while more healthy game play would come from more balanced HP (Billieux, Flayelle, Rumpf, & Stein, 2019). These patterns of results are discussed in more detail below.

3.1.1. *In-game need satisfaction and its relation to videogame passion*

The results of this study supported H1, showing that in-game need satisfaction is significantly related to both OP and HP, and is supportive of past studies both within the context of videogame engagement (Johnson et al., 2022) and outside it through other passionate activities (Lalande et al., 2017). Notably, the relationship observed between in-game need satisfaction and HP was stronger compared to its relationship with OP, indicating a greater likelihood that in-game need satisfaction would be related to the more harmonious and balanced passion for videogames. This finding was also supportive of past research (Johnson et al., 2022; Lalande et al., 2017).

3.1.2. *Frustrated needs influence on obsessive videogame passion*

Past studies exploring need satisfaction across different sources (e.g., through daily life and passionate activities; Johnson et al., 2022; Lalande et al., 2017; Tóth-Király et al., 2019) have consistently shown that when general life need satisfaction is low, there is a greater chance of OP occurring. This current study failed to observe this; however, what was shown to determine OP, over HP, was the frustration of needs in important life domains. Therefore, H3 was supported but not H2. This finding supports other work outside the context of videogames, which found that general life need frustration was more likely to lead to an OP for studies among dental students (Orsini et al., 2019). Within the context of videogames, Tóth-Király et al. (2019) found that both low need satisfaction and need frustration in general life was related to OP, however, the relationship between need frustration and OP was observed to be stronger. Considering this, along with the findings of this current study, it appears as though need frustration may play a more impactful role than need satisfaction regarding its association with OP. This finding is also still consistent with the notion that when needs in life

domains are not being met, individuals will turn to other areas in order to compensate for those unmet needs (Johnson et al., 2022; Lalande et al., 2017).

The lack of a significant negative relationship between need satisfaction through important life domains and OP in this current study could also be related to the source of need satisfaction explored. In Tóth-Király et al.'s (2019) study, the source of need satisfaction explored was through general life, which appears to be the most common source explored throughout the literature (Johnson et al., 2022; Lalande et al., 2017; Przybylski et al., 2009). It is likely that when people think about their general life, they may consider multiple aspects of it, including school, work, family, and even their passionate hobbies. It may be that when considered collectively, a person's overall lack of need satisfaction is sufficient enough to influence OP. In contrast, when considered individually, a lack of need satisfaction in a specific life domain (such as school or work) might be insufficient to influence OP. Rather, it is only when a person experiences need frustration (as opposed to low need satisfaction) in an individual life domain that OP is influenced.

3.1.3. Wellbeing outcomes of passionate videogame engagement and need satisfaction

Regarding the wellbeing outcomes, it was hypothesised that HP for videogame play would predict greater wellbeing outcomes and lower ill-being outcomes (H4a) and, in contrast, OP for videogame play would predict greater ill-being outcomes and lower wellbeing outcomes (H4b). With the exception of the associations to problematic videogame behaviours (i.e., HP negatively associated, and OP positively associated with problematic videogame play), these hypotheses were mostly unsupported by the findings. This outcome was surprising; however, it could possibly be explained by the direct relationships observed between need satisfaction/frustration and wellbeing/ill-being. As results showed, need satisfaction through important life domains was positively associated with both satisfaction with life and vitality. Need frustration through these life domains was shown to be negatively related to these measures, while also being positively associated with psychological distress.

Prior research has already shown that the satisfaction of needs in general is related to numerous positive wellbeing outcomes (Bartholomew et al., 2011; Chen, Vansteenkiste, et al., 2015; Deci et al., 2001; DeHaan et al., 2016; Martela & Ryan, 2016; Tay & Diener, 2011; Verner-Filion & Vallerand, 2018). And there is growing evidence showing how need satisfaction through work and one's study are important for wellbeing (Milyavskaya et al., 2009; Neufeld & Malin, 2019; Neufeld et al., 2020; Schultz et al., 2015; Walker & Kono, 2018), as well as how the frustration of needs through these sources may impair wellbeing (Neufeld et al., 2020; Schultz et al., 2015). Specifically within the context of videogames, Johnson et al. (2022) similarly found that general life need satisfaction was positively associated with satisfaction with life and vitality, while also lacking significant relationships between HP and these wellbeing measures.

It could be that, in our current study's sample of videogame players, videogame passion may be a less influential factor for wellbeing compared to satisfied needs through other important life domains (in this case, work or study), which have extensively been shown to directly influence wellbeing. However, it should be noted that in Johnson et al.'s (2022) study, they did observe that, with a similar sample, both OP and general life need satisfaction significantly influenced wellbeing. This loss of connection between OP and wellbeing in the current study could also be a function of the source of need satisfaction that was explored (i.e., important life domains as opposed to general life). Perhaps because the source of need satisfaction is coming from an important life domain, its effect on wellbeing is more impactful and, therefore, attenuates the influence of passion. This finding could also be explained by the addition of frustration in the model. As need frustration is known to be harmful to wellbeing and functioning (Vansteenkiste & Ryan, 2013), it would not be unreasonable to expect its influence may also attenuate the impact passion has on wellbeing. Further research is needed to explore these possible explanations.

3.1.4. Precursors of problematic videogame behaviours

Despite the lack of wellbeing and ill-being outcomes related to passion, the findings did indicate that both harmonious and obsessive passion for videogame play have a significant effect on problematic videogame behaviour. Specifically, HP was found to be associated with lower levels and OP with high levels of problematic play. These findings support the general notion that OP tends to result in more adverse outcomes, while HP is less likely to (Vallerand et al., 2003, 2006; Verner-Filion & Vallerand, 2018). When we look specifically at the videogame context, our findings add to the highly varied results that already exist. Some previous studies have failed to observe significant relationships between HP for videogames and problematic patterns of play (Kneer & Rieger, 2015; Wang & Chu, 2007), whereas other studies have unexpectedly shown a positive relationship between HP for videogames and problematic game play (Johnson et al., 2022; though this study did show that OP had a stronger relationship with problematic game play than HP). The difference between the findings of the current study and Johnson et al.'s (2022) findings could relate to the pathways included in the respective models. For example, the current study included the pathway from in-game need satisfaction to wellbeing but Johnson et al.'s (2022) model did not; these differences in the models may partially explain the differing patterns of results. Turning to OP, its significant positive relationship with problematic game play is in line with past research (Johnson et al., 2022; Kneer & Rieger, 2015; Tóth-Király et al., 2019; Wang & Chu, 2007). These past findings, together with the results of this current study, support Billieux et al.'s (2019) recognition of the DMP being a sound theoretical framework to conceptualise problematic versus highly engaged yet healthy game play. As research has consistently shown that OP is associated with more adverse and dysfunctional outcomes as opposed to HP (Vallerand et al., 2003; Vallerand, 2015), it is reasonable to expect that more dysfunctional game play would be driven by an OP for games, while more healthy game play would come from a balanced HP (Billieux et al., 2019).

Our model also confirmed pathways between in-game need satisfaction and problematic videogame behaviour, with results indicating that greater in-game need satisfaction is more likely to be associated with problematic game play. This finding is consistent with previous studies, which have found that when needs are met through videogame engagement, there is an increased likelihood of dysfunctional videogame related behaviours occurring (Bender et al., 2020; Kosa & Uysal, 2021). However, Kosa and Uysal's (2021) findings noted that this significant relationship was weaker than the relationship between in-game need frustration and dysfunctional videogame play, suggesting that thwarted needs through videogame engagement is a greater risk factor for problematic videogame play behaviours. As our model did not consider frustration of needs through videogame play (only need satisfaction), we cannot contribute evidence for this potential explanation; thus, it would be beneficial for future research to consider need frustration from the source of videogame engagement to provide a more comprehensive understanding of how different factors influence the likelihood of problematic game play.

Overall, taking into account the model pathways in the current study, it appears that when needs are met through videogame engagement, there is a chance of OP or HP developing, however the chance for OP is particularly heightened when needs are frustrated in an important domain of a person's life. When this happens, there is a greater chance for problematic game play to occur. If needs are not frustrated in these important domains, and are also met through videogames, HP is more likely and, in turn, significantly reduces the likelihood of problematic videogame behaviours.

4. Study 2

Study two consisted of data collected during the COVID-19 pandemic. Ethics approval was obtained under the same application as study one (approval number 1900000933).

4.1. Method

4.1.1. Participants and procedures

All participants were recruited through similar avenues as study one, with the addition of other online groups (e.g., COVID-19 related subreddits). The eligibility criteria for this study was also the same as the first study. Interested participants responded to the invite and provided consent before completing the online survey. All participants in this study were also offered the chance to go into the prize draw for one of four $50USD Amazon gift vouchers.

A total of 567 participants were recruited, however a number of them were deemed ineligible for the study as they either did not complete the survey (n = 174) or did not meet the eligibility criteria (n = 64). The final sample was made up of 329 participants (all participant information is provided in Table 1).

4.1.2. Measures

This study used the same measures as study one. All scales used in this study showed good scale reliability; need satisfaction met through videogames (α = 0.86), need satisfaction through important life domains (α = 0.87), need frustration through important life domains (α = 0.88), HP (α = 0.75), OP (α = 0.78), satisfaction with life (α = 0.87), subjective vitality (α = 0.88), problematic videogame play (α = 0.79) and psychological distress (α = 0.83). As per study one, all scales' reliability were measured using Cronbach's alpha in SPSS (version 27).

4.2. Independent-samples T-Tests

4.2.1. Data analysis and results

A series of independent-samples t-tests were conducted (in SPSS version 27) to determine if there were any mean differences in the variables investigated across the two time points: prior to and during COVID-19. Each variable, across both time points, was assessed to check for assumption violations. Each variable, with the exception of need frustration in important life domains and satisfaction with life, showed outliers through visual inspection of the boxplots. However, each outlier was checked and determined to be genuine data and, therefore, kept in the analysis. For variables that violated assumptions of normality and/or homogeneity of variance, the non-parametric Mann-Whitney U test was also conducted. In cases where the Mann-Whitney U test supported the independent samples t-test results, the t-test results were deemed robust and therefore interpreted.

All results have been reported in-depth in the supplementary material provided, and all means of the following variables can be found in Table 2. In summary, the majority of variables showed no difference between time points: these were need satisfaction (M = 0.10, 95% CI [-0.02, 0.23], t (408) = 1.61, p = .109) and frustration (M = −0.02, 95% CI [-0.16, 0.12], t (539) = -0.28, p = .776) through important life domains, harmonious (M = 0.02, 95% CI [-0.16, 0.20], t (399) = 0.22, p = .829) and obsessive passion (M = 0.12, 95% CI [-0.09, 0.33], t (408) = 1.14, p = .254), satisfaction with life (M = −0.18, 95% CI [-0.42, 0.06], t (539) = −1.48, p = .140), vitality (M = −0.05, 95% CI [−0.26, 0.15], t (537) = −0.48, p = .632), problematic videogame play (M = −0.06, 95% CI [-0.23, 0.10], t (539) = −0.76, p = .445) and psychological distress (M = 0.77, 95% CI [-0.12, 1.66], t (539) = -1.70, p = .089). Only two variables showed a significant difference between the two time points. These were in-game need satisfaction (U = 31,151.50, z = −0.2.09, p = .036), which was determined with the non-parametric Mann-Whitney U test, and time spent playing videogames (M = −4.95, 95% CI [−7.41, −2.48], t (531) = -3.94, p < .001; please see supplementary material for further detail on these tests), specifically with differences showing that during the COVID-19 pandemic there was a reduced need satisfaction from videogame play (pre-COVID Md = 3.92, post-COVID Md = 3.75) but increase in time spent playing (pre-COVID M = 15.48, post-COVID M = 20.43).

4.3. Path analysis

4.3.1. Data analysis

To assess the research question related to this study, a path analysis was conducted (in Mplus version 8.3). Due to limited research on the COVID-19 pandemic, particularly within this context, no new hypotheses were formulated and instead we simply sought to explore the extent to which the same relationships as study one were shown. The same path model was used in study two, that is the model regressed both passions on need satisfaction through videogame play, OP on need satisfaction through important life aspects, and both passions on need frustration through important life aspects. It also regressed all wellbeing and ill-being outcomes on both passions. Finally, the analysis freely estimated all pathways of need satisfaction and frustration (through videogame play and important life aspects) on all wellbeing and ill-being outcomes.

Model fit for this study's model was evaluated using the same recommendations followed in study one. The model showed good model fit to the observed data according to recommended cutoff criteria: $\chi 2$ (33) = 818.012, p < .0000; sRMR = 0.003; RMSEA = 0.000; CFI = 1.000; TLI = 1.036.

4.3.2. Results

The means, standard deviations, and value ranges for each measure in study two are presented in Table 2. All bivariate correlations were analysed with Pearson's r and are shown in Table 4.

In the path analysis model (Fig. 2) in-game need satisfaction was positively related to both forms of passion for videogames (supporting H1), while need frustration through important life domains was positively related to OP (supporting H3). Need satisfaction through these life domains did not show any relationship to either kinds of passion (showing a lack of support for H2). Additionally, important life domain need frustration was positively related to both ill-being measures, as well as negatively related to both wellbeing measures. In contrast to this, need satisfaction through these important life aspects was only positively associated with the wellbeing measures, and not associated with either ill-being outcomes. Lastly, HP for videogames was shown to be positively related to vitality (partially supporting H4a), while OP was positively related to problematic videogame play (partially supporting H4b). Both HP and OP also showed a negative relationship with psychological distress (in the case of HP providing further support for H4a, but in the case of OP contradicting H4b). Finally, as with study one, the covariation between the outcome measures (i.e., measures of wellbeing) in this study also indicate an acceptable level of discriminant validity (all being below 0.80; Gana & Broc, 2019; Kline, 2016).

4.4. Discussion

While there has been some prior work on how people engage with videogames during stressful times (Caro & Popovac, 2020; Iacovides & Mekler, 2019), the onset of COVID-19 brought along unprecedented challenges to people's lives. Due to the limited knowledge about videogame engagement during COVID-19, we recognised the need to explore how people's needs were met through different sources (i.e., through videogame play and important life domains), how this influences their passion for videogames and, in turn, how it influenced their wellbeing during the pandemic. As the literature regarding COVID-19 and videogame engagement is nascent, no new hypotheses were formed and instead an overarching research question was formulated to explore the extent to which H1-4 applied in the context of this worldwide pandemic. Additionally, a series of independent-samples

Table 4
Bivariate correlations between all variables in study 2.

Variable	1	2	3	4	5	6	7	8	9
1. In-Game Need Satisfaction	–	.093	.075	.496**	.212**	.117*	.138*	.265**	.012
2. Important Life Aspect NS	.093	–	-.635**	.068	-.094	.430**	.437**	-.061	-.398**
3. Important Life Aspect NF	.075	-.635**	–	.030	.231**	-.378**	-.426**	.261**	.625**
4. Harmonious Passion	.469**	.068	.030	–	.097	.089	.178**	.093	-.091
5. Obsessive Passion	.212**	-.094	.231**	.097	–	-.056	.005	.629**	.059
6. Satisfaction with Life	.117*	.430**	-.378**	.089	-.056	–	.567**	-.130*	-.519**
7. Vitality	.138*	.437*	-.426**	.178**	.005	.567**	–	-.081	-.496**
8. Problematic Videogame Play	.265**	-.061	.261**	.093	.629**	-.130*	-.081	–	.226**
9. Psychological Distress	.012	-.398**	.625**	-.091	.059	-.519**	-.496**	.226**	–

$N = 329$. ** correlation significant at the 0.01 level (2 tailed). * correlation significant at the 0.05 level (2 tailed). Data here analysed in SPSS version 27.

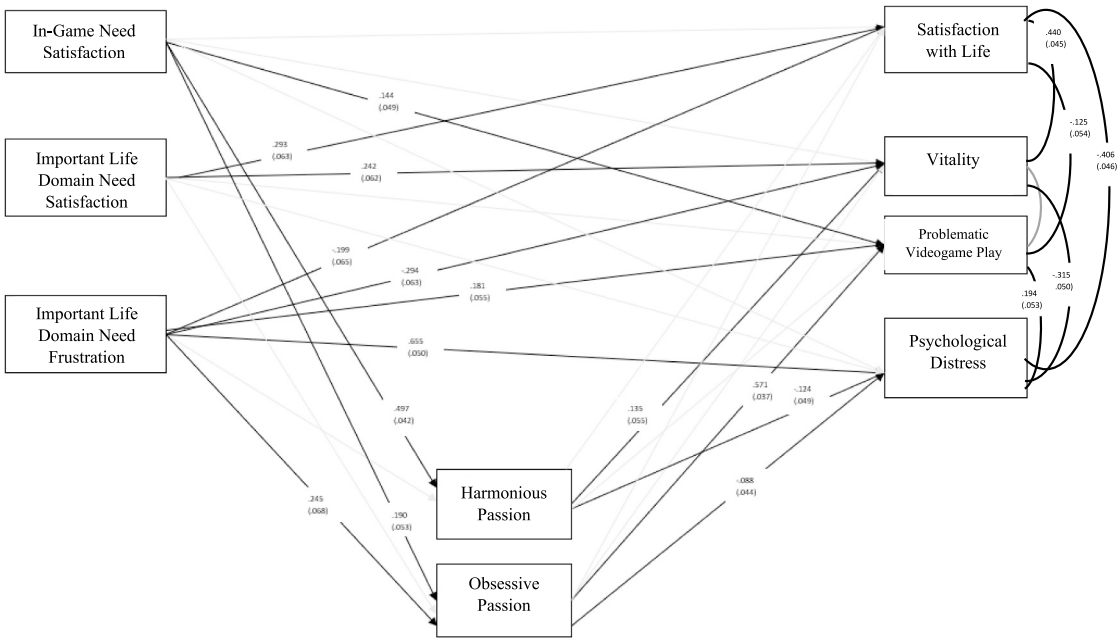

Fig. 2. Path analysis model of study two data (during COVID-19 pandemic). Standardized beta coefficients are provided with standard error values in parentheses for the significant pathways. All beta coefficients and standard error values for the non-significant pathways are provided in Appendix B (in supplementary material). Pathways significant at $p < .05$ are shown in black, and non-significant pathways are shown in grey. Fit indices are provided in section 2.2.

t-tests were conducted to investigate the mean differences between the variables across the two time points; prior to and during COVID-19.

Regarding the independent-samples t-tests, it was observed that there was a significant increase in time spent playing videogames each week but a decrease in reported in-game need satisfaction. In terms of the path analysis, there were some similarities to study one, whereby in-game need satisfaction was related to both passions but was more strongly related to HP. Additionally, only need frustration through important life domains was shown to be linked to OP (and not low need satisfaction), indicating the impactful role need frustration plays in influencing OP. In comparison to study one, study two did however show significant differences in terms of wellbeing outcomes, highlighting the important role that videogame engagement has during times of stress and difficulty. HP for videogame play was shown to be associated with greater vitality and reduced psychological distress and while OP was still linked to problematic videogame behaviours it was also associated with reduced psychological distress. So while videogame engagement during this time may potentially lead to more dysfunctional habits of play when passions are more obsessive, it may also provide more wellbeing benefits than it does in less stressful times.

4.4.1. Greater time spent playing, reduced in-game need satisfaction but an absence of changes in wellbeing during COVID-19

Because of the unprecedented spread of COVID-19 reaching countries all over the world, research investigating its effect on wellbeing is growing fast and initial evidence has highlighted the substantial strain and stress caused by the pandemic (Brooks et al., 2020; Cao et al., 2020; Li et al., 2020; Riva et al., 2020; Schimmenti et al., 2020; Son et al., 2020). To determine how people's need satisfaction, passion for videogames, and wellbeing changed across the two time points, a series of independent samples t-tests were conducted and revealed very few differences across the variables; however, participants did report significantly higher hours of videogame play each week (on average) and significantly lower levels of perceived in-game need satisfaction during COVID-19.

Regarding time spent playing, this finding itself was not too surprising as there has been evidence showing an increase in videogame play during the pandemic (Balhara et al., 2020; Shanley, 2020; Stephen, 2020). There was, however, a reduced level of perceived in-game need satisfaction during the pandemic, which possibly indicates that while there may be greater time spent playing, it does not necessarily mean greater (and in fact may lower) feelings of in-game autonomy, competence, and relatedness. While this finding would need to be explored further in future research, the reduction of in-game need satisfaction

during this time could be a consequence of external stressors caused by the pandemic and associated living restrictions. It could be that external stressors outside of the passionate activity may prevent important psychological needs from being met through the activity.

It is somewhat surprising that we did not see a difference in wellbeing measures between the two samples given the established impacts of COVID-19 (Brooks et al., 2020; Cao et al., 2020; Li et al., 2020; Riva et al., 2020; Schimmenti et al., 2020; Son et al., 2020). One possible explanation for the lack of differences between the groups on wellbeing measures, is that in our sample collected during COVID-19, the greater time spent playing effectively reduced the potential negative impacts on wellbeing of the pandemic. It is important to keep in mind that our findings are based on different samples across two studies (rather than multi-time point data from a single sample) precluding thinking of these differences as "changes". Further multi-time point research in the context of stressful life events is needed. Another explanation (for the lack of difference on wellbeing measures) is that the geographic diversity of our samples mean that some participants were more impacted than others depending on the severity of infection and restrictions where they lived. Unfortunately, we did not collect geographic location data from our participants, precluding any analysis of this possibility. However, these findings may still suggest that while stressors may work to prevent important needs from being met as effectively through one's passionate activity, such activities may be a key component of maintaining one's wellbeing during the stressful time.

4.4.2. Need satisfaction and its relation to videogame passion during COVID-19

Turning to the path analysis, in line with study one and previous research (Johnson et al., 2022; Lalande et al., 2017), in-game need satisfaction was shown to be associated with both passions, and once again this source of need satisfaction was shown to have a stronger relationship with HP, compared to OP. Additionally, and again consistent with study one, study two observed a relationship between need frustration through important life domains and OP, suggesting that thwarted needs are more indicative of the rigid style of videogame engagement (over harmonious and balanced engagement). As discussed earlier, this is consistent with the notion that when needs are unable to be met in life, individuals are more likely to turn to something else in order to make up for those needs (Johnson et al., 2022; Lalande et al., 2017; Przybylski et al., 2009; Tóth-Király et al., 2019).

As discussed in study one, it is still unclear why there was no significant negative pathway observed between need satisfaction through important life domains and OP. Past studies have shown that when general life need satisfaction is low, there is a significant likelihood of OP occurring (Johnson et al., 2022; Lalande et al., 2017; Przybylski et al., 2009), even when need frustration in general life is accounted for (Tóth-Király et al., 2019). However, there is evidence based on Tóth-Király et al.'s (2019) work that suggests that need frustration (in comparison to low need satisfaction) may play a more impactful role on OP, which could help to explain the findings in this current study. Furthermore, following on from points made in study one, these findings could also be explained by the specific source of need satisfaction and frustration explored. Since general life need satisfaction may constitute fulfilment of needs through multiple aspects of a person's life, including work, school and hobbies, it is reasonable to expect that need fulfilment through specific subsets of life may influence passion differently.

4.4.3. Wellbeing outcomes related to need satisfaction and videogame engagement during COVID-19

4.4.3.1. Benefits of harmonious passion. During COVID-19, a number of differences were observed regarding the relationships between passion and wellbeing. For instance, HP for videogames was shown to lead to greater vitality, which has been seen as a benefit of HP outside the context of videogames (Abdelati & Salama-Younes, 2016; Lalande et al., 2017; Vallerand et al., 2006). Additionally, HP for videogames was found to be associated with reduced levels of psychological distress during COVID-19. Similar findings have been observed in the work by Houlfort, Philippe, Bourdeau, and Leduc (2017) from the perspective of work-based passion. Notably, neither of these relationships with vitality nor psychological distress were observed in study one, nor have they been observed in previous studies related to videogame passion (Johnson et al., 2022), suggesting harmoniously passionate engagement with videogames may play a more important role in a person's life and provide greater benefits and reduced harm during difficult times.

4.4.3.2. Precursors of problematic videogame behaviours. Compared to the first study, there were notable differences regarding the relationships between passion and problematic videogame behaviours. Specifically, while we still see a significant positive relationship between OP and problematic videogame engagement during the COVID-19 pandemic, HP is no longer associated with dysfunctional game play. It is possible that, pre-COVID-19 era, harmonious and balanced videogame engagement was enough to prevent problematic videogame behaviours, but during COVID-19, the protective benefits of HP regarding problematic videogame play may be reduced. This may possibly stem from the observed increased likelihood of problematic videogame play being associated with need frustration through important life domains (which was not observed in study one). It could be that during this time, the protective effects of HP become attenuated by the living situations which have resulted from the pandemic. Additionally, it is important to consider that, given the nature of the items in the problematic videogame play scale, it may simply be that people are using videogames more as a means of coping during a particularly stressful life event with limited recreational activities available.

4.4.3.3. Videogame engagement as a means to reduce psychological distress during COVID-19. Unexpectedly, OP for videogames during the pandemic was also shown to lead to reduced psychological distress. What was surprising about this was that past studies have typically found OP to be associated with increased psychological distress, both in samples of videogame players (Johnson et al., 2022), in samples of workers (Houlfort et al., 2017), and even among students regarding their passion for study during COVID-19 (Peixoto, Pallini, Vallerand, Rahimi, & Silva, 2021). Taken together, these findings have salient implications for what we know about passionate videogame play and how players are engaged with videogames during times of difficulty and stress. It may be that while during times of stress, OP is still associated with negative impacts to wellbeing (such as psychological distress), the size of these impacts is reduced. Indeed, this pattern (reduced impacts on wellbeing from passionate videogame play during a stressful life event) has emerged in recent research conducted with a sample experiencing a first episode of psychosis (Johnson et al., 2021). The relative impact of obsessive passion for videogames on wellbeing may be reduced when larger, more significant life events occur.

4.4.4. Need frustration differences prior to and during COVID-19

Lastly, comparisons made between the models for study one and two (Fig. 1, Fig. 2), identified notable changes in the strength of some of the pathways. First, in study two, need frustration through important life domains shows a weaker relationship with satisfaction with life in comparison to study one; however, it is more strongly associated with vitality. It is possible that, during the pandemic, need frustration through work or study has an impact on feelings of vitality without it translating to overall satisfaction with life because it is accepted that things are different during unprecedented times. Second, in study two, the relationship between need frustration through important life domains and OP is weaker than what is observed in study one. Again, this may reflect a deeper acceptance of frustrating circumstances during the

pandemic that attenuates the impact of frustration of OP. However, in study two, this source of need frustration becomes associated with problematic videogame behaviours (which was not the case in study one). It may be that while need frustration during the pandemic is not causing a lack of balance and obsessiveness, it is leading to changes in actual videogame play behaviour referenced in the problematic videogame play scale (e.g., changes in social behaviour, concerns about addiction, impaired sleep). Both of these explanations, however, need to be explored further in future research.

5. General discussion

Overall, the findings from both studies have provided important insight into how people engage with videogames and the influence it has on their wellbeing. Additionally, it has explored how these factors relate to one another both prior to and during the COVID-19 pandemic. By examining the data across both time points, some similarities were observed; for instance, at both time points, in-game need satisfaction was shown to be a determinant of both HP and OP for videogames (H1), with HP showing the stronger relationship. Both studies also showed that OP was more likely to be exhibited when needs were thwarted in important life domains (H3).

The majority of differences observed between each time point were regarding the influence videogame passion had on wellbeing. Prior to COVID-19, it seems passion for videogames influenced problematic game play but did not extend to more general wellbeing. Specifically, HP for videogames was more likely to be associated with a reduced likelihood of problematic videogame engagement, while OP had a greater likelihood of being associated with it. However, general wellbeing (i.e., satisfaction with life, vitality, psychological distress) appears to be influenced more by the satisfaction and frustration of needs through videogame play and important life domains. In contrast, in the context of a stressful and difficult time, videogame play appears to be more influential in a person's life, with greater hours spent playing and passion for play being associated with greater benefits to wellbeing (e.g., videogame passion influencing greater vitality and reduced psychological distress), despite the reported decrease in in-game need satisfaction (across the two time points). OP for videogames was shown to be associated with an increased likelihood of problematic videogame play at both time points but notably, at time two (during COVID-19), it was also associated with reduced psychological distress. Relatedly, HP for videogames was no longer negatively associated with problematic game play during the pandemic and instead was shown to lead to a number of other benefits, such as greater vitality and reduced psychological distress.

It appears that during COVID-19, people's passion for videogame play is able to positively influence wellbeing, even among players who may be engaged in games in a more obsessive and rigid manner. It is possible the people are using videogames during this time as a way to escape from other stressors associated with the pandemic, which supports initial work relating to videogame use during COVID-19 (e.g., Balhara et al., 2020; Kiraly et al., 2020; Ko & Yen, 2020); however, as videogame play has been shown to be an adaptive coping method for some (Russoniello et al., 2009), this could explain why we still see reduced psychological distress. It is essential to note though that for those with an OP for videogames, while there may be these perceived benefits, it is still possible for rigid engagement with games to lead to problematic videogame behaviours (i.e., videogame addiction).

5.1. Practical implications

As there are growing concerns about potentially maladaptive engagement with videogames during this time, these findings have important implications for the research field, health practitioners, and players alike. The findings of this study highlight that those who are able to balance their videogame engagement harmoniously with other life aspects (allowing for external sources of need satisfaction to be met), are likely to experience a range of benefits. Moreover, during stressful life events, even obsessive passion for play may be associated with some benefits. This suggests that videogame play may act as a potential protective factor during stressful life events, such as the COVID-19 pandemic.

This study provides further evidence of the important role of videogames in satisfying people's basic psychological needs that are usually lowered or even potentially thwarted in difficult environments (Vansteenkiste & Ryan, 2013). Given the tremendous burden stressful life events have on people's mental health, as highlighted during COVID-19 (e.g., Brooks et al., 2020; Cao et al., 2020; Li et al., 2020), videogames may provide a compensatory mechanism for people to cope with the stressors they experience. Mental health practitioners are encouraged to recognise the potential beneficial role videogames may play during such stressful times and to consider the implementation of videogame use in treatment. Additionally, it would be beneficial for health care providers to recognise the importance of meeting needs through *both* videogame engagement and external life domains for those seeking support during these times.

Instead of trying to prevent players from engaging with videogames for those who are not successfully meeting their psychological needs through external life domains, strategies could be put in place by health practitioners (and supported by family/peers) to encourage a more balanced, healthy engagement with the activity as well as ensuring their psychological needs are able to be met in other important domains of their life (e.g., work/study). To help facilitate this, support networks should be encouraged to work towards providing need-supportive environments for players that may be struggling with meeting their needs during this difficult time (e.g., providing autonomy-support, structure, warmth; Ryan & Deci, 2017).

Similarly, policies put in place should be directed towards supporting a range of need satisfaction generating activities rather than specifically targeting gameplay hours or behaviours. For example, rather than focusing only on the potential harms, guidelines from policymakers should also acknowledge the potential benefits. Moreover, rather than focusing on limits to play time, more effective guidelines might focus on the value of incorporating a range of need-satisfying activities. Additionally, programs could be implemented into videogame-related clubs at educational institutions (e.g., videogame and esports clubs at universities) to build more awareness around videogame engagement and mental health during stressful life events (such as COVID-19). Educational institutions and associated clubs could also be encouraged to provide programs for families of videogame players to learn about the benefits of videogames and their impact during stressful life events. Overall, it is important for players, those close to them, policymakers, as well as health practitioners, to acknowledge the potential protective influence that games might be playing during stressful life events, and to be careful that concerns about videogame play do not lead to the ignoring of other problematic external factors (i.e., need frustrating events) that may be the real issue.

6. Limitations and future directions

Despite the contributions made to the COVID-19 and videogame literature, this study is not without limitations. The primary limitation is the method of data collection, which was data taken from a self-report survey. Self-reported data is subject to a level of self-representational bias so future research should consider incorporating additional methods of obtaining data (e.g., observations, informants). The study was also correlational and, therefore, cannot provide causality.

One major contribution of this study was that it provided salient knowledge of videogame engagement both prior to the COVID-19 pandemic and during it. However, it is important to note that during the time data was collected, the negative effects of COVID-19 and its consequential lockdowns/restrictions looked different across countries

worldwide. As the survey was open internationally, some participants perhaps could have been more heavily restricted and affected by the pandemic at greater levels compared to others. In future, it would be beneficial to account for specific restrictions in place by controlling for the amount of disruption or stress the pandemic has caused for participants. It would also be beneficial for future work to investigate the ongoing effects of COVID-19 (or other stressful life events) in relation to videogame engagement with longitudinal studies.

Additionally, it is important to note the shift in gender percentage across both studies. In study one, 56.6% of participants were male, which increased to 75.4% in study two. It is possible this shift influenced our results. We also want to acknowledge that while one of the ill-being measures was problematic videogame play, there is not yet consensus on the best way to measure problematic play and addiction. This is important to note as other measures may have shown differing patterns of results. Another possible limitation is that this study did not consider different genres of games. Since people are motivated to play different games for varying reasons (Granic et al., 2014), it is reasonable to expect that their engagement and its influence on their wellbeing may differ. Future research may explore these relationships across various game genres to strengthen our knowledge in this area, and particularly to understand how people engage with different game genres during difficult times.

7. Conclusions

Overall, the findings of this study provided insights on how people engage with videogames, and how such engagement relates to well-being, both prior to and during COVID-19. Prior to COVID-19, outside of a worldwide pandemic, a person's passion for videogame play seems to influence problematic game play without extending to more general wellbeing, such as satisfaction with life, vitality or psychological distress. Rather, it would seem that a person's general wellbeing is more influenced by their needs being met or thwarted in other areas of their life (e.g., videogame play, work/study). In contrast, in the context of a worldwide pandemic, videogame play appears to be more influential in a person's life, having a greater influence on wellbeing despite the increase in weekly videogame play hours and the reported reduction of perceived in-game need satisfaction. In particular, harmonious engagement with games appears to be associated with greater wellbeing overall and obsessive engagement shows the potential to still reduce psychological distress despite a greater association with problematic videogame behaviours. Finally, while videogame passion may have the potential to influence problematic videogame play, the findings highlight that the ability to which an individual is able to meet important psychological needs plays a very important role in the likelihood of certain behaviours occurring. In order to prevent problematic videogame play, people should look outside the activity and into other important domains of life which may help an individual to meet their basic psychological needs.

Credit author statement

Jessica Formosa: Conceptualization, Methodology; Formal Analysis; Investigation; Data Curation; Writing – Original Draft; Writing – Review & Editing; Visualisation. **Daniel Johnson:** Conceptualization; Methodology; Formal Analysis; Resources; Writing – Review & Editing; Supervision. **Selen Türkay:** Conceptualization; Methodology; Writing – Review & Editing; Supervision. **Regan Mandryk:** Conceptualization; Methodology; Writing – Review & Editing; Supervision.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.chb.2022.107232.

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