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## Article:

Online-only friends, real-life friends or strangers? Differential associations with passion and social capital in video game play.

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Abstract

The present study tests a recently proposed model in which social video game play supports wellbeing by contributing to a harmonious type of engagement with the game. Players ($N = 2030$) of the online-only multiplayer first-person shooter game, *Destiny*, reported the frequency they played with real-life friends, online-only friends and strangers, their type of engagement with the game – measured as harmonious and obsessive passion, and completed a wellbeing measure of social capital. Telemetry data also recorded their total time playing over the duration of the study. A structural equation model supported the prediction that harmonious – but not obsessive – passion would mediate the positive association between playing with others and social capital. The findings also supported a supplementary hypothesis that the three types of social relationships would be differentially associated with two forms of social capital – bridging versus bonding – as a function of the closeness of social ties. Real-life friends was positively associated with bonding, strangers with bridging, and online-only friends with both. Overall, these results emphasise that social interactions in (and around) online multiplayer video games are effective for building social capital, and do so by ensuring game play is in harmony with other goals and values.

*Keywords*: video games; passion; social capital; relationships; online; multiplayer

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Online-only friends, real-life friends or strangers? Differential associations with passion and social capital in video game play.

1. Introduction

Video games provide a unique environment in which individuals can play with a very wide range of other people with scarcely any boundary including across age, sex, language or location. Moreover, the social nature of video games is an important component of positive health and wellbeing outcomes. Where previously attention has focussed on negative outcomes related, in particular, to high amounts of time spent playing (Anderson et al., 2010; Porter, Starcevic, Berle, & Fenech, 2010), other evidence suggests that players' experiences of the game, as well as elements of the in-game environment, may be critical determinants of positive versus negative outcomes (e.g., Durkin & Barber, 2002; Kaye & Bryce, 2012). Even when focussing on groups who might be more at-risk (e.g, children), the reported size of any negative impacts is very small and moreover, a number of problems with existing research suggest that even these small effect sizes might be overestimates (Ferguson, 2007, 2015; Hilgard, Engelhardt & Rouder, 2017; Przybylski, 2014). In contrast, a growing body of research provides evidence of the positive impact of video game play (Jones, Scholes, Johnson, Katsikitis & Carras, 2014).  Online multiplayer games, in particular, provide ample opportunities for building and maintaining interpersonal relationships (Cole & Griffiths, 2007; Yee, 2006). The concept of *social capital* (Putnam, 2000) captures the appeal and benefits of social networks as facilitated by games, with recent research providing evidence of building social capital through online multiplayer video game play (Domahidi, Festl, & Quandt, 2014; Trepte, Reinecke & Juechems, 2012; Vella, Johnson & Hides, 2015).

Is all social play beneficial? One consideration central to the present study is whether beneficial effects of multiplayer gaming differ according to the nature of the

relationships between players. Online video game players form new social relationships, even while also playing with offline friends and family members (Domahidi et al., 2014). A small number of studies have also begun to examine the different implications of playing with friends and family compared with strangers (e.g., Eklund, 2015). The first aim of the present study is to simultaneously examine the independent effects of three relationship types: friends that are exclusive to the in-game environment (labelled here as *online-only friends*); friends that extend to offline relationships (*real-world friends*); and those who are unknown to the player (*strangers*). These categories were developed to index distinct and easily discernable relationship types that differ as a function of the strength of social ties. Social networks characterised by strong versus weak social ties are expected to produce different forms of social capital (Putnam, 2000).

Although the link between social gaming and positive wellbeing outcomes is reasonably well established, less explored are possible mechanisms of this process. Johnson, Wyeth and Sweetser (2013) proposed a *People-Game-Play* model in which the type of engagement with a game mediates associations of player and game characteristics with wellbeing outcomes. These authors identified *harmonious passion* as perhaps the most important such determinant of positive wellbeing. Vallerand et al.'s (2003) *Dualistic Model of Passion* (DMP) seeks to describe individuals' experiences of activities that they are highly invested in as either congruent with other needs and goals in their life (i.e., harmonious passion), or in conflict with these needs and goals (*obsessive passion*). In a recent series of studies exploring need satisfaction in non-video game settings, for example, harmonious – but not obsessive – passion mediated the effect of needs satisfaction on various indicators of wellbeing (Lalande et al., 2015). The second aim of the present study is therefore to utilise the theoretical framework provided by the People-Game-Play model (Johnson et al., 2013) to examine whether harmonious passion for the

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game *Destiny* mediates associations between playing with other people and greater wellbeing.

1.1 Destiny gameplay

      *Destiny* is an online-only multiplayer first-person shooter game in which players share the same persistent virtual world, and compete and cooperate with other human players in a variety of settings. However, communication with other players is more limited than with traditional massively multiplayer online game (MMOG) designs. *Destiny* features team-based combat within a variety of environments. Gameplay is focused on collecting weapons (and other equipment) to combat both human and computer controlled opponents. *Destiny* features both single-player and multiplayer game modes, as well as both Player-vs-Environment (PvE) and Player-vs-Player (PvP) combat. PvE mode includes story-based missions that can be played either solo or in teams of three, which include public events, raids and strikes on computer controlled enemies, or other teams of human players. PvP mode includes a variety of more traditional deathmatch style games where teams of three or six human players battle in an arena with objectives including eliminating every member of the other team, or capture the flag.

1.2 Video games and social capital

      Both online and off, social interaction and support are essential for positive mental health and wellbeing (Kawachi & Berkman, 2001), with stronger social ties associated with reducing negative health outcomes ranging from depression to alcoholism (e.g., Peirce, Frone, Russell, Cooper & Mudar, 2000). A recent meta-analysis encompassing over three million participants reported that those who live alone or feel socially isolated have around a 30% increased risk of mortality (Holt-Lunstad, Smith, Baker, Harris &

Stephenson, 2015). Although the direction of effects between chronic disease and loneliness is not directly discernable across this research, classic ostracism experiments support the contention that social isolation and rejection is profoundly disagreeable and can result in negative heath (Williams & Zadro, 2012). Baumeister and Leary (1995) argued that isolation and rejection are harmful because such experiences thwart our fundamental need to belong.

One area of research into the health outcomes of loneliness that has garnered considerable attention examines the impact of internet use on social isolation in older populations. In one cross-sectional study, going online more often was associated with decreased loneliness, and improved quality of communication with others, as reported by participants (Cotten, Anderson, & McCullough, 2013). Furthermore, a program aimed at training older people to use social media reported a positive overall impact on mental health and physical wellbeing due to feeling less isolated (Mortan & Genova, 2014). An important caveat to these findings however, is that negative and positive outcomes from internet use can depend on a number of factors including the purpose of internet use, contextual factors and individual characteristics (Shen & Williams, 2011; Primack et al., 2017).

Social capital (Putnam, 2000), is a construct that formalises the value of social ties, framing social networks as resources that are important and useful to individuals and organisations. Like economic capital, it is also understood that an investment of social capital produces more capital; if social connections are nurtured, they will provide value in return in the form of support and the sharing of information. Putnam (2000) suggested the value of social networks is driven by norms of reciprocity in which maintaining connections is valuable because they are expected to provide reciprocal benefits. This cyclical process indicates that social capital may be either a determinant of outcomes like

wellbeing, or an outcome in itself (Williams, 2006). Putnam (2000) developed social capital as a construct to examine a perceived decline in American social and civic engagement as people spend more time in isolating activities like watching television. As other scholars (Ducheneaut, Moore, & Nickell, 2007; Steinkuehler & Williams, 2006) have argued however, online multiplayer video games may be an exception among such isolating activities, providing virtual public spaces that allow people to socialise and develop networks, thus supporting the formation and maintenance of social capital.

Among the growing body of wellbeing and video games research, a small number of studies have reported an association between social experiences of online gaming and social capital (Domahidi et al., 2014; Trepte et al., 2012; Vella et al., 2015; Zhong, 2011). The objectives of online multiplayer games facilitate collaboration and interdependent social relationships among players, processes which should function to establish and maintain social networks (Putnam, 2000). Williams (2006) developed the *Internet Social Capital Scales* (ISCS) to assess social capital specifically among internet users online. The ISCS is readily adaptable to the context of online multiplayer gaming, and previous studies have used it in this way (e.g., Trepte et al., 2012; Zhong, 2011). Zhong (2011), for example, reported that collective play in a massively multiplayer online role-playing game (MMORPG) was longitudinally associated with increased online social capital independently of existing levels of social capital.

The ISCS was developed to capture two relatively independent domains of social capital that Putnam (2000) originally labelled *bridging* and *bonding*. According to Putnam (2000), bonding occurs when support is provided among individuals with strong social ties, such as families or close friends. Bonding is considered exclusive in that support provided by the network promotes insularity and outgroup antagonism (Putnam, 2000). Bridging, in contrast, occurs when individuals from diverse backgrounds and with

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more distal relationships form connections with one another. Research comparing online and offline social networks, for example, has identified that online networks tend to exhibit weaker social ties, and are characterised by specialized relationships (Williams, 2006). Compared with offline networks, online relationships are also more homogeneous in that they are premised on a more limited range of common interest (Katz, Rice, Acord, Dasgupta & David, 2004; Wellman & Gulia, 1999). Putnam (2000) described bridging social capital as inclusive, in that these social connections bring individuals and groups closer, and facilitate the sharing of information and resources. Compared with bonding however, bridging provides weak emotional support (Putnam, 2000). Bridging and bonding are expected to differ in their relevance across relationship types as a function of the strength of those relationships.

1.3 Multiplayer relationship types

The impact of internet use (and, by extension, online multiplayer gaming) on health and wellbeing is dependent on both individual and contextual factors (Shen & Williams, 2011; Primack et al., 2017). Key factors of the gaming experience that influence wellbeing potentially therefore includes not only the genre of the game, and total time spent playing, but also whether the game is played alone or with others. The importance of social gaming experiences is demonstrated, for example, in studies manipulating whether an opponent is perceived as human- or computer-controlled (e.g., Cairns, Cox, Day, Martin & Perryman, 2013; Johnson, Wyeth, Clark, & Watling, 2015; Ravaja, Saari, Turpeinen, Laarni, Salminen & Kivikangas, 2005). A recent study also reported differential experiences of those who primarily played video games alone compared with socially (Vella et al., 2015). Furthermore, for both alone and social players wellbeing was negatively associated with playing for more hours over the past

month, and older players in both categories reported higher wellbeing. Bridging (but not bonding) social capital was also positively associated with wellbeing for social players (Vella et al., 2015).

Rather than alone versus social play, Eklund (2015) compared covariates across different types of relationship: gaming primarily with family, friends or strangers. Across separate regression models, Eklund (2015) reported a number of discrepancies including that casual gamers played more with friends and strangers, but did not differ from more dedicated players in their likelihood of playing with family members. Playing for more time was only associated with higher odds of playing with strangers, and seeing gaming as a way to socialise was associated with higher odds of playing with friends (but not family or strangers). These findings might indicate that different types of gaming relationships are associated with distinct experiences and outcomes. However, research to date examines different relationships in discrete models, and it remains unclear whether they comprise independent characteristics of gaming that relate differently to engagement with the game or to bridging versus bonding social capital.

We are aware of only one study to have explicitly examined the effect of playing with others on social capital. Zhong (2011) modelled cross-lagged effects of collective play (a composite measures of time spent in group activities, and evaluations of those groups and their leaders) on social capital. Collective play at time one independently predicted higher online bonding and bridging four months later, indicating that enjoyable social interactions in-game are beneficial to players' virtual social networks. As noted, bridging and bonding forms of social capital are differentially related to the strength of social bonds in a network however. Zhong's (2011) composite measure of collective play did not allow such a distinction. As far as we are aware, no previous studies have modelled simultaneous effects of different relationship types (that differ in the closeness

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of social ties) on social capital.

1.4 Passion for activities

A further consideration addressed in the present study is possible mechanisms by which playing with others might lead to greater social capital. The People-Game-Play model (Johnson et al., 2013) provides a macro-level understanding of the relationships between individual differences, game characteristics and type of engagement with the game. Johnson et al. (2013) specifically propose pathways between these factors in which game and player characteristics impact wellbeing both directly, as well as indirectly via the nature of one's engagement with the game. A harmonious type of engagement may be the most important factor in determining wellbeing (Johnson et al., 2013).

The development of passion requires that a highly valued activity becomes internalised, is loved, important and meaningful, and is something in which considerable time and effort is invested (Vallerand et al., 2003). According to Vallerand et al. (2003), there are two specific types of passion, harmonious and obsessive, that arise due to differences in this internalisation process. The two types of passion reflect whether individuals feel that they want to play (i.e., harmonious), or that they have to play (i.e., obsessive) the game. Consistent with *self-determination theory* (Deci & Ryan, 2000; Ryan & Deci, 2000), harmonious passion results from an autonomous internalisation of an activity; in other words, for the sake of the activity itself, rather than due to external or uncontrollable demands. A central element of harmonious passion is that there should be no conflict between the activity and other aspects of an individual's life.

In contrast, obsessive passion leads to conflicts between the passionate activity and other aspects of life (Vallerand et al., 2003; Mageau & Vallerand, 2007), and an uncontrollable desire to engage in the passionate activity. Such persistence may lead to

improved performance in the activity (e.g., Vallerand, Salvy, & Mageau, 2007), but is also associated with negative outcomes both during and after engagement in the activity. Some studies indicate that obsessive passion may simply be unrelated to desirable outcomes including positive emotions (Vallerand et al., 2003) and satisfaction with life (Vallerand & Miquelon, 2007). However, Lafrenière, Vallerand, Donahue and Lavigne (2009) found that obsessive passion for gaming was significantly associated with both negative affect and negative physical symptoms. Furthermore, in Przybylski, Weinstein, Ryan and Rigby (2009), playing for long amounts of time was associated with negative wellbeing outcomes, but only for those experiencing gaming as an obsessive passion. Consistent with the People-Game-Play model (Johnson et al., 2013), the type of engagement (i.e., harmonious versus obsessive passion), and not the amount of play, best predicted the impact of game-play on wellbeing.

1.5 Overview and hypotheses

Drawing on the theoretical framework of the People-Game Play model (Johnson et al., 2013), Social Capital (Putnam, 2000) and Passion for Play (Vallerand et al., 2003), Tthe current study utilises survey responses and behavioral telemetry data from the video game *Destiny* to examine direct associations between time spent playing with other people on (a) bridging and bonding social capital, and (b) total time played over the duration of the study, as well as indirect associations via harmonious and obsessive passion. Survey responses were collected between May and July 2016, telemetry data was recorded between August 2014 and November 2016. Playing with others is assessed as time spent playing with three relationships types: online-only friends, real-life friends, and strangers. These constructs are operationalized to reflect different levels of relationship closeness, and are expected to be reasonably independent and readily

discernable for participants. Consistent with the People-Game-Play model (Johnson et al., 2013), we will also examine the extent to which association between playing with others and social capital (as well as time) are mediated by a harmonious versus obsessive engagement with the game. Although our approach is exploratory, with the proposed model allowing all possible direct and indirect pathways in the expected direction of effects, we do make three specific hypotheses which are outlined as follows.

1.5.1 Hypothesis 1: The positive effect of playing with others will differ according to the nature of the relationship.

Previous findings indicate that social play in video games is associated with greater bridging and bonding social capital (e.g., Zhong, 2011). However, the two components of social capital are expected to differ according to the closeness of social ties in the network concerned (Putnam, 2000). We expect that, where time spent with online-only and real-life friends should both increase experiences of bonding, only time spent with online-only friends should increase experiences of bridging. Online-only friends are expected to be a relatively more heterogenous group with highly varied levels of connectedness in their social network, compared with real-life friends; the latter should reflect networks with strong social bonds. Playing with strangers may also be associated with higher bridging, however this prediction is less certain as a network of strangers may be too disparate to positively impact social capital.

1.5.2 Hypothesis 2: Harmonious passion will mediate the effects of playing with others on increased social capital.

According to the People-Game-Play model, a harmonious type of engagement (rather than player or game characteristics) should be the most important determinant of

wellbeing (Johnson et al., 2013). We therefore predict that, in addition to the varied direct effects predicted in Hypothesis 1, playing with others will be associated with greater social capital to the extent that each predictor leads to harmonious (but not obsessive) engagement with the game.

1.5.3 Hypothesis 3: Obsessive passion will be associated with playing for a greater amount of time, but not with social capital.

Both harmonious and obsessive passion are associated with increased time allocated to the passionate activity (Vallerand et al., 2003). However, when the two types of passion are modelled simultaneously, we expect that harmonious passion will be associated with social capital and obsessive passion will be associated with more time playing, but not vice-versa. Since harmonious and obsessive passion are closely related, and harmonious passion is expected to be strongly associated with social capital, the independent component of obsessive passion should be uniquely associated with increased time spent playing.

2. Method

2.1 Participants and procedure

Participants were recruited from *Destiny*-related forums (e.g., on bungie.net and reddit.com), university student class lists, snowball sampling (beginning with individuals known by the research team to have an interest in *Destiny*), and an existing list of participants from previous relevant studies. Participants responded to forum posts, email, in-class, and social media invitations to complete a survey online. The survey was distributed via *limesurvey*; participants completed a series of demographic questions,

followed by social connectedness, passion, reward sensitivity, and BrainHex scales. Finally, they received a summary report of their responses, and answered a series of open ended questions regarding their experiences with *Destiny*. They also provided their gamertag/psn from which gameplay statistics were accessed from the public API provided by the game developer *Bungie*. In total, 3238 *Destiny* players participated; 1208 were removed from analyses due to largely uncompleted passion and social capital scales. Of the remaining 2030 participants: 1890 were male, 98 female, and 42 unreported; the mean age was 25 ($SD = 8.05$); 64.7% were based in the USA; and 55.9% considered themselves very experienced at the game (scoring 7 on a scale of 1 to 7; with a mean score of 6.5).

2.2 Measures

2.2.1 Playing with others

In the survey, participants self reported the extent to which they played *Destiny* with (a) "people I don't know (strangers)", (b) "people I know (friends, that I only spend time with playing *Destiny* or other video games)", and (c) "people I know (friends, that I also do other activities with). Responses were made on a seven-point Likert scale ranging from 1 (not at all) to 7 (all of the time).

2.2.2 Average time played per week

A value was automatically generated from each participant's in-game activity representing the number of hours they played each week. A weekly average was then calculated for each player using values from the first week to the last week they were active in the game. In other words, the play time variable used was the average hours of

play per week, across all weeks played.

2.2.3 Passion for *Destiny*

Passion was assessed with a shortened 10-item version (Wang, Khoo, Liu & Divaharan, 2008) of Vallerand et al.'s (2003) *Passion Scale*, comprised of two five-item subscales assessing harmonious and obsessive passion. Consistent with the original intent of the scale, the generic phrase "passionate activity" was replaced with "game" in each item. Items included for example, "This game is in harmony with other activities in my life" (harmonious passion) and "I have a tough time controlling my need to play this game" (obsessive passion). Responses were made on a 7-point Likert scale, ranging from 1 (do not agree) to 7 (strongly agree). Both subscales had acceptable reliability, with Cronbach's alphas of .79 and .86 for harmonious and obsessive passion, respectively.

2.2.4 Social capital

Social capital from playing *Destiny* was assessed using the full 20-item Internet Social Capital Scales (ISCS; Williams, 2006), with minor adaptations to the scale items to fit the context of the present study. The ISCS is comprised of two dimensions – bridging social capital and bonding social capital – with 10 items indexing each. Example items included, "There are several people I play with in *Destiny* that I trust to help solve my problems" (bonding social capital), and "Interacting with people in *Destiny* makes me feel like part of a larger community" (bridging social capital). Responses were made on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alphas were .91 for bonding and .90 for bridging. Item content for the passion and social capital scales is available in the supplementary material.

3. Data analysis

We estimated a structural equation model in which the three single-item relationship types directly predicted latent variables representing bonding and bridging social capital as well as the single-item time variable, both directly and indirectly via latent variables representing harmonious passion and obsessive passion. The model is presented in Figure 1, but note that residual variances and the manifest indicators of the latent variables are omitted from the diagram for ease of presentation[1]. The model was estimated in Mplus 7 using a 5000 bootstrapped resampling procedure to determine bias-corrected 99% confidence intervals for the indirect effects. Latent variables were estimated using all available observed item scores for each construct. Passion variables were estimated using five manifest item scores, and social capital variables were estimated using 10 manifest item scores each. Relationship types and time were modeled as manifest variables given that they were each assessed using only a single item. All manifest indicators loaded only on their specified latent variable and we did not allow any residual associations between these.

We allowed the model to freely estimate all pathways from each relationship type to the passion, time, and social capital variables, as well as all pathways from passion to time and social capital (as shown in Figure 1). When evaluating model fit, Hu and Bentler (1999) suggested models should generally have a standardized root mean square residual (sRMR) below .080 and a root mean square error of approximation (RMSEA) below .060. Our model provided a good fit to the observed data according to these cutoff criteria: $\chi^2(503) = 3634.041$; sRMR = .051; RMSEA = .055.

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[1] The full Mplus output is available as supplementary material and includes items loadings on the latent factors, as well as bivariate associations between those manifest indicators and with the other study variables.

4. Results

Bivariate correlations between playing with others, time, and the latent scale scores for passion and social capital are presented in Table 1. Playing with real-life friends and online-only friends were moderately positively correlated, and both were moderately negatively correlated with playing with strangers. Harmonious passion and obsessive passion were also moderately positively correlated, and bonding and bridging were strongly correlated with one another. Furthermore, playing with real-life and online-only friends were similarly associated with harmonious passion and with bonding social capital, whereas playing with online-only friends was substantially more closely associated with bridging social capital than were the other relationship types, and was the only relationship type to be associated with obsessive passion. Playing with strangers was also weakly associated with bridging, but negatively associated with bonding and unrelated to passion. Harmonious passion was positively associated with obsessive passion, bonding social capital, and (very strongly with) bridging social capital. Obsessive passion was also positively associated with bonding and bridging, but more modestly in both cases. Finally, time (as measured via in-game activity) was positively associated with obsessive passion, and bonding and bridging social capital, but not with harmonious passion. Time was also positively associated with playing with online-only friends, but was unrelated to playing with strangers or real-life friends.

INSERT TABLE 1 ABOUT HERE.

In the structural model (Figure 1), playing more with online-only friends was associated with higher harmonious and obsessive passion, as well as greater bridging and bonding. Playing with real-life friends and with strangers was associated with higher harmonious passion, but unrelated to obsessive passion. Real-life friends was positively associated with bonding, whereas strangers was positively associated with bridging (and

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negatively with bonding). Taken together, bridging social capital appears to stem from relationships characterised by stronger social ties (real-life and online-only friends), whereas bonding social capital stems from forming more disparate relationships (strangers and online-only friends). Furthermore, playing more with online-only friends was associated with more time spent playing on average, whereas playing more with real-life friends was associated with less time spent playing on average. As for the effects of passion, harmonious passion was associated with greater bonding and bridging (being particularly strongly associated with the latter) but unrelated to time, and obsessive passion was associated with greater time but unrelated to social capital.

INSERT FIGURE 1 ABOUT HERE

Indirect effects and their bias-corrected 99% confidence intervals are presented in Table 2. As indicated, playing more with other people was consistently associated with higher bonding and bridging via increased harmonious passion. Indirect effects on bonding social capital via harmonious passion were also significant, but generally weaker for all three relationship types. Obsessive passion was unrelated to either bonding or bridging social capital. Unsurprisingly, playing with others did not affect social capital indirectly via this dimension of passion. As shown in Table 2, however, the indirect association of online-only friends on average time spent playing via obsessive passion was small but significant.

INSERT TABLE 2 ABOUT HERE

5. Discussion

The findings of the present study show variable associations between playing with others and social capital that are broadly consistent with a central proposition of social capital theory (Putnam, 2000): that the two forms of social capital – bridging and bonding

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– should manifest as a function of the closeness of social ties in a given network. Furthermore, and consistent with the People-Game-Play model (Johnson et al., 2013), playing with others was indirectly associated with increased social capital by promoting a harmonious type of engagement with the game. Playing more with friends and strangers was associated with increased harmonious passion for *Destiny,* and this type of passion was strongly associated with greater bonding and bridging social capital. Obsessive passion, in contrast, was associated with increased time playing the game on average over the duration of the study, and was unrelated to social capital. Overall, these results provide further support for the notion that the social interactions that occur in (and around) online multiplayer video games are an effective way of building social capital (both bridging and bonding). Given the strong links between social capital and wellbeing (and also between social isolation and negative mental health outcomes) these findings, in turn, emphasise the wellbeing benefits of video games for many players. The findings were consistent with all three of our hypotheses, as discussed in the following sections.

5.1 Hypothesis 1: The positive effect of playing with others will differ according to the nature of the relationship.

Playing more with each of the three types of relationship – online-only friends, real-life friends and strangers – had substantial direct associations with social capital. Moreover, systematic variation in these pathways indicates that these different types of relationship relate differently to bonding versus bridging as a function of the closeness of relationship ties among players. Perhaps most notably, although playing with online-only friends was associated with greater bonding and bridging, playing with real-life friends was unrelated to bridging and playing with strangers was, in fact, associated with less bonding. These findings are consistent with the proposition that these two forms of social

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capital manifest differently as a function of the closeness of social bonds in a given network (Putnam, 2000). Players presumably have the closest bonds with real-life friends, and playing together reflects the more exclusive emotional and substantive support these relationships provide. In contrast, players likely have the weakest bonds with strangers and, while playing with strangers is constructive in promoting inclusive social connections between networks (i.e., bridging), this type of relationship may be detrimental to experiences of close emotional support (i.e., bonding). Finally, online-only relationships may be relatively heterogenous in that they constitute both close and more distal social networks.

Whereas the systematic differences in closeness of ties is inferred from our relationship categories, *social network analysis* provides a supplementary empirical method for identifying and characterising closeness in player relationships. Due to the detailed behavioral telemetry data available for *Destiny*, it is possible to build an assortment of social networks characterizing relationships between players. Recently Rattinger, Wallner, Drachen, Pirker and Sifa (2016), for example, used data from the Player-versus-Player (PvP) mode of *Destiny*, which comprises about a dozen different types of multiplayer matches, to model competitive networks in the game. A competitive network represents the ties formed between players who either played together or against each other, however network connection strengths can be based on either collaborative or competitive play. These kinds of networks can thus be used to map the closeness of ties as they manifest within a game, and potentially provides a more formal means of quantifying closeness compared with the self-reported ties used here.

We note that a similar limitation of the present study is our reliance on subjective survey data for our assessment of passion and social capital. While the scales employed are well validated and have been shown to be reliable (Vallerand et al., 2003; Wang,

Khoo, Liu & Divaharan, 2008; Williams, 2006), our plans for future research include complementing these measures with more objective measures. For example, the aforementioned social networks using in-game behavioural data regarding how often players play with the same others could be operationalized as an index of social capital (e.g, Rattinger et al., 2016).

5.2 Hypothesis 2: Harmonious passion will mediate the effects of playing with others on increased social capital.

Furthermore, and consistent with the People-Game-Play model (Johnson et al., 2013), the game characteristic we were interested in – relationships with other players – was uniformly positively associated with social capital indirectly by promoting a harmonious engagement with the game. This was true for all three relationship types, suggesting that playing more with anyone online – friends or strangers – is consistent with a harmonious passion for the game. A harmonious passion is one which is complementary to other important activities and goals in one's life (Vallerand et al., 2003). Social environments provide essential opportunities for individuals to satisfy their fundamental needs – for autonomy, competence and relatedness (Deci & Ryan, 2000), with online multiplayer games perhaps the epitome of environments for facilitating needs satisfaction (see, for example, Ducheneaut et al., 2007; Steinkuehler & Williams, 2006).

5.3 Hypothesis 3: Obsessive passion will be associated with playing for a greater amount of time, but not with social capital.

One additional indirect effect was observed in which playing with online-only friends was associated with playing for more time on average indirectly via increased obsessive passion. This is consistent with our contention that playing with online-only

friends is a relatively heterogenous category of gaming relationships, and appears to be equally likely to lead to harmonious and obsessive engagement. Those playing with real-life friends might use gaming as one shared activity (among many) with their friends, whereas those playing with strangers might be similarly using gaming as one of a large variety of social activities. In contrast, those playing with online-only friends may be using the game as a primary social activity (or one of fewer activities in total), leading them to play for longer hours.

The dual association of playing with online-only friends with both harmonious and obsessive passion may reflect a process that occurs in many communities built around a specific social activity. If many of one's closest friendships were initiated and maintained through, for example, a football club, then more time is likely to be spent doing club activities with associated positive outcomes. This same process is likely occurring in multiplayer video games – if building and maintaining close friendships is achieved through a multiplayer game then devoting further time to the game is not necessarily indicative of an obsession, and can lead to further benefit. This supports research showing that people experience social connections of equivalent or greater intimacy and value in online as offline environments (Williams, 2006), including video games (Cole & Griffiths, 2007; Granic, Lobel & Engels, 2014). In the present study, playing with online-only friends was also directly associated with increased time spent playing, suggesting that those who played more with online-only friends simply spent more time playing the game without this necessarily being due to developing an obsession for it.

Providing an alternative perspective, Juul (2006) described a recent increase in *casual* gaming as opposed to more traditionally observed *hardcore* gamers. Hardcore gamers play for long periods of time, and demand cutting edge graphics and technology.

Casual gaming, in contrast, more recently gained prominence through easily accessible social media and mobile games that required less investment of time, a shallower learning curve, and through support of other valued activities such as movement and dance via, for example, the *Nintendo Wii* (Juul, 2006). Relevant to the present findings, more hardcore players appear to be motivated by the game itself, whereas casual players value opportunities to relax and pass the time (e.g., Royse, Lee, Undrahbuyan, Hopson, & Consalvo, 2007). These latter motivations reflect a harmonious type of engagement that is integrated with other needs (relaxation and physical fitness) and with the player's broader schedule (playing in their spare time). In the present study, however, those who played more with online-only friends were more likely to experience both obsessive and harmonious passion, and indirectly spend more time playing, as well as gain both bridging and bonding social capital. We suggest that further refining this apparently heterogenous group into categories reflecting hardcore and casual (or similar) may be a useful direction for future studies.

Obsessive passion was associated with greater bonding and bridging social capital at the bivariate level. When harmonious and obsessive passion were modelled simultaneously though, obsessive passion was no longer independently associated with social capital. Obsessive passion should have a detrimental effect on social relationships being, by definition, a rigid adherence to an activity that conflicts with other life goals – including the quality of relationships (see Seguin-Levesque, Laliberte, Pelletier, Blanchard & Vallerand, 2003; Vallerand, 2010). However, this detrimental effect of obsessive passion on social relationships may be limited to those social relationships built and maintained outside the multiplayer game. It may be, that obsessive passion for the game occurs in the context of social capital (and associated positive outcomes) through the game alongside a relative dearth of social capital outside the game. However, further

research is needed to confirm this possibility. This may explain some mixed findings in the literature regarding expected negative effects of obsessive passion on relationship satisfaction (e.g., Lafrenière, Jowett, Vallerand, Donahue & Lorimer, 2008), and obsessive passion may still be associated with other negative health outcomes (Lafrenière et al., 2009; Przybylski et al., 2009).

5.4 ~~Summary and~~ Conclusion

~~In support of recent perspectives arguing for positive benefits of gaming, our findings highlight the role of establishing and maintaining social relationships with other players, as well as the type of engagement with the game that such relationships facilitate.~~ Results supported all three of our hypotheses, demonstrating (a) systematic differences across relationship types, (b) harmonious passion mediating increases in social capital, and (c) obsessive passion mediating increases in total time played. Consistent with Hypothesis 1, di~~Di~~rect effects of playing with others on social capital were ~~mixed~~varied. ~~,~~ ~~where c~~Closer social ties (real-life friends) were associated with higher bonding social capital and more distal ties (strangers) were associated with higher bridging social capital (consistent with social capital theory; Putnam, 2000). Consistent with Hypothesis 2, ~~Across all three relationship types that we examined,~~ playing with others was also consistently (i.e., across all three relationship types that we examined) positively associated with both forms social capital to the extent that engagement with the game was characterised by harmonious passion. Finally, and consistent with Hypothesis 3, obsessive passion was associated with increased time spent playing (but not with social capital). We highlight that even though only online-only relationships were associated with obsessive passion and increased time spent playing, ~~these~~ this relationship type was ~~s were~~ simultaneously associated with positive social capital outcomes in the form of both

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bridging and bonding. This should go some way toward allaying fears that gaming –

particularly playing for large amounts of time – is always associated with negative

outcomes.

      In support of recent perspectives arguing for positive benefits of gaming, our

findings highlight the role of establishing and maintaining social relationships with other

players in building social capital, as well as the type of engagement with the game that

such relationships facilitate. Overall, our study provides initial support for two

propositions from the People-Game-Play model (Johnson et al., 2013): that individual and

game characteristics impact wellbeing by affecting the type of engagement with the

game; and that a harmonious type of engagement is the most important determinant of

positive wellbeing outcomes.

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Table 1. Bivariate correlations and descriptive statistics for all variables included in the structural model.

|   |                    | 1      | 2      | 3      | 4      | 5     | 6     | 7     | 8    |
|---|--------------------|--------|--------|--------|--------|-------|-------|-------|------|
| 1 | Time               |        |        |        |        |       |       |       |      |
| 2 | Real-Life Friends  | -0.076 |        |        |        |       |       |       |      |
| 3 | Online-Only Friends| 0.253  | 0.277  |        |        |       |       |       |      |
| 4 | Strangers          | -0.049 | -0.214 | -0.248 |        |       |       |       |      |
| 5 | Harmonious Passion | 0.048  | 0.172  | 0.172  | 0.043  |       |       |       |      |
| 6 | Obsessive Passion  | 0.218  | 0.026  | 0.165  | 0.013  | 0.360 |       |       |      |
| 7 | Bonding            | 0.128  | 0.458  | 0.495  | -0.279 | 0.353 | 0.169 |       |      |
| 8 | Bridging           | 0.155  | 0.127  | 0.306  | 0.121  | 0.580 | 0.299 | 0.469 |      |
| Mean     |            | 11.92  | 3.90   | 4.47   | 3.99   | 4.73  | 2.82  | 2.79  | 3.44 |
| Variance |            | 43.29  | 4.97   | 4.21   | 3.23   | 1.45  | 2.08  | 1.05  | 0.77 |

$N = 1956$ (with pairwise deletion to remove cases with missing data).

Coefficients ≥ 0.06 are significant to $p < 0.01$

Table 2. Indirect associations of playing with other people on social capital and total time played via passion.

| Outcome | Mediator | Predictor | b | 99% Confidence Intervals Lower | Upper |
|---|---|---|---|---|---|
| Time | HP | Online | -0.011 | -0.032 | 0.008 |
| | | Real-Life | -0.006 | -0.019 | 0.005 |
| | | Strangers | -0.007 | -0.023 | 0.005 |
| | OP | Online | 0.051* | 0.030 | 0.079 |
| | | Real-Life | -0.004 | -0.020 | 0.009 |
| | | Strangers | 0.016 | -0.002 | 0.036 |
| Bonding social capital | HP | Online | 0.163* | 0.105 | 0.231 |
| | | Real-Life | 0.096* | 0.055 | 0.147 |
| | | Strangers | 0.105* | 0.053 | 0.168 |
| | OP | Online | -0.008 | -0.040 | 0.021 |
| | | Real-Life | 0.001 | -0.002 | 0.009 |
| | | Strangers | -0.003 | -0.019 | 0.006 |
| Bridging social capital | HP | Online | 0.282* | 0.187 | 0.380 |
| | | Real-Life | 0.165* | 0.096 | 0.243 |
| | | Strangers | 0.182* | 0.091 | 0.281 |
| | OP | Online | 0.002 | -0.026 | 0.028 |
| | | Real-Life | 0.000 | -0.007 | 0.003 |
| | | Strangers | 0.000 | -0.009 | 0.011 |

99% bias-corrected confidence intervals computed from 5000 bootstrapped resamples.

HP = Harmonious Passion, OP = Obsessive Passion, Online = Online-only friends, Real-life = Real-life friends.

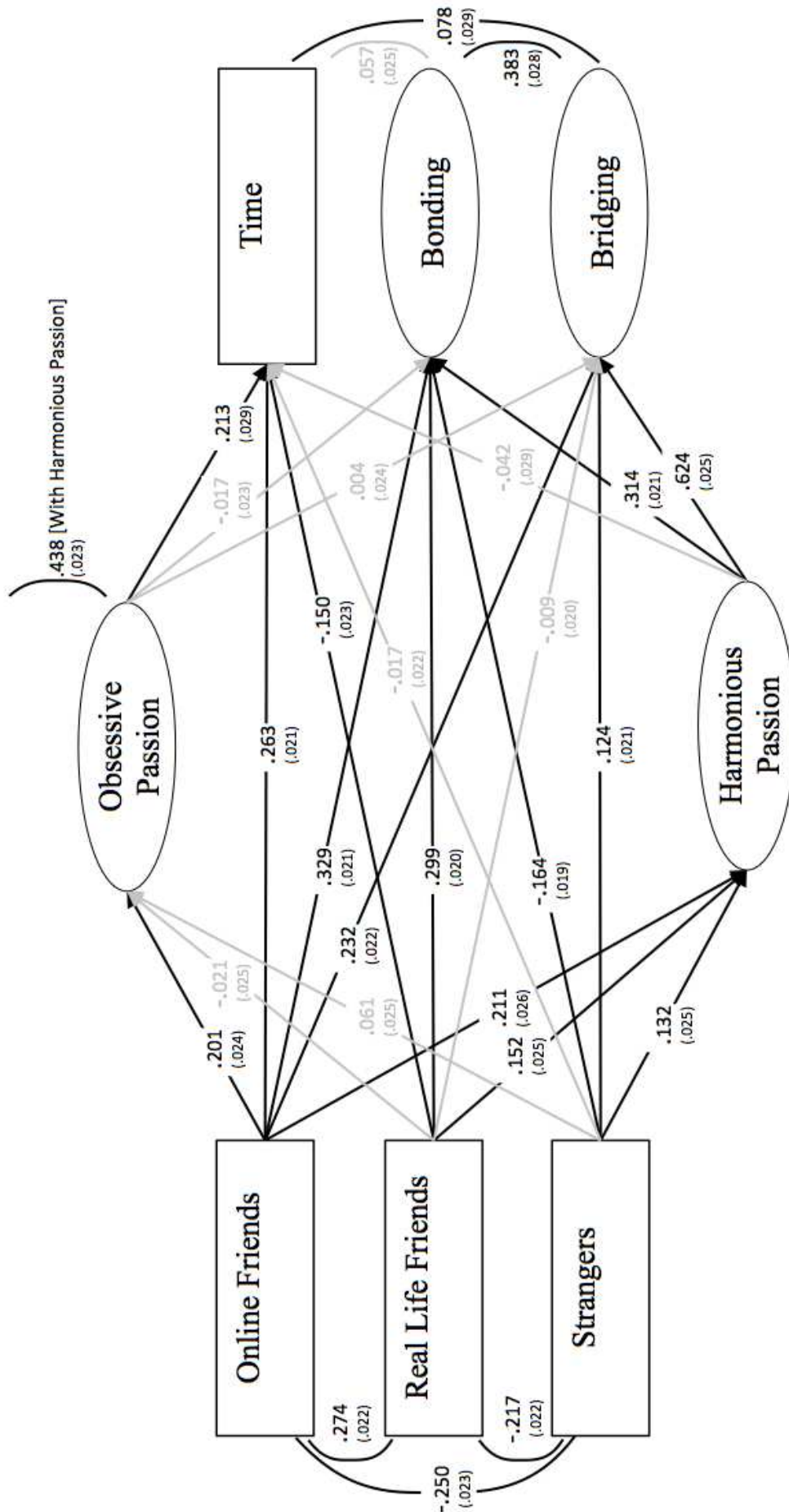* indicates a significant indirect effect ($p < .01$).

Figure 1. Structural equation model in which playing more with others (modelled as three distinct relationship types: online-only friends, real-life friends, and strangers) is indirectly associated with bonding and bridging social capital, as well as average time spent playing the game, via harmonious and obsessive passion. Standardized beta coefficients are provided with standard error values in parentheses. Pathways significant to $p < .01$ are shown in black, non-significant pathways are grey. Fit indices and indirect effects are provided in the results section, all other model information is provided in the supplementary material (Mplus output).

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Abstract

The present study tests a recently proposed model in which social video game play

supports wellbeing by contributing to a harmonious type of engagement with the game.

Players ($N = 2030$) of the online-only multiplayer first-person shooter game, *Destiny*,

reported the frequency they played with real-life friends, online-only friends and

strangers, their type of engagement with the game – measured as harmonious and

obsessive passion, and completed a wellbeing measure of social capital. Telemetry data

also recorded their total time playing over the duration of the study. A structural equation

model supported the prediction that harmonious – but not obsessive – passion would

mediate the positive association between playing with others and social capital. The

findings also supported a supplementary hypothesis that the three types of social

relationships would be differentially associated with two forms of social capital –

bridging versus bonding – as a function of the closeness of social ties. Real-life friends

was positively associated with bonding, strangers with bridging, and online-only friends

with both. Overall, these results emphasise that social interactions in (and around) online

multiplayer video games are effective for building social capital, and do so by ensuring

game play is in harmony with other goals and values.

*Keywords*: video games; passion; social capital; relationships; online; multiplayer

Online-only friends, real-life friends or strangers? Differential associations with passion and social capital in video game play.

1. Introduction

Video games provide a unique environment in which individuals can play with a very wide range of other people with scarcely any boundary including across age, sex, language or location. Moreover, the social nature of video games is an important component of positive health and wellbeing outcomes. Where previously attention has focussed on negative outcomes related, in particular, to high amounts of time spent playing (Anderson et al., 2010; Porter, Starcevic, Berle, & Fenech, 2010), other evidence suggests that players' experiences of the game, as well as elements of the in-game environment, may be critical determinants of positive versus negative outcomes (e.g., Durkin & Barber, 2002; Kaye & Bryce, 2012). Even when focussing on groups who might be more at-risk (e.g, children), the reported size of any negative impacts is very small and moreover, a number of problems with existing research suggest that even these small effect sizes might be overestimates (Ferguson, 2007, 2015; Hilgard, Engelhardt & Rouder, 2017; Przybylski, 2014). In contrast, a growing body of research provides evidence of the positive impact of video game play (Jones, Scholes, Johnson, Katsikitis & Carras, 2014).  Online multiplayer games, in particular, provide ample opportunities for building and maintaining interpersonal relationships (Cole & Griffiths, 2007; Yee, 2006). The concept of *social capital* (Putnam, 2000) captures the appeal and benefits of social networks as facilitated by games, with recent research providing evidence of building social capital through online multiplayer video game play (Domahidi, Festl, & Quandt, 2014; Trepte, Reinecke & Juechems, 2012; Vella, Johnson & Hides, 2015).

Is all social play beneficial? One consideration central to the present study is whether beneficial effects of multiplayer gaming differ according to the nature of the

relationships between players. Online video game players form new social relationships, even while also playing with offline friends and family members (Domahidi et al., 2014). A small number of studies have also begun to examine the different implications of playing with friends and family compared with strangers (e.g., Eklund, 2015). The first aim of the present study is to simultaneously examine the independent effects of three relationship types: friends that are exclusive to the in-game environment (labelled here as *online-only friends*); friends that extend to offline relationships (*real-world friends*); and those who are unknown to the player (*strangers*). These categories were developed to index distinct and easily discernable relationship types that differ as a function of the strength of social ties. Social networks characterised by strong versus weak social ties are expected to produce different forms of social capital (Putnam, 2000).

Although the link between social gaming and positive wellbeing outcomes is reasonably well established, less explored are possible mechanisms of this process. Johnson, Wyeth and Sweetser (2013) proposed a *People-Game-Play* model in which the type of engagement with a game mediates associations of player and game characteristics with wellbeing outcomes. These authors identified *harmonious passion* as perhaps the most important such determinant of positive wellbeing. Vallerand et al.'s (2003) *Dualistic Model of Passion* (DMP) seeks to describe individuals' experiences of activities that they are highly invested in as either congruent with other needs and goals in their life (i.e., harmonious passion), or in conflict with these needs and goals (*obsessive passion*). In a recent series of studies exploring need satisfaction in non-video game settings, for example, harmonious – but not obsessive – passion mediated the effect of needs satisfaction on various indicators of wellbeing (Lalande et al., 2015). The second aim of the present study is therefore to utilise the theoretical framework provided by the People-Game-Play model (Johnson et al., 2013) to examine whether harmonious passion for the

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game *Destiny* mediates associations between playing with other people and greater wellbeing.

1.1 Destiny gameplay

*Destiny* is an online-only multiplayer first-person shooter game in which players share the same persistent virtual world, and compete and cooperate with other human players in a variety of settings. However, communication with other players is more limited than with traditional massively multiplayer online game (MMOG) designs. *Destiny* features team-based combat within a variety of environments. Gameplay is focused on collecting weapons (and other equipment) to combat both human and computer controlled opponents. *Destiny* features both single-player and multiplayer game modes, as well as both Player-vs-Environment (PvE) and Player-vs-Player (PvP) combat. PvE mode includes story-based missions that can be played either solo or in teams of three, which include public events, raids and strikes on computer controlled enemies, or other teams of human players. PvP mode includes a variety of more traditional deathmatch style games where teams of three or six human players battle in an arena with objectives including eliminating every member of the other team, or capture the flag.

1.2 Video games and social capital

Both online and off, social interaction and support are essential for positive mental health and wellbeing (Kawachi & Berkman, 2001), with stronger social ties associated with reducing negative health outcomes ranging from depression to alcoholism (e.g., Peirce, Frone, Russell, Cooper & Mudar, 2000). A recent meta-analysis encompassing over three million participants reported that those who live alone or feel socially isolated have around a 30% increased risk of mortality (Holt-Lunstad, Smith, Baker, Harris &

Stephenson, 2015). Although the direction of effects between chronic disease and loneliness is not directly discernable across this research, classic ostracism experiments support the contention that social isolation and rejection is profoundly disagreeable and can result in negative heath (Williams & Zadro, 2012). Baumeister and Leary (1995) argued that isolation and rejection are harmful because such experiences thwart our fundamental need to belong.

One area of research into the health outcomes of loneliness that has garnered considerable attention examines the impact of internet use on social isolation in older populations. In one cross-sectional study, going online more often was associated with decreased loneliness, and improved quality of communication with others, as reported by participants (Cotten, Anderson, & McCullough, 2013). Furthermore, a program aimed at training older people to use social media reported a positive overall impact on mental health and physical wellbeing due to feeling less isolated (Mortan & Genova, 2014). An important caveat to these findings however, is that negative and positive outcomes from internet use can depend on a number of factors including the purpose of internet use, contextual factors and individual characteristics (Shen & Williams, 2011; Primack et al., 2017).

Social capital (Putnam, 2000), is a construct that formalises the value of social ties, framing social networks as resources that are important and useful to individuals and organisations. Like economic capital, it is also understood that an investment of social capital produces more capital; if social connections are nurtured, they will provide value in return in the form of support and the sharing of information. Putnam (2000) suggested the value of social networks is driven by norms of reciprocity in which maintaining connections is valuable because they are expected to provide reciprocal benefits. This cyclical process indicates that social capital may be either a determinant of outcomes like

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wellbeing, or an outcome in itself (Williams, 2006). Putnam (2000) developed social capital as a construct to examine a perceived decline in American social and civic engagement as people spend more time in isolating activities like watching television. As other scholars (Ducheneaut, Moore, & Nickell, 2007; Steinkuehler & Williams, 2006) have argued however, online multiplayer video games may be an exception among such isolating activities, providing virtual public spaces that allow people to socialise and develop networks, thus supporting the formation and maintenance of social capital.

Among the growing body of wellbeing and video games research, a small number of studies have reported an association between social experiences of online gaming and social capital (Domahidi et al., 2014; Trepte et al., 2012; Vella et al., 2015; Zhong, 2011). The objectives of online multiplayer games facilitate collaboration and interdependent social relationships among players, processes which should function to establish and maintain social networks (Putnam, 2000). Williams (2006) developed the *Internet Social Capital Scales* (ISCS) to assess social capital specifically among internet users online. The ISCS is readily adaptable to the context of online multiplayer gaming, and previous studies have used it in this way (e.g., Trepte et al., 2012; Zhong, 2011). Zhong (2011), for example, reported that collective play in a massively multiplayer online role-playing game (MMORPG) was longitudinally associated with increased online social capital independently of existing levels of social capital.

The ISCS was developed to capture two relatively independent domains of social capital that Putnam (2000) originally labelled *bridging* and *bonding*. According to Putnam (2000), bonding occurs when support is provided among individuals with strong social ties, such as families or close friends. Bonding is considered exclusive in that support provided by the network promotes insularity and outgroup antagonism (Putnam, 2000). Bridging, in contrast, occurs when individuals from diverse backgrounds and with

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more distal relationships form connections with one another. Research comparing online and offline social networks, for example, has identified that online networks tend to exhibit weaker social ties, and are characterised by specialized relationships (Williams, 2006). Compared with offline networks, online relationships are also more homogeneous in that they are premised on a more limited range of common interest (Katz, Rice, Acord, Dasgupta & David, 2004; Wellman & Gulia, 1999). Putnam (2000) described bridging social capital as inclusive, in that these social connections bring individuals and groups closer, and facilitate the sharing of information and resources. Compared with bonding however, bridging provides weak emotional support (Putnam, 2000). Bridging and bonding are expected to differ in their relevance across relationship types as a function of the strength of those relationships.

1.3 Multiplayer relationship types

The impact of internet use (and, by extension, online multiplayer gaming) on health and wellbeing is dependent on both individual and contextual factors (Shen & Williams, 2011; Primack et al., 2017). Key factors of the gaming experience that influence wellbeing potentially therefore includes not only the genre of the game, and total time spent playing, but also whether the game is played alone or with others. The importance of social gaming experiences is demonstrated, for example, in studies manipulating whether an opponent is perceived as human- or computer-controlled (e.g., Cairns, Cox, Day, Martin & Perryman, 2013; Johnson, Wyeth, Clark, & Watling, 2015; Ravaja, Saari, Turpeinen, Laarni, Salminen & Kivikangas, 2005). A recent study also reported differential experiences of those who primarily played video games alone compared with socially (Vella et al., 2015). Furthermore, for both alone and social players wellbeing was negatively associated with playing for more hours over the past

month, and older players in both categories reported higher wellbeing. Bridging (but not

bonding) social capital was also positively associated with wellbeing for social players

(Vella et al., 2015).

Rather than alone versus social play, Eklund (2015) compared covariates across

different types of relationship: gaming primarily with family, friends or strangers. Across

separate regression models, Eklund (2015) reported a number of discrepancies including

that casual gamers played more with friends and strangers, but did not differ from more

dedicated players in their likelihood of playing with family members. Playing for more

time was only associated with higher odds of playing with strangers, and seeing gaming

as a way to socialise was associated with higher odds of playing with friends (but not

family or strangers). These findings might indicate that different types of gaming

relationships are associated with distinct experiences and outcomes. However, research to

date examines different relationships in discrete models, and it remains unclear whether

they comprise independent characteristics of gaming that relate differently to engagement

with the game or to bridging versus bonding social capital.

We are aware of only one study to have explicitly examined the effect of playing

with others on social capital. Zhong (2011) modelled cross-lagged effects of collective

play (a composite measures of time spent in group activities, and evaluations of those

groups and their leaders) on social capital. Collective play at time one independently

predicted higher online bonding and bridging four months later, indicating that enjoyable

social interactions in-game are beneficial to players' virtual social networks. As noted,

bridging and bonding forms of social capital are differentially related to the strength of

social bonds in a network however. Zhong's (2011) composite measure of collective play

did not allow such a distinction. As far as we are aware, no previous studies have

modelled simultaneous effects of different relationship types (that differ in the closeness

of social ties) on social capital.

1.4 Passion for activities

A further consideration addressed in the present study is possible mechanisms by which playing with others might lead to greater social capital. The People-Game-Play model (Johnson et al., 2013) provides a macro-level understanding of the relationships between individual differences, game characteristics and type of engagement with the game. Johnson et al. (2013) specifically propose pathways between these factors in which game and player characteristics impact wellbeing both directly, as well as indirectly via the nature of one's engagement with the game. A harmonious type of engagement may be the most important factor in determining wellbeing (Johnson et al., 2013).

The development of passion requires that a highly valued activity becomes internalised, is loved, important and meaningful, and is something in which considerable time and effort is invested (Vallerand et al., 2003). According to Vallerand et al. (2003), there are two specific types of passion, harmonious and obsessive, that arise due to differences in this internalisation process. The two types of passion reflect whether individuals feel that they want to play (i.e., harmonious), or that they have to play (i.e., obsessive) the game. Consistent with *self-determination theory* (Deci & Ryan, 2000; Ryan & Deci, 2000), harmonious passion results from an autonomous internalisation of an activity; in other words, for the sake of the activity itself, rather than due to external or uncontrollable demands. A central element of harmonious passion is that there should be no conflict between the activity and other aspects of an individual's life.

In contrast, obsessive passion leads to conflicts between the passionate activity and other aspects of life (Vallerand et al., 2003; Mageau & Vallerand, 2007), and an uncontrollable desire to engage in the passionate activity. Such persistence may lead to

improved performance in the activity (e.g., Vallerand, Salvy, & Mageau, 2007), but is also associated with negative outcomes both during and after engagement in the activity. Some studies indicate that obsessive passion may simply be unrelated to desirable outcomes including positive emotions (Vallerand et al., 2003) and satisfaction with life (Vallerand & Miquelon, 2007). However, Lafrenière, Vallerand, Donahue and Lavigne (2009) found that obsessive passion for gaming was significantly associated with both negative affect and negative physical symptoms. Furthermore, in Przybylski, Weinstein, Ryan and Rigby (2009), playing for long amounts of time was associated with negative wellbeing outcomes, but only for those experiencing gaming as an obsessive passion. Consistent with the People-Game-Play model (Johnson et al., 2013), the type of engagement (i.e., harmonious versus obsessive passion), and not the amount of play, best predicted the impact of game-play on wellbeing.

1.5 Overview and hypotheses

Drawing on the theoretical framework of the People-Game Play model (Johnson et al., 2013), Social Capital (Putnam, 2000) and Passion for Play (Vallerand et al., 2003), the current study utilises survey responses and behavioral telemetry data from the video game *Destiny* to examine direct associations between time spent playing with other people on (a) bridging and bonding social capital, and (b) total time played over the duration of the study, as well as indirect associations via harmonious and obsessive passion. Survey responses were collected between May and July 2016, telemetry data was recorded between August 2014 and November 2016. Playing with others is assessed as time spent playing with three relationships types: online-only friends, real-life friends, and strangers. These constructs are operationalized to reflect different levels of relationship closeness, and are expected to be reasonably independent and readily

discernable for participants. Consistent with the People-Game-Play model (Johnson et al., 2013), we will also examine the extent to which association between playing with others and social capital (as well as time) are mediated by a harmonious versus obsessive engagement with the game. Although our approach is exploratory, with the proposed model allowing all possible direct and indirect pathways in the expected direction of effects, we do make three specific hypotheses which are outlined as follows.

1.5.1 Hypothesis 1: The positive effect of playing with others will differ according to the nature of the relationship.

Previous findings indicate that social play in video games is associated with greater bridging and bonding social capital (e.g., Zhong, 2011). However, the two components of social capital are expected to differ according to the closeness of social ties in the network concerned (Putnam, 2000). We expect that, where time spent with online-only and real-life friends should both increase experiences of bonding, only time spent with online-only friends should increase experiences of bridging. Online-only friends are expected to be a relatively more heterogenous group with highly varied levels of connectedness in their social network, compared with real-life friends; the latter should reflect networks with strong social bonds. Playing with strangers may also be associated with higher bridging, however this prediction is less certain as a network of strangers may be too disparate to positively impact social capital.

1.5.2 Hypothesis 2: Harmonious passion will mediate the effects of playing with others on increased social capital.

According to the People-Game-Play model, a harmonious type of engagement (rather than player or game characteristics) should be the most important determinant of

wellbeing (Johnson et al., 2013). We therefore predict that, in addition to the varied direct effects predicted in Hypothesis 1, playing with others will be associated with greater social capital to the extent that each predictor leads to harmonious (but not obsessive) engagement with the game.

1.5.3 Hypothesis 3: Obsessive passion will be associated with playing for a greater amount of time, but not with social capital.

Both harmonious and obsessive passion are associated with increased time allocated to the passionate activity (Vallerand et al., 2003). However, when the two types of passion are modelled simultaneously, we expect that harmonious passion will be associated with social capital and obsessive passion will be associated with more time playing, but not vice-versa. Since harmonious and obsessive passion are closely related, and harmonious passion is expected to be strongly associated with social capital, the independent component of obsessive passion should be uniquely associated with increased time spent playing.

2. Method

2.1 Participants and procedure

Participants were recruited from *Destiny*-related forums (e.g., on bungie.net and reddit.com), university student class lists, snowball sampling (beginning with individuals known by the research team to have an interest in *Destiny*), and an existing list of participants from previous relevant studies. Participants responded to forum posts, email, in-class, and social media invitations to complete a survey online. The survey was distributed via *limesurvey*; participants completed a series of demographic questions,

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followed by social connectedness, passion, reward sensitivity, and BrainHex scales. Finally, they received a summary report of their responses, and answered a series of open ended questions regarding their experiences with *Destiny*. They also provided their gamertag/psn from which gameplay statistics were accessed from the public API provided by the game developer *Bungie*. In total, 3238 *Destiny* players participated; 1208 were removed from analyses due to largely uncompleted passion and social capital scales. Of the remaining 2030 participants: 1890 were male, 98 female, and 42 unreported; the mean age was 25 (*SD* = 8.05); 64.7% were based in the USA; and 55.9% considered themselves very experienced at the game (scoring 7 on a scale of 1 to 7; with a mean score of 6.5).

2.2 Measures

2.2.1 Playing with others

In the survey, participants self reported the extent to which they played *Destiny* with (a) "people I don't know (strangers)", (b) "people I know (friends, that I only spend time with playing *Destiny* or other video games)", and (c) "people I know (friends, that I also do other activities with). Responses were made on a seven-point Likert scale ranging from 1 (not at all) to 7 (all of the time).

2.2.2 Average time played per week

A value was automatically generated from each participant's in-game activity representing the number of hours they played each week. A weekly average was then calculated for each player using values from the first week to the last week they were active in the game. In other words, the play time variable used was the average hours of

play per week, across all weeks played.

### 2.2.3 Passion for *Destiny*

Passion was assessed with a shortened 10-item version (Wang, Khoo, Liu & Divaharan, 2008) of Vallerand et al.'s (2003) *Passion Scale*, comprised of two five-item subscales assessing harmonious and obsessive passion. Consistent with the original intent of the scale, the generic phrase "passionate activity" was replaced with "game" in each item. Items included for example, "This game is in harmony with other activities in my life" (harmonious passion) and "I have a tough time controlling my need to play this game" (obsessive passion). Responses were made on a 7-point Likert scale, ranging from 1 (do not agree) to 7 (strongly agree). Both subscales had acceptable reliability, with Cronbach's alphas of .79 and .86 for harmonious and obsessive passion, respectively.

### 2.2.4 Social capital

Social capital from playing *Destiny* was assessed using the full 20-item Internet Social Capital Scales (ISCS; Williams, 2006), with minor adaptations to the scale items to fit the context of the present study. The ISCS is comprised of two dimensions – bridging social capital and bonding social capital – with 10 items indexing each. Example items included, "There are several people I play with in *Destiny* that I trust to help solve my problems" (bonding social capital), and "Interacting with people in *Destiny* makes me feel like part of a larger community" (bridging social capital). Responses were made on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alphas were .91 for bonding and .90 for bridging. Item content for the passion and social capital scales is available in the supplementary material.

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3. Data analysis

We estimated a structural equation model in which the three single-item relationship types directly predicted latent variables representing bonding and bridging social capital as well as the single-item time variable, both directly and indirectly via latent variables representing harmonious passion and obsessive passion. The model is presented in Figure 1, but note that residual variances and the manifest indicators of the latent variables are omitted from the diagram for ease of presentation[1]. The model was estimated in Mplus 7 using a 5000 bootstrapped resampling procedure to determine bias-corrected 99% confidence intervals for the indirect effects. Latent variables were estimated using all available observed item scores for each construct. Passion variables were estimated using five manifest item scores, and social capital variables were estimated using 10 manifest item scores each. Relationship types and time were modeled as manifest variables given that they were each assessed using only a single item. All manifest indicators loaded only on their specified latent variable and we did not allow any residual associations between these.

We allowed the model to freely estimate all pathways from each relationship type to the passion, time, and social capital variables, as well as all pathways from passion to time and social capital (as shown in Figure 1). When evaluating model fit, Hu and Bentler (1999) suggested models should generally have a standardized root mean square residual (sRMR) below .080 and a root mean square error of approximation (RMSEA) below .060. Our model provided a good fit to the observed data according to these cutoff criteria: $\chi^2(503) = 3634.041$; sRMR = .051; RMSEA = .055.

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[1] The full Mplus output is available as supplementary material and includes items loadings on the latent factors, as well as bivariate associations between those manifest indicators and with the other study variables.

4. Results

Bivariate correlations between playing with others, time, and the latent scale scores for passion and social capital are presented in Table 1. Playing with real-life friends and online-only friends were moderately positively correlated, and both were moderately negatively correlated with playing with strangers. Harmonious passion and obsessive passion were also moderately positively correlated, and bonding and bridging were strongly correlated with one another. Furthermore, playing with real-life and online-only friends were similarly associated with harmonious passion and with bonding social capital, whereas playing with online-only friends was substantially more closely associated with bridging social capital than were the other relationship types, and was the only relationship type to be associated with obsessive passion. Playing with strangers was also weakly associated with bridging, but negatively associated with bonding and unrelated to passion. Harmonious passion was positively associated with obsessive passion, bonding social capital, and (very strongly with) bridging social capital. Obsessive passion was also positively associated with bonding and bridging, but more modestly in both cases. Finally, time (as measured via in-game activity) was positively associated with obsessive passion, and bonding and bridging social capital, but not with harmonious passion. Time was also positively associated with playing with online-only friends, but was unrelated to playing with strangers or real-life friends.

INSERT TABLE 1 ABOUT HERE.

In the structural model (Figure 1), playing more with online-only friends was associated with higher harmonious and obsessive passion, as well as greater bridging and bonding. Playing with real-life friends and with strangers was associated with higher harmonious passion, but unrelated to obsessive passion. Real-life friends was positively associated with bonding, whereas strangers was positively associated with bridging (and

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negatively with bonding). Taken together, bridging social capital appears to stem from relationships characterised by stronger social ties (real-life and online-only friends), whereas bonding social capital stems from forming more disparate relationships (strangers and online-only friends). Furthermore, playing more with online-only friends was associated with more time spent playing on average, whereas playing more with real-life friends was associated with less time spent playing on average. As for the effects of passion, harmonious passion was associated with greater bonding and bridging (being particularly strongly associated with the latter) but unrelated to time, and obsessive passion was associated with greater time but unrelated to social capital.

INSERT FIGURE 1 ABOUT HERE

Indirect effects and their bias-corrected 99% confidence intervals are presented in Table 2. As indicated, playing more with other people was consistently associated with higher bonding and bridging via increased harmonious passion. Indirect effects on bonding social capital via harmonious passion were also significant, but generally weaker for all three relationship types. Obsessive passion was unrelated to either bonding or bridging social capital. Unsurprisingly, playing with others did not affect social capital indirectly via this dimension of passion. As shown in Table 2, however, the indirect association of online-only friends on average time spent playing via obsessive passion was small but significant.

INSERT TABLE 2 ABOUT HERE


5. Discussion

The findings of the present study show variable associations between playing with others and social capital that are broadly consistent with a central proposition of social capital theory (Putnam, 2000): that the two forms of social capital – bridging and bonding

– should manifest as a function of the closeness of social ties in a given network. Furthermore, and consistent with the People-Game-Play model (Johnson et al., 2013), playing with others was indirectly associated with increased social capital by promoting a harmonious type of engagement with the game. Playing more with friends and strangers was associated with increased harmonious passion for *Destiny,* and this type of passion was strongly associated with greater bonding and bridging social capital. Obsessive passion, in contrast, was associated with increased time playing the game on average over the duration of the study, and was unrelated to social capital. Overall, these results provide further support for the notion that the social interactions that occur in (and around) online multiplayer video games are an effective way of building social capital (both bridging and bonding). Given the strong links between social capital and wellbeing (and also between social isolation and negative mental health outcomes) these findings, in turn, emphasise the wellbeing benefits of video games for many players. The findings were consistent with all three of our hypotheses, as discussed in the following sections.

5.1 Hypothesis 1: The positive effect of playing with others will differ according to the nature of the relationship.

Playing more with each of the three types of relationship – online-only friends, real-life friends and strangers – had substantial direct associations with social capital. Moreover, systematic variation in these pathways indicates that these different types of relationship relate differently to bonding versus bridging as a function of the closeness of relationship ties among players. Perhaps most notably, although playing with online-only friends was associated with greater bonding and bridging, playing with real-life friends was unrelated to bridging and playing with strangers was, in fact, associated with less bonding. These findings are consistent with the proposition that these two forms of social

capital manifest differently as a function of the closeness of social bonds in a given

network (Putnam, 2000). Players presumably have the closest bonds with real-life friends,

and playing together reflects the more exclusive emotional and substantive support these

relationships provide. In contrast, players likely have the weakest bonds with strangers

and, while playing with strangers is constructive in promoting inclusive social

connections between networks (i.e., bridging), this type of relationship may be

detrimental to experiences of close emotional support (i.e., bonding). Finally, online-only

relationships may be relatively heterogenous in that they constitute both close and more

distal social networks.

Whereas the systematic differences in closeness of ties is inferred from our

relationship categories, *social network analysis* provides a supplementary empirical

method for identifying and characterising closeness in player relationships. Due to the

detailed behavioral telemetry data available for *Destiny*, it is possible to build an

assortment of social networks characterizing relationships between players. Recently

Rattinger, Wallner, Drachen, Pirker and Sifa (2016), for example, used data from the

Player-versus-Player (PvP) mode of *Destiny*, which comprises about a dozen different

types of multiplayer matches, to model competitive networks in the game. A competitive

network represents the ties formed between players who either played together or against

each other, however network connection strengths can be based on either collaborative or

competitive play. These kinds of networks can thus be used to map the closeness of ties

as they manifest within a game, and potentially provides a more formal means of

quantifying closeness compared with the self-reported ties used here.

We note that a similar limitation of the present study is our reliance on subjective

survey data for our assessment of passion and social capital. While the scales employed

are well validated and have been shown to be reliable (Vallerand et al., 2003; Wang,

Khoo, Liu & Divaharan, 2008; Williams, 2006), our plans for future research include complementing these measures with more objective measures. For example, the aforementioned social networks using in-game behavioural data regarding how often players play with the same others could be operationalized as an index of social capital (e.g, Rattinger et al., 2016).

5.2 Hypothesis 2: Harmonious passion will mediate the effects of playing with others on increased social capital.

Furthermore, and consistent with the People-Game-Play model (Johnson et al., 2013), the game characteristic we were interested in – relationships with other players – was uniformly positively associated with social capital indirectly by promoting a harmonious engagement with the game. This was true for all three relationship types, suggesting that playing more with anyone online – friends or strangers – is consistent with a harmonious passion for the game. A harmonious passion is one which is complementary to other important activities and goals in one's life (Vallerand et al., 2003). Social environments provide essential opportunities for individuals to satisfy their fundamental needs – for autonomy, competence and relatedness (Deci & Ryan, 2000), with online multiplayer games perhaps the epitome of environments for facilitating needs satisfaction (see, for example, Ducheneaut et al., 2007; Steinkuehler & Williams, 2006).

5.3 Hypothesis 3: Obsessive passion will be associated with playing for a greater amount of time, but not with social capital.

One additional indirect effect was observed in which playing with online-only friends was associated with playing for more time on average indirectly via increased obsessive passion. This is consistent with our contention that playing with online-only

friends is a relatively heterogenous category of gaming relationships, and appears to be equally likely to lead to harmonious and obsessive engagement. Those playing with real-life friends might use gaming as one shared activity (among many) with their friends, whereas those playing with strangers might be similarly using gaming as one of a large variety of social activities. In contrast, those playing with online-only friends may be using the game as a primary social activity (or one of fewer activities in total), leading them to play for longer hours.

The dual association of playing with online-only friends with both harmonious and obsessive passion may reflect a process that occurs in many communities built around a specific social activity. If many of one's closest friendships were initiated and maintained through, for example, a football club, then more time is likely to be spent doing club activities with associated positive outcomes. This same process is likely occurring in multiplayer video games – if building and maintaining close friendships is achieved through a multiplayer game then devoting further time to the game is not necessarily indicative of an obsession, and can lead to further benefit. This supports research showing that people experience social connections of equivalent or greater intimacy and value in online as offline environments (Williams, 2006), including video games (Cole & Griffiths, 2007; Granic, Lobel & Engels, 2014). In the present study, playing with online-only friends was also directly associated with increased time spent playing, suggesting that those who played more with online-only friends simply spent more time playing the game without this necessarily being due to developing an obsession for it.

Providing an alternative perspective, Juul (2006) described a recent increase in *casual* gaming as opposed to more traditionally observed *hardcore* gamers. Hardcore gamers play for long periods of time, and demand cutting edge graphics and technology.

Casual gaming, in contrast, more recently gained prominence through easily accessible social media and mobile games that required less investment of time, a shallower learning curve, and through support of other valued activities such as movement and dance via, for example, the *Nintendo Wii* (Juul, 2006). Relevant to the present findings, more hardcore players appear to be motivated by the game itself, whereas casual players value opportunities to relax and pass the time (e.g., Royse, Lee, Undrahbuyan, Hopson, & Consalvo, 2007). These latter motivations reflect a harmonious type of engagement that is integrated with other needs (relaxation and physical fitness) and with the player's broader schedule (playing in their spare time). In the present study, however, those who played more with online-only friends were more likely to experience both obsessive and harmonious passion, and indirectly spend more time playing, as well as gain both bridging and bonding social capital. We suggest that further refining this apparently heterogenous group into categories reflecting hardcore and casual (or similar) may be a useful direction for future studies.

Obsessive passion was associated with greater bonding and bridging social capital at the bivariate level. When harmonious and obsessive passion were modelled simultaneously though, obsessive passion was no longer independently associated with social capital. Obsessive passion should have a detrimental effect on social relationships being, by definition, a rigid adherence to an activity that conflicts with other life goals – including the quality of relationships (see Seguin-Levesque, Laliberte, Pelletier, Blanchard & Vallerand, 2003; Vallerand, 2010). However, this detrimental effect of obsessive passion on social relationships may be limited to those social relationships built and maintained outside the multiplayer game. It may be, that obsessive passion for the game occurs in the context of social capital (and associated positive outcomes) through the game alongside a relative dearth of social capital outside the game. However, further

research is needed to confirm this possibility. This may explain some mixed findings in the literature regarding expected negative effects of obsessive passion on relationship satisfaction (e.g., Lafrenière, Jowett, Vallerand, Donahue & Lorimer, 2008), and obsessive passion may still be associated with other negative health outcomes (Lafrenière et al., 2009; Przybylski et al., 2009).

5.4 Summary and Conclusion

Results supported all three of our hypotheses, demonstrating (a) systematic differences across relationship types, (b) harmonious passion mediating increases in social capital, and (c) obsessive passion mediating increases in total time played. Consistent with Hypothesis 1, direct effects of playing with others on social capital were varied. Closer social ties (real-life friends) were associated with higher bonding social capital and more distal ties (strangers) were associated with higher bridging social capital (consistent with social capital theory; Putnam, 2000). Consistent with Hypothesis 2, playing with others was also consistently (i.e., across all three relationship types that we examined) positively associated with both forms social capital to the extent that engagement with the game was characterised by harmonious passion. Finally, and consistent with Hypothesis 3, obsessive passion was associated with increased time spent playing (but not with social capital). We highlight that even though only online-only relationships were associated with obsessive passion and increased time spent playing, this relationship type was simultaneously associated with positive social capital outcomes in the form of both bridging and bonding. This should go some way toward allaying fears that gaming – particularly playing for large amounts of time – is always associated with negative outcomes.

In support of recent perspectives arguing for positive benefits of gaming, our

findings highlight the role of establishing and maintaining social relationships with other players in building social capital, as well as the type of engagement with the game that such relationships facilitate. Overall, our study provides initial support for two propositions from the People-Game-Play model (Johnson et al., 2013): that individual and game characteristics impact wellbeing by affecting the type of engagement with the game; and that a harmonious type of engagement is the most important determinant of positive wellbeing outcomes.

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Table 1. Bivariate correlations and descriptive statistics for all variables included in the structural model.

|   |                    | 1      | 2      | 3      | 4      | 5     | 6     | 7     | 8    |
|---|--------------------|--------|--------|--------|--------|-------|-------|-------|------|
| 1 | Time               |        |        |        |        |       |       |       |      |
| 2 | Real-Life Friends  | -0.076 |        |        |        |       |       |       |      |
| 3 | Online-Only Friends| 0.253  | 0.277  |        |        |       |       |       |      |
| 4 | Strangers          | -0.049 | -0.214 | -0.248 |        |       |       |       |      |
| 5 | Harmonious Passion | 0.048  | 0.172  | 0.172  | 0.043  |       |       |       |      |
| 6 | Obsessive Passion  | 0.218  | 0.026  | 0.165  | 0.013  | 0.360 |       |       |      |
| 7 | Bonding            | 0.128  | 0.458  | 0.495  | -0.279 | 0.353 | 0.169 |       |      |
| 8 | Bridging           | 0.155  | 0.127  | 0.306  | 0.121  | 0.580 | 0.299 | 0.469 |      |
| Mean     | | 11.92 | 3.90 | 4.47 | 3.99 | 4.73 | 2.82 | 2.79 | 3.44 |
| Variance | | 43.29 | 4.97 | 4.21 | 3.23 | 1.45 | 2.08 | 1.05 | 0.77 |

$N = 1956$ (with pairwise deletion to remove cases with missing data).

Coefficients ≥ 0.06 are significant to $p < 0.01$

Table 2. Indirect associations of playing with other people on social capital and total time played via passion.

| Outcome | Mediator | Predictor | b | 99% Confidence Intervals Lower | Upper |
|---------|----------|-----------|------|--------|--------|
| Time | HP | Online | -0.011 | -0.032 | 0.008 |
| | | Real-Life | -0.006 | -0.019 | 0.005 |
| | | Strangers | -0.007 | -0.023 | 0.005 |
| | OP | Online | 0.051* | 0.030 | 0.079 |
| | | Real-Life | -0.004 | -0.020 | 0.009 |
| | | Strangers | 0.016 | -0.002 | 0.036 |
| Bonding social capital | HP | Online | 0.163* | 0.105 | 0.231 |
| | | Real-Life | 0.096* | 0.055 | 0.147 |
| | | Strangers | 0.105* | 0.053 | 0.168 |
| | OP | Online | -0.008 | -0.040 | 0.021 |
| | | Real-Life | 0.001 | -0.002 | 0.009 |
| | | Strangers | -0.003 | -0.019 | 0.006 |
| Bridging social capital | HP | Online | 0.282* | 0.187 | 0.380 |
| | | Real-Life | 0.165* | 0.096 | 0.243 |
| | | Strangers | 0.182* | 0.091 | 0.281 |
| | OP | Online | 0.002 | -0.026 | 0.028 |
| | | Real-Life | 0.000 | -0.007 | 0.003 |
| | | Strangers | 0.000 | -0.009 | 0.011 |

99% bias-corrected confidence intervals computed from 5000 bootstrapped resamples.

HP = Harmonious Passion, OP = Obsessive Passion, Online = Online-only friends, Real-life = Real-life friends.
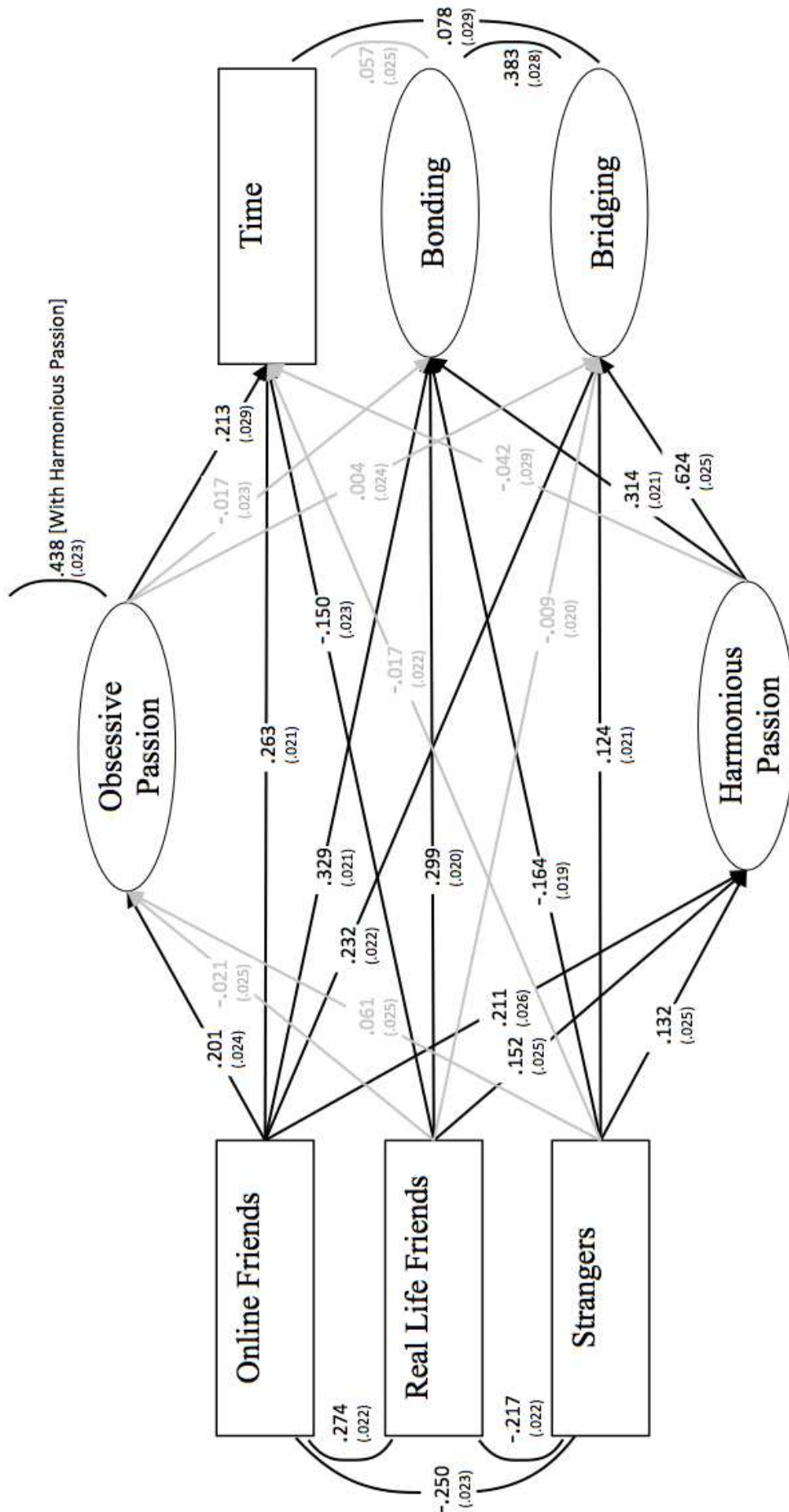
* indicates a significant indirect effect ($p < .01$).

Figure 1. Structural equation model in which playing more with others (modelled as three distinct relationship types: online-only friends, real-life friends, and strangers) is indirectly associated with bonding and bridging social capital, as well as average time spent playing the game, via harmonious and obsessive passion. Standardized beta coefficients are provided with standard error values in parentheses. Pathways significant to $p < .01$ are shown in black, non-significant pathways are grey. Fit indices and indirect effects are provided in the results section, all other model information is provided in the supplementary material (Mplus output).

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**Supplementary Material (for online Publication)**