THE SOCIAL CONTEXT OF VIDEO GAME PLAY: RELATIONSHIPS WITH THE PLAYER EXPERIENCE AND WELLBEING

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Abstract

Video game play is becoming one of the most popular forms of entertainment in the Western world, with broad reach and appeal. The ability of video games to facilitate both social and solitary play partially explains the popularity of this form of entertainment—it appears to offer something for everyone. Yet not much is known about what influences the decision to play in different social contexts, nor how this might affect the player experience or players' wellbeing.

This thesis builds upon existing research linking video game play with positive wellbeing by examining the social context of play and its impact on the player experience. It uses two theories to achieve this: self-determination theory (SDT) and social capital theory (SCT). Four studies were conducted to explore the relationships between the social context of play, the player experience and wellbeing; the studies involved online surveys, interview techniques and laboratory-based experiments. The social context of play is constructed as contrasts between social and solitary play; relationship type (play with known or unknown others); interaction type (competitive or cooperative play); or combinations of relationship and interaction type.

The first study established links between the player experience and wellbeing via an online survey of a broad cross-section of players. The experiences of autonomy, relatedness and flow were found to predict wellbeing after taking into account the possible influences of age, gender, game genre, amount of play and the social context of play (social as compared with solitary play). In tandem, this study also found that playing with others predicted greater social wellbeing than playing alone, but this result was no longer significant once other player experience measures were entered into the analysis. This result, however, in combination with

the strong finding for relatedness, supported the need to further explore the social context of play.

The second study thus used another online survey to examine the social context of play. It showed that play with others was associated with greater feelings of relatedness relative to playing alone, while those playing alone experienced greater autonomy and presence. Those who played competitively with strangers experienced less relatedness than those who played cooperatively with known others, or those who played a mix of competitive and cooperative play with known others and strangers. Bridging social capital was greatest for those who engaged in mixed play, followed by those who played cooperatively with known others, and lastly, competitive play with strangers. Solitary players' wellbeing was predicted by experiences of autonomy and relatedness, while social players' wellbeing was predicted by playing with strangers instead of playing with known others, and by bridging social capital. All players experienced greater wellbeing with age and less wellbeing with greater amounts of play.

The third study explored the reasons why people might play in different social contexts by using open-ended survey responses and interview techniques. Solitary players were found to enjoy relaxing, immersive, escapist and autonomous experiences, and to avoid both toxicity in other players and performance pressure. Solitary play, as well as play with strangers, was also seen as convenient, as it did not require reliance on others' availability or ability. Social players, overall, enjoyed experiences of competence and challenge, as well as relatedness, and saw other people as the means to experience this. People who engaged in mixed play (mixed interaction type only) experienced the most fun, enjoyed the variety and showed the least dissatisfaction. These results suggest that players weigh up practical and psychological considerations when choosing between different social contexts of play. The implications for wellbeing were also outlined.

The fourth and final study used a laboratory-based repeated-measures experiment to show that cooperative play with an avatar (human-controlled character) caused greater positive

affect, presence, enjoyment, connection and cooperation than cooperative play with an agent (computer-controlled character). The effect of play with an avatar or agent on enjoyment and positive affect, however, was qualified by an interaction with relationship type. The findings for each study are discussed in Chapter 8 with reference to the literature outlined in Chapter 2.

The results of this PhD provide important insights into the impact of video game play on wellbeing. The findings provide a resource for both designers and policy makers, and for individuals with a personal interest in games and wellbeing.

List of Publications

Vella, K., Klarkowski, M., Johnson, D., Hides, L., & Wyeth, P. (in press). The social context of video game play: Challenges and strategies. Proceedings of the Designing Interactive Systems Conference (DIS '16), ACM, Brisbane, Australia.

Vella, K., Johnson, D., & Hides, L. (2015). Indicators of wellbeing in recreational video game players. *Proceedings of the Annual Meeting of the Australian Special Interest Group for* Computer *Human Interaction* (OzCHI '15), ACM, Melbourne, Australia, pp. 613-617. doi: 10.1145/2838739.2838818.

Vella, K., Johnson, D., & Hides, L. (2015). Playing alone, playing with others: Differences in player experience and indicators of wellbeing. *Proceedings of the 2015 Annual Symposium on Computer–Human Interaction in Play* (CHIPlay '15), ACM, London, UK. doi: 10.1145/2793107.2793118.

Vella, K., Johnson, D., & Hides, L. (2013). Positively playful: When videogames lead to player wellbeing. *Proceedings of the First International Conference on Gameful Design, Research, and Applications* (Gamification '13), 99-102, ACM, Stratford, Canada. doi: 10.1145/2583008.2583024.

Vella, K., & Johnson, D. (2012). Flourishing and video games. *Proceedings of the 8th Australasian Conference on Interactive Entertainment: Playing the System* (IE2012), 1-3, ACM, Auckland, New Zealand. doi: 10.1145/2336727.2336746.

PAPER IN PREPARATION

Vella, K., Johnson, D., & Hides, L. Perception of humanness in video game team-mates: Differences in mood and player experience. (Working title. Based on Study 4)

Table of Contents

List of Figures

List of Tables

List of Abbreviations and Terms

Agent	Computer-controlled game character
AI	Artificial intelligence (in this context, this term refers to programs used to control characters or make dynamic adjustments to game difficulty)
Avatar	Human-controlled game character
Campaign	Game mode, which might contain an element of narrative, completion of which advances the player further along the story arc. Have game-specific goals.
CET	Cognitive evaluation theory
Co-located play	Play which occurs with another person in the same physical location
Death match	Game mode in which the aim is to kill as many other players as possible
Gamification	Using gameplay rewards and feedback to motivate in non-game settings
FSS-2	Flow State Scale
Gameplay	The interaction of a player with a video game, resulting in the player experience.
HP	Harmonious passion: passion for an activity, undertaken as a choice
IMI	Intrinsic Motivation Inventory
Interaction type	The type of interactions players have, e.g. competitive, cooperative or a mix of both
ISCS	Internet Social Capital Scales
MANOVA	Multivariate analysis of variance
Matchmaking	When a game system assembles a team from available players based on ratings (generally skill-based)
MHC / MHC-SF	Mental Health Continuum / Mental Health Continuum Short Form
MMO	Massively multiplayer online games
MMORPG	Massively multiplayer online role-playing games
MOBA	Multiplayer online battle arena
OP	Obsessive passion: passion for an activity, undertaken as a compulsion
PANAS	Positive and Negative Affect Schedule

Player experience	Emotional experience of playing video games
Platform game	Involves guiding an avatar through an obstacle course from platform to platform
PENS	Player Experience of Need Satisfaction scale
POMS	Profile of Mood States
SCT	Social capital theory
SDT	Self-determination theory
Sandbox games	Games without a reliance on structured play, often open-world
Serious games	Games designed to have 'serious' outcomes e.g. education and training, recruitment, health gains
Social context of play	Solitary and social play
Social play	Inclusive of relationship type and interaction type
Streaming	Live online broadcasting of gameplay
Relationship type	The type of relationship players have, e.g. playing with known others or play with strangers
RPG	Role-playing games
U&G	Uses and gratifications theory
Video game	Any electronic or digital game played on a computer, mobile phone, tablet or dedicated gaming console

Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature:

Date: 30/5/16

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1 Introduction

1.1 BACKGROUND

For over three decades, people have been playing video games—by themselves, in arcades, online, with their friends, with strangers, cooperatively, competitively, in teams, for rankings, for all sorts of reasons. Until quite recently, the general public understanding of the impacts of video game play has been negative. Concerns have revolved around the potential effects of violent content (Anderson et al., 2010), the potential for pathological gaming (Lemmens, Valkenburg, & Peter, 2011), the encouragement of a sedentary lifestyle (He, Piche, Beynon, & Harris, 2010) and associations with other poor emotional and behavioural outcomes (Khan, 2007). This wave of public concern has also been largely directed at what was perceived to be the primary demographic likely to be at risk: children and young people.

While that might have been true once, 71% of gamers are aged 18 to 64 years, 39% of those 65 years and over play games, and the average age of a video game player in Australia is 33 years (Brand & Todhunter, 2015). This is similar to the United States, where the average age of a video game player is 35 years, and 26% of players are under 18 years of age (Entertainment Software Association, 2015). Correspondingly, video game content and mechanics have grown in complexity, as have the studies directed at understanding their effects. The reported link between violent content and aggression has been criticised for both publication bias, leading to an over-representation of studies that support this conclusion, and for methodologically flawed studies (Ferguson, 2007; Ferguson & Kilburn, 2010). A more balanced view of the potential effects of video game play is now being taken (Boyle, Connolly, & Hainey, 2011; P. M. Markey, 2015; Przybylski, Weinstein, Ryan, & Rigby, 2009; Tear & Nielsen, 2014)}, and the circumstances in which video game play can lead to positive mental health are being detailed (Allahverdipour, Bazargan, Farhadinasab, & Moeini, 2010; Durkin & Barber, 2002; Przybylski,

2014; Reinecke, 2009). More nuanced research into the motivational aspects of gameplay is also providing a means of understanding the potential risks and benefits of playing video games (Lafreniere, Vallerand, Donahue, & Lavigne, 2009; Przybylski, Rigby, & Ryan, 2010; Przybylski, Ryan, & Rigby, 2009; Przybylski, Weinstein, Murayama, Lynch, & Ryan, 2011; Przybylski, Weinstein, et al., 2009). Given that 68% of Australians now play video games (Brand & Todhunter, 2015), this change in focus has ramifications for both public health policy and education, and has the potential to benefit an extremely broad base of young people and adults engaging in recreational gameplay.

Additionally, games are becoming increasingly social (Brand & Todhunter, 2015) and complex. When people play with each other, whether using a ball or a video game, there are layers of intention that frame the encounter. Unlike most ball games, however, video games can be played alone or by people who are known or unknown to each other, in a space where players can be in the same room or on the other side of the world. Play can be competitive, cooperative and combinations of both, with a range of communication options (co-located voice, mediated voice, text). Game technologies that facilitate social play are also becoming increasingly sophisticated, from the simple split-screen format to play across multiple devices and locations, in a bid to make gameplay more immersive, fun and social. The way people interact with others, or do not, shapes the player experience, situating gameplay as a site where relationships are negotiated, maintained and created. Conversely, solitary play can serve as a means of restoring the self. Research into the benefits of solitude has found that certain forms of it are associated with self-esteem and emotional creativity (Long, Seburn, Averill, & More, 2003), and it certainly seems likely that people engage in solitary gameplay not just as a matter of convenience. Do people choose to play alone in order to avoid interactions with others or to achieve a deeper engagement with game content, or both? Do different social contexts of play (including solitary play) provide players with the opportunity to fulfil distinct needs?

Research into how gameplay might fulfil these needs is proceeding from both the application of self-determination theory (SDT), and a shift in the way mental health is

conceptualised. SDT posits that intrinsic motivation for an activity is accompanied by the satisfaction of certain psychological needs (autonomy, competence and relatedness), and that this leads to greater wellbeing (Deci & Ryan, 2000). Relatedly, mental health researchers and theorists now consider the positive indicators of 'life going well' (p. 1331, Huppert, Baylis, & Keverne, 2004), such as experiences of autonomy, competence and relatedness. Research (listed in sections 2.2, 2.4.1 and throughout this thesis) ties these aspects of the player experience to wellbeing. Uniquely, however, this thesis examines these relationships through the lens of the social context of play. In order to do so, it uses social capital theory (SCT), which ties the types of social interactions we engage in to practical and emotional forms of support (Putnam, 2000).

Though there is research tying aspects of the social context of play to player motivations, or the player experience, there are remarkably few contrasts of the social context of play (discussed throughout Chapter 2). Of those contrasts, fewer again engage wellbeing measures, or attempt to explain why players might commonly engage in a particular social context of play. This thesis attempts to bridge this gap in the literature by linking the social context of play to the player experience, and from there, to its relationship with wellbeing.

1.2 RESEARCH PROBLEM

Video game play is a mainstream entertainment choice for both young people and adults, but research to date has largely been fixed on exploring its potential negative effects, with some notable exceptions (Boyle, et al., 2011; Durkin & Barber, 2002; Ferguson, Garza, Jerabeck, Ramos, & Galindo, 2013; Johnson & Gardner, 2010; Przybylski, et al., 2010; Reinecke, 2009; Russoniello, O'Brien, & Parks, 2009b; Shen & Williams, 2011; Snodgrass, Lacy, Dengah, & Fagan, 2011; Trepte, Reinecke, & Juechems, 2012; Williams, Caplan, & Xiong, 2007; Yee, 2006a). Correspondingly, games are rapidly evolving, with play occurring in a range of social contexts. Yet very little is known about how the social context of play might intersect with wellbeing.

1.3 RESEARCH AIM

While video game play is incredibly diverse, it is still understood to be, at its best, an engaging and entertaining medium that provides the player with the intrinsic motivation to play. Underscoring this is the player experience—how the player experiences games emotionally or cognitively, and how this experience ties in with the player's drive to have certain needs satisfied. Understanding the player experience and how it ties in with the social context of play provides a means of understanding how a broad range of games might influence player wellbeing.

SDT offers the means of explaining how the player experience may lead to wellbeing, in terms of personal satisfaction and increased inner resources (Ryan & Deci, 2000). SCT offers additional links to wellbeing by tying social interaction to social support (Putnam, 2000). By focussing on the player experience and making use of SDT and SCT, this thesis seeks to determine some of the psychological effects of playing video games, and highlight where opportunities for enhancing wellbeing might be. In order to refine the scope of this investigation, the social context of play is used as the framing experience. Specifically, this thesis investigates which social contexts of play are associated with greater wellbeing than others, and how they differ in terms of the player experience. The main aim of this thesis, therefore, is to identify how the social context of play relates to the player experience and ultimately, wellbeing.

1.4 SIGNIFICANCE AND CONTRIBUTIONS

The ubiquity of technology and the popularity of playing video games in both social and solitary contexts provide a broad platform from which to positively influence and understand wellbeing in the modern age. Having the knowledge of how the player experience can aid or indicate greater wellbeing arms those who want to minimise play's potential negative effects and increase its positive effects. The original contribution to knowledge made by this thesis is identifying how different social contexts of play might influence wellbeing. This is achieved by

focussing on the player experience, framed by the social context of play (including solitary play). In doing so, this research remains responsive to differences present across the population, and provides game developers, mental health professionals, policy makers, parents and players with a more nuanced understanding of video game effects. The practical repercussions include informing the design of games to enhance wellbeing and aiding those who wish to make more informed decisions about their own or their dependents' interactions with entertainment technology.

Given the relative newness of studying video game play effects, as well as the diverse characteristics (e.g. different game mechanics, genres, communication technologies, social contexts of play) that this field attempts to encompass, this thesis tackles the overarching research questions through a multi-method approach. In doing so, the thesis bridges the methodological divide in games research spelled out in Williams' essay (2005) by attempting to not only understand the effects of games on users, but to also understand the meaning and the context of gameplay. This thesis is a synthesis of both approaches. In addition, while research on the effects of video game play on mental health has to date largely focussed on potential negative effects, this program of research builds on the established positive links between video game play and wellbeing, and seeks to further identify the circumstances under which these occur. Finally, by making use of SDT and SCT, this research contributes to the field of computer–human interaction by placing the emphasis on the psychological and social nature of that interaction, and by indicating directions for future research.

1.5 THESIS OUTLINE

Chapter 2 presents a literature review in which the relevant theories and constructs are outlined (SDT, SCT and the player experience), and the social context of play is established as a means of investigating the wellbeing opportunities available to players of recreational video games.

Chapter 3 outlines how, over four studies, the research problem was addressed in a systematic and reflective manner, and provides a philosophical rationale for the choice of approach. The thesis objectives and research questions are matched to the method of each study, while the relative strengths and weaknesses of each method are addressed in brief.

Chapter 4 details the first study, a cross-sectional survey of a wide range of video game players. It sought to determine if the player experience, and the social context of play, predicts wellbeing. The social context of play was conceived as either solitary or social play. The study revealed that elements of the player experience (specifically, autonomy, relatedness and flow) predicted aspects of wellbeing. The social context of play was not found to be predictive of wellbeing; however, the results suggest that the construct of relatedness mediated the impact of social context. This, as well as the strong result for relatedness, prompted the need to explore the social aspects of play in greater detail. The findings also highlight that the player experience was an important component to include in future studies.

Chapter 5 describes a second cross-sectional survey, which built on the findings of the first study by taking a more nuanced approach to the social context of play and wellbeing. Measures of social capital were engaged and the social context of play was expanded to include *whom* people played with (solitary play; relationship type: with known others, with strangers); *how* people played with others (interaction type: competitive, cooperative, or mixed competitive and cooperative play); and categories that combined relationship and interaction types (e.g. playing with strangers competitively). Using these categories showed that solitary players experience greater autonomy and presence, while social players, unsurprisingly, experience greater relatedness. Experiences of relatedness and bonding social capital were greatest for those who played cooperatively with known others, while those who engaged in mixed play (with known others and strangers; in mixed cooperative and competitive play) experienced the most bridging social capital. This study also found that for social players, greater wellbeing was associated with the experience of bridging social capital, as was playing with strangers (versus playing with familiar others). Solitary players, on the other hand, found benefits associated with

the experiences of autonomy and relatedness. The wellbeing of both sets of players was negatively associated with amount of play. While some of these findings are intuitive, the findings that play with strangers predicted greater wellbeing than play with familiar others, and that solitary player wellbeing was predicted by relatedness, are not. The finding that presence was greater for solitary players, however, contradicted some of the findings outlined in the literature review. This prompted the need to explore the social context of play in greater depth.

Chapter 6 changes the focus from questions of 'What' (Chapters 4 & 5) to the question of 'Why'. A mixed-methods study using open-ended responses collected in the second study (Chapter 5), as well as interview data collected separately, provide insights into why players commonly choose to play in one social context over others. Open-ended responses were thematically coded, while the interviews provided insight into the generated codes. The social context of play contrasted who people play with (no one/solitary play; relationship type: with known others, with strangers) and 'how' people play with others (interaction type: competitive, cooperative or mixed competitive and cooperative play).

In brief, this study showed that solitary players enjoyed immersive, relaxing, autonomous play, and sought to avoid toxic behaviours. Social players, overall, enjoyed experiencing competence (via challenge, teamwork or both) through interactions with others, and also expressed a dislike of others' toxicity. Mixed players appeared to either enjoy diverse experiences or be more active in adjusting their play to meet their needs. In order to establish a causal direction between the social context of play and both the player experience and an aspect of wellbeing, the next chapter describes an experimental study.

Chapter 7 outlines the fourth and final study, a laboratory-based experiment contrasting gameplay in two social contexts: cooperative play with either an avatar (human-controlled character or social play) or an agent (computer-controlled character, or solitary play). This study established a causal relationship: play with an avatar results in greater positive affect, presence, enjoyment, cooperation and connection than does play with an agent. While some of these

results align with the literature in the field, some contrast with previous chapters' findings as well as other survey studies. Whether the choice of method or other factors (design, measures) led to these divergent results is discussed in full in Chapter 8, as is the contribution of this study to the field of video game play research.

Chapter 8 discusses the entire investigation into the social context of play, the player experience and wellbeing by breaking it down across different contrasts of the social context of play. The contributions this research makes to the literature and its use in terms of practical applications are both discussed, as are directions for future research. References and Appendices follow this final chapter.

2 Literature review

Wellbeing research and video game play research are two relatively young fields of enquiry, which this thesis connects. This chapter begins with some assumptions that are tested against the pre-existing literature: that video game play can result in wellbeing; and that concepts such as SDT, SCT and other measures of the player experience (enjoyment, flow and presence/immersion) can help us understand this relationship. Subsequent sections exploring the social context of play (from section 2.5 onwards) rest on this foundation, as they detail interactions between the social context of play and the player experience. While other variables that might affect wellbeing are briefly explored or excluded (e.g. personal characteristics), the choice not to emphasise them was a result of wishing to maintain a realistic scope, and to instead focus on variables that were closely linked to the player experience.

2.1 WELLBEING

Research concerned with the mental health of video game players has adopted a range of measures. Gameplay has been shown to assist post-work recovery in adults (Collins & Cox, 2014; Reinecke, 2009); social play to provide stress relief for children (Ferguson & Olson, 2013) and young men (Wack & Tantleff-Dunn, 2009); moderate levels of gameplay, compared with no and/or large amounts of play, has been associated with a range of positive outcomes in terms of adolescent attachment to school, family closeness (Durkin & Barber, 2002; Przybylski, 2014), anxiety/insomnia and social dysfunction (Allahverdipour, et al., 2010). Casual gameplay has been shown to improve mood (Russoniello, et al., 2009b) and decrease anxiety (Fish, Russoniello, & O'Brien, 2014; Russoniello, et al., 2009b), and social online play to provide opportunities for building and maintaining valued relationships with others (Cole & Griffiths, 2007; Snodgrass, et al., 2011; Yee, 2006a). Alternatively, self-esteem has been shown to impact the player experience by predicting in-game need satisfaction and post-play affect (Birk,

Mandryk, Miller, & Gerling, 2015), and everyday need satisfaction (not supplied by gameplay) has been associated with harmonious gameplay and greater post-play energy (Przybylski, Weinstein, et al., 2009). These studies suggest that gameplay is both a means of gaining wellbeing and an expression of it.

Running parallel to the trend of researching positive outcomes from gameplay is the redefinition of mental health to focus on the positive aspects of living. A pivotal tenet of wellbeing research is that the absence of mental illness does not equate to the presence of mental health and wellbeing—although it has also been established that a lack of wellbeing provides fertile ground for mental dysfunction to thrive (Keyes, Dhingra, & Simoes, 2010). While the definitions of what constitutes wellbeing are numerous (see Appendix A), wellbeing is understood to mean the positive qualities of an individual's life, and leading authors agree on its multidimensional and subjective nature (Huppert & So, 2013; Keyes, 2002; Ryff & Keyes, 1995). There is also agreement regarding the two primary components of wellbeing: hedonia and eudaimonia.

Hedonia refers to a pleasure-based *raison d'être*, and is largely indicated by the presence of positive affect and lack of negative affect (Wirth, Hofer, & Schramm, 2012), while eudaimonia, sometimes characterised as engagement and tracing back to Hellenic philosophy, refers to the happiness resulting from expressing virtue or human potential (Ryff & Singer, 2008). Eudaimonic wellbeing can in turn be seen as the realisation of one's true and autonomous self (Bhullar, Schutte, & Malouff, 2012), or a 'well-lived life' (Ryff & Singer, 2008). Within the framework of SDT (discussed in section 2.2), eudaimonic wellbeing results from an authentic life built on the pillars of realising intrinsic goals; the satisfaction of the need for competence, relatedness and autonomy; self-reflection or mindfulness; and behaving in autonomous or consensual ways (Ryan, Huta, & Deci, 2008). Of interest in Ryan, Huta and Deci's (2008) findings are that the relationship between eudaimonia and hedonia is one of cause and effect, and that to live in accordance with one's daimon (spirit or higher nature) could have hedonic outcomes.

These two components present complementary ways of understanding human wellbeing, and these are pertinent when investigating the wellbeing that might result from engaging in an intrinsically motivating activity. Keyes' Mental Health Continuum (MHC) takes both aspects of wellbeing into account by framing wellbeing as comprised of emotional, psychological and social wellbeing—the combination of all three yielding a score that can assess an individual's level of flourishing (Keyes, 2002). Emotional wellbeing is the only scale to capture hedonic qualities, as it broadly includes positive affect and life satisfaction. Eudaimonic qualities are present in both the measures of psychological wellbeing (derived from Ryff's model, Ryff & Keyes, 1995) and social wellbeing. Psychological wellbeing is comprised of the following components: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life and self-acceptance. Social wellbeing, however, broadly encompasses an individual's outlook on society as a whole and as a member, and is comprised of the following:

- *Social Acceptance:* the acceptance of other people, and a basically favourable view of human nature.
- *Social Actualisation:* the sense that society has potential that is in the process of being realised.
- *Social Coherence:* believing the workings of society to be understandable, reasonable and predictable.
- *Social Contribution:* the sense that one has something of value to offer others.
- *Social Integration:* the evaluation of commonality between self and community/society.

These facets of social wellbeing describe an individual who is flourishing within their particular milieu. Overall, the MHC offers a means of conceiving the individual's overall quality of life that takes into account both the hedonic and eudaimonic components of wellbeing, albeit as a snapshot (e.g. over the last month). Of more use to experimental research

are measures that are capture the immediate emotional benefits of playing games, such as measures of positive affect and mood.

2.1.1 Positive Emotion

Positive emotion can be understood as occurring on two levels: via the immediate and subjective account of emotions such as calmness, happiness, interest in life and cheerfulness (positive affect); or via observations of emotional states that persist over time (mood) (Müller & Garcia-Retamero, 2009). Various researchers have found associations between video game play and positive affect, and positive changes in mood (Allahverdipour, et al., 2010; Gajadhar, De Kort, & Ijsselsteijn, 2008; Lafreniere, et al., 2009; Ravaja, Saari, Salminen, Laarni, & Kallinen, 2006; Russoniello, et al., 2009b; Ryan, Rigby, & Przybylski, 2006; Wang, Khoo, Liu, & Divaharan, 2008). For example, Gajadhar et al.'s (2008) study of sociality and gameplay (section 2.4.2), found that positive affect was significantly and highly correlated with experiences of competence and performance (being a winner), and was significantly higher when players were located in the same space as opposed to when play was against a computer or a human in another room. Additionally, another study using experimental data found that content influenced post-play affect (Chiang, Lin, Cheng, & Liu, 2011). A contrast of violent and non-violent gameplay found that participants reported significantly higher flow and positive affect scores in the non-violent game condition compared with the violent game condition; however, both conditions elicited a positive affect post-play compared with pre-play (Chiang, et al., 2011).

Positive affect has also shown association with other aspects of the player experience. Wang et al.'s (2008) investigation of motivation in digital gaming surveyed 155 Singaporean secondary school students. Measurements were taken of passion for play, flow, regulatory styles (e.g. externally regulated behaviour is performed in order to secure a reward or to avoid a threat (Deci & Ryan, 2000)), and the degree of positive and negative affect (making use of the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988)) experienced during gaming.

Passion for play refers to either Harmonious Passion (HP) or Obsessive Passion (OP) (Vallerand et al., 2003). HP is marked by autonomous internalisations so that involvement in an activity is undertaken as a choice, while OP is marked by the controlled internalisation of an activity into one's identity, resulting in the activity being experienced as a compulsion. Wang et al.'s study revealed that HP had higher associations with positive affect than obsessive play, while positive affect was positively correlated with flow and more self-determined regulations (identified and intrinsic). Relatedly, Ryan et al. (2006), across a series of four studies (outlined in section 2.4.1) using experimental and survey methods, found that changes in mood were moderated by the in-game experiences of autonomy and competence, such that mood improved in games that supplied these experiences.

Positive emotion has also been determined from psychophysiological measures in a study that made use of facial electromyography (EMG), skin conductance levels (SCL) and cardiac interbeat intervals to determine valence (Ravaja, Saari, Salminen, et al., 2006). In this case, participants played four different games of *Super Monkey Ball 2* in random order: practice sessions and actual play at easy and difficult levels, though the analysis was only performed on data from the easy play sessions. The researchers found that positively scored events (e.g. the researchers scored events such as 'the monkey picks a banana' as positive, while 'monkey falling off the board' was negative) elicited positive emotional responses that were largely linear, meaning that more highly scored events engendered a greater response. Interestingly, the negative event of the monkey falling off the board provoked muscular activity indicative of positive affect during play, which shifted to negative when the participant viewed a replay of the event. As the authors have suggested, engaging in challenging play might allow the player to respond to negative events playfully, which could reverse when the sense of challenge is removed. This suggests a clear connection between challenge and positive affect, though whether this is due to a resulting sense of competence is unknown. That challenge might also negatively impact on affect is suggested by a survey of different game genres that found players of multiplayer online battle arenas (MOBA) had significantly less positive effect than players of

role-playing games (RPG) (Johnson, Nacke, & Wyeth, 2015). While RPGs can be played both socially (competitively or cooperatively) or alone, MOBAs are defined by challenging competitive play. However, as the RPGs in this study were undefined, this comparison is tenuous and suggests the need for further research.

There is also support for adolescent and adult play of video games for mood management (Colwell, 2007; Funk, Chan, Brouwer, & Curtiss, 2006; Wallenius, Rimpela, Punamaki, & Lintonen, 2009). A randomised controlled trial has found a causal link between casual gameplay and mood improvements (Russoniello, et al., 2009b). Specifically, 143 participants were assigned to either a control group or the experimental condition. Both groups completed a Profile of Mood States (POMS, a validated measure of mood) (McNair, Lorer, & Droppleman, 1971) questionnaire before and after completing their tasks, and had biometric data (brainwave activity and heart rate variability) taken during the task. The experimental group played one of three casual games: *Bejeweled 2* (a tile-matching game); *Bookworm Adventures* (a word puzzle game); or *Peggle* (a physics puzzle game); see Figure 2.1. They played uninterrupted for 20 minutes, while for the same length of time, the control group used a computer to search for articles on health-related topics and file them in a desktop folder.

All of the casual video games were found to produce changes in brainwave activity that was consistent with improved mood. The POMS scores supported the electroencephalogram (EEG) readings: for those in the experimental group, the overall impact of playing games on mood differed significantly from those in the control group, resulting in significantly decreased

Figure 2.1 Left-to-right screenshots of *Bejeweled 2*, *Bookworm Adventures* and *Peggle* (Popcap Games, 2004, 2006, 2007)

tension, depression, fatigue, confusion (all games), decreased anger (*Bejeweled 2* and *Peggle* players), as well as significantly increased vigour (*Bejeweled 2* players). Physical stress as measured by heart rate variability also significantly decreased from pre- to post-test in *Bejeweled 2* players. A more recent randomised controlled trial making use of the same games and self-report measures, and participants with depressive symptoms, found that casual gameplay on a regular basis resulted in significant decreases in symptom severity (Fish, et al., 2014). These studies give further credence to the notion of players using gameplay intuitively to manage their mood.

While the previous studies describe some of the factors affecting player mood and positive affect, the methods used are primarily surveys of a wide range of gameplay, or experiments tailored to solitary (lab-based) play. Other than Gajadhar et al.'s study (2008), the social context of play and its impact the player's emotional experience remains relatively untargeted. Furthermore, little attempt was made to provide a theory linking the experience of play to the emotional outcomes, with a few exceptions (Ryan, et al., 2006; Wang, et al., 2008). The next section provides an overview of one theory that does just that.

2.2 SELF-DETERMINATION THEORY

SDT holds that the satisfaction of three psychological needs—autonomy, competence and relatedness—facilitates an individual's wellbeing, integrity and intrinsic motivation (Ryan & Deci, 2000). The need for autonomy refers to having choice and a sense of volition for one's actions; competence refers to a sense of efficacy in relation to one's environment; and relatedness refers to the sense of connectedness and support shared with others (Ryan, et al., 2008). It should be noted that these three needs are also considered elements of eudaimonic wellbeing according to wellbeing theorists (Huppert & So, 2013; Keyes, 2002; Ryan, et al., 2008; Ryff & Keyes, 1995; Seligman, 2011) (Appendix A). A sub-theory of SDT, Cognitive Evaluation Theory (CET), accounts for variability in intrinsic motivation, dependent upon the social and environmental factors that support or thwart the satisfaction of those aforementioned

psychological needs, leading to varying degrees of engagement, personal achievement and wellbeing (Deci & Ryan, 2000).

Sheldon and Filak's (2008) study of the interaction between competence, relatedness and autonomy in a game-learning environment tested all three needs on measures of affect and intrinsic motivation. Specifically, participants played the word game *Boggle* (multiple die with printed letters need to form words before a timer runs out) in one of six ways: with or without autonomy support, competence support and relatedness support. These were manipulated by providing instructions for participants to play the game with differing scripts—for example, autonomy support encouraged players to make their own choices and explore the game's limits, while the non-autonomy support condition told participants to follow instructions and play in a particular order. The experimenters found that each supportive condition was associated with its respective satisfaction, and that each satisfaction predicted intrinsic motivation. Only competence and relatedness, however, predicted increased positive affect and reduced negative affect. While these experiences were a result of the experimental priming, they lend support to studies such as Ryan et al.'s (2006), mentioned in greater detail in section 2.4.1, which examines how these satisfactions result from video game play.

SDT has informed a great deal of research on video game play and provided insight into people's experience while playing and their motivations for play, as well as indicating where opportunities for healthy engagement with video games might lie. At the forefront is the work of Ryan, Rigby and Przybylski, who have applied SDT to video game play in order to determine how it satisfies fundamental psychological needs (Przybylski, et al., 2010; Przybylski, et al., 2011; Ryan, et al., 2006). Other applications of SDT to video games research include understanding the interaction of need satisfaction with personality (Johnson & Gardner, 2010) and genre (Johnson, Nacke, et al., 2015); how vitality is maintained or enhanced via volitional activity in video game play in an experimental setting (Ryan & Deci, 2008; Ryan, et al., 2006); and defining the qualities of harmonious and obsessive gameplay (Przybylski, Weinstein, et al., 2009; Wang, et al., 2008).

There are other theories besides SDT that attempt to explain how players negotiate their wellbeing via gameplay. Uses and Gratifications Theory (U&G) has a similar outlook on human agency, theorising that individuals seek to solve specific problems via gratifications available in various media (Blumler & Katz, 1974). This has been applied to video game play research, and has led to a validated taxonomy linking various gratifications to video game play (Sherry & Lucas, 2006). Of particular interest is that diversion and social interaction were most predictive of the amount of play among college students, 11th and 8th graders (but not 5th graders); while across all grades, male participants ranked social interaction higher than female participants did (Sherry & Lucas, 2006). However, specific gratifications might differ across different types of media (e.g. reading a book does not provide a direct source of social interaction), whereas SDT offers a universal model of human motivation. Relatedly, a gratification such as diversion might not be tied to wellbeing; yet even if it was, U&G does not provide a means of understanding how. SDT, however, might be able to test this motivation against the need satisfaction gained both in gameplay and from everyday life, and determine if there is a relationship.

Overall, research from a self-determination perspective is finding that if gaming allows the player to satisfy their need to experience autonomy, competence or relatedness, this has an impact on wellbeing and motivation to play (see section 2.4.1). An understanding of the need satisfaction present in players' everyday lives might also contextualise their engagement with games—players with high levels of need satisfaction have been found to engage with games in a harmonious fashion, with OP for games shown by those with low levels of need satisfaction (Przybylski, Weinstein, et al., 2009). Focussing on the social context of play might indicate the type of needs players seek to satisfy in gameplay, and what wellbeing might result. Given the additional level of engagement that social interaction lends social play, however, other theories besides SDT are required to explain the link between sociality and wellbeing.

2.3 SOCIAL CAPITAL THEORY

One of the ways in which social interaction can support wellbeing is through the creation of social capital. *Bridging social capital* is described as inclusive links between individuals of different social networks with broad, but not deep, levels of connection; *bonding social capital* refers to exclusive ties between individuals such as close friends and family, with stronger levels of support, albeit greater insularity (Putnam, 2000). Thus, creating social networks cannot only result in positive feelings between individuals, but can act as a resource when emotional or practical support is needed. Gameplay can be an activity whereby these reciprocal relationships are formed and maintained, not least because it has the additional reach of online interactions. As a proviso, however, those high in extraversion have been found to be more effective at increasing social capital both on and offline (Williams, 2007).

Applying social capital to gameplay has typically entailed comparing online social capital to any offline effects. The Internet Social Capital Scales (ISCS) were developed to measure both bridging and bonding forms of social capital among internet users (Williams, 2006), but has also been adapted to study online gaming (Collins & Cox, 2014; Collins & Freeman, 2013; Skoric, 2011; Trepte, et al., 2012; Williams, et al., 2007; Zhong, 2011). For example, a survey study compared problematic video game use (defined as addictive behaviours), extraversion, trait empathy, pro-social tendencies and online and offline social capital and found differences between the qualities of problematic and non-problematic video game players, as well as those who did not play at all (Collins & Freeman, 2013). Problematic players were significantly higher in online social capital and lower in offline social capital than non-problematic players and non-players, while non-problematic players had higher online social capital than non-players. No other differences were evident. This suggests that high levels of online social capital in the absence of offline social capital can be associated with problematic play, while high levels of online social capital are not related to problematic play when social capital is also being accrued offline.

Similarly, a study by Zhong (2011) surveying massively multiplayer online role-playing game (MMORPG) players failed to find offline impacts from online gaming social capital. Specifically, collective play (team or guild-based play) was positively related with online social capital, while no interaction was found between online and offline social capital. Interestingly, however, this study found that time spent playing negatively influenced both online and offline social capital. While online play could be seen to displace offline relationships, that it negatively affected online relationships suggests that increased hours of play were associated with solitary play (e.g. 'grinding'—repetitive solitary tasks to unlock additional features), or play in conflict with others. Collective play, on the other hand, would rely on scheduling discrete amounts of cooperative play with others, and potentially forming bonds via shared challenges. That some time in MMORPG play is spent either in solitary play or play that devalues social connections is partially supported by a survey of 5000 *EverQuest II* (MMORPG) players, which found that time spent playing predicted greater loneliness, while playing with existing ties (family, and friends that they knew offline before playing the game) predicted less loneliness (Shen & Williams, 2011). Together, these findings suggest that players are not always social in social games, or alternatively, that not all social games create feelings of connection between players.

Bringing greater detail to the study of social capital in gameplay is a controlled field experiment with guild members of the popular massive multiplayer online (MMO) game, *World of Warcraft* (Williams, et al., 2007). Comparing the difference between using text-only to communicate during gameplay versus text-plus-voice, participants in the text-plus-voice condition were found to have significantly higher levels of bridging capital than those in the text-only condition. For co-workers and schoolmates, there was also evidence that text-plus-voice strengthened their existing ties and sense of community more than text-only communication over time, suggesting that a richer form of communication combined with play with known others can cement social connection. Correspondingly, Trepte, Reineche and Jeuchems' (2012) survey of online sports gaming clans found that physical (e.g. practising together offline) and social proximity (being involved with clan administration) and familiarity

(amount of time players spend in online training together) among e-sports game players were linked, via increased social capital, to increased offline social support. As the authors themselves have stated, the capacity for games to provide opportunities for increased social capital could offset some of the potential negative effects of online gameplay via supportive friendships. That this could be facilitated via game features suggests directions for future game design.

Taking into account the types of relationships and interactions that occur between players could be key to understanding the part that social capital plays in relation to wellbeing, particularly as gameplay now contains a range of options for social interactions: offline, online, competitive, team-based, cooperative, with strangers and with known others, and diverse modes of communication. These social contexts of play might in turn have their own distinct relationships to both bridging and bonding social capital, suggesting the satisfaction of dissimilar needs and the expression of diverse motivations for play. Understanding how social capital is associated with various social contexts of play helps tease out the mechanics of player wellbeing in different social contexts, just as need satisfaction provides broad insights into the player experience.

2.4 PLAYER EXPERIENCE

Player experience broadly refers to the emotional and cognitive experiences of the player during video game play. It encapsulates the experiences of SDT (in-game autonomy, competence and relatedness), but extends to other aspects of the mentally and emotionally engaging nature of games, specifically enjoyment, flow and presence/immersion. Interactions between these constructs are explored here, as is their relationship to wellbeing.

2.4.1 Autonomy, Competence and Relatedness

The development of the Player Experience of Need Satisfaction scale (PENS) facilitated the application of SDT directly to video game play via its sub-scales: autonomy, competence

and relatedness, as well as measures of presence and intuitive controls (Ryan, et al., 2006). For example, a series of four studies (three using within- and between-subject repeated-measure experiments, and one using online survey) found various interactions between the PENS sub-scales and measures of wellbeing across a range of gaming experiences (Ryan, et al., 2006). Study 1 examined how experiences of autonomy and competence predicted game experience by applying self-report measures to 89 participants before and after playing a simple platform game (*Super Mario 64*). Study 2 demonstrated how SDT variables accounted for game preference in an experiment with 50 participants playing one popular (*Zelda*, a fantasy action–adventure) and one unpopular game (*A Bug's Life*, a platform game). Study 3 looked at between- and within-person variation in need satisfaction as a reason for game preference and motivation, employing 58 participants playing four popular games from different genres (*Super Mario 64*—platform, *Super Smash Brothers*—fighting, *Star Fox 64*—shooter, *San Francisco Rush*—racing). Finally, Study 4 surveyed 730 members of an MMO gaming community using the PENS and other measures of player motivation. Overall, autonomy and competence were found to account for positive changes in mood and game enjoyment across all four studies. Specifically, autonomy was positively correlated with game enjoyment (studies 1–4), intuitive controls (Study 1), self-esteem (Study 3), presence (studies 3 and 4), and intended future play (studies 2 and 4). Competence predicted presence (studies 1, 2 and 3); intuitive controls (studies 1, 2 and 4) and game enjoyment (studies 1–4), and was related to higher state self-esteem, more positive post-play mood (studies 1, 2 and 3) and improvements in vitality (studies 2 and 3). Relatedness, in Study 4, positively predicted greater hours of play, game enjoyment and the intention for future play.

While this series of studies made use of both solitary (lab-based) and social play, no contrast between the two was made, leaving the effects of the social context of play on psychological need satisfaction speculative. Other studies (not using the PENS) show that competence is significantly higher in co-located play than online play (Gajadhar, et al., 2008), and is facilitated by competition compared with non-competitive play (Kazakova, Cauberghe,

Pandelaere, & De Pelsmacker, 2014). Also of interest is whether other conceptions of relatedness might capture the sense of connection players might have for each other even after brief amounts of game play, as opposed to the deeper levels of connection formed over longer periods of time. One way to de-emphasise the quality of the relationship, while still capturing connection, is to use simple pictorial measures such as those used to measure the overlap between self and group (Schubert & Otten, 2002). The measure used by Schubert & Otten is a simple image that creates a visual analogy of self and other along a scale (see Figure 2.2). While these are typically used to gauge the degree of inclusion or exclusion felt by the individual for a group or groups, it is also a promising measure for assessing the sense of connection between quickly gained between people engaged in shared goals, such as in social gameplay. Measures such as this and the PENS however, have not been much applied to contrasts of the social context of play, suggesting opportunities for future research.

2.4.2 Enjoyment

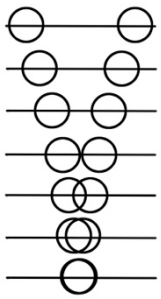

Figure 2.2 Pictorial scale to indicate connection

Enjoyment is a crucial aspect of video game play, and can be directly explained as the intrinsic motivation resulting from experiences of competency, autonomy and relatedness (Ryan, et al., 2006; Tamborini, Bowman, Eden, Grizzard, & Organ, 2010). This has been most clearly demonstrated by Tamborini et al. (2010), who designed an experiment to test whether media enjoyment was reducible to need satisfaction. Participants (N = 129) were randomly assigned to one of four conditions: playing a bowling simulation game with a human partner

(co-play) or a computer partner (solo play), with a controller for a PlayStation 2 (traditional controller), or a Wii controller encased in a weighted plastic bowling ball (naturally mapped controller). Measures of video game experience, demographics, trait measures of need satisfaction, personality, self-esteem, empathy and positive and negative affect were taken in the screening survey, while measures of in-game need satisfaction, enjoyment and perceived natural mapping of the controllers were taken post-play. In-game need satisfaction was found to explain 51% of the variance in enjoyment, which was in turn accounted for by perceptions of natural mapping (which were unexpectedly more strongly associated with the traditional PS2 controller), and social play via higher levels of relatedness in the co-play condition. This is further supported by the research of Ryan et al. (2006), which found that game enjoyment was associated with the in-game experiences of autonomy, competence and relatedness (detailed in section 2.4.1). In this last study, game enjoyment was also positively associated with player vitality, self-esteem and mood.

Support for a social influence on game enjoyment is provided by Gajadhar, De Kort and Ijsselsteijn's (2008) experiment, which found that just the perception of playing with another human increased player enjoyment. Using a repeated-measures experimental design, the authors partnered 86 participants against each other in three conditions: virtual (where they were told that they played against the computer, though it was actually against their partner, who was in another booth), mediated (online, against each other, in separate booths) and co-located (against each other in the same booth, on the one console). Participants played *WoodPong*, a graphically simple tennis game and answered a post-play questionnaire; performance scores were noted. Mediation analyses confirmed that player enjoyment (encompassing positive affect, competence, challenge, frustration and aggression) was mediated by the subjective sense of social presence. As in Tamborini et al.'s (2010) study, gameplay context can be seen as pivotal to affecting the enjoyment of and engagement with video games. However, while Tamborini et al. made use of the Intrinsic Motivation Inventory (IMI), a validated measure of enjoyment for an activity, Gajadhar et al. used four scales from the relatively new Game Experience

Questionnaire. It is possible that the choice to not use a dedicated measure of enjoyment muddied the interpretability of Gajadhar et al.'s findings, and so these results should be approached with caution. Section 2.3 provides further support for differences in enjoyment across contrasted social contexts of play.

2.4.3 Flow

Flow overlaps with SDT in terms of describing the experience of deep enjoyment originating from engagement with tasks matched to individual skill, and producing intrinsic motivation (Csikszentmihalyi, 1990; Deci & Ryan, 1985). The experience of flow is said to encompass some or all of the following characteristics: a match of task to an ability to complete it; concentration on the task at hand; clear goals; immediate feedback; deep and effortless involvement that removes awareness of everyday life; control over actions; loss of self-consciousness during the activity, but sense of self reinforced afterwards; an altered sense of time passing (Csikszentmihalyi, 1990).

Both flow and SDT have direct implications for the design of games that lead to optimal player experiences. Flow also has direct implications for the field of mental health, by showing associations with building resilience (Parr, Montgomery, & DeBell, 1998), meaning making, present-centred enjoyment (Csikszentmihalyi, 1990) and a negative correlation with anxiety (Jackson, Ford, Kimiecik, & Marsh, 1998). In a study of how people cultivate happiness, flow was found to be significantly higher among men compared with women, which the authors have suggested might relate to greater amounts of video game play by men than women (Warner & Vroman, 2011). Flow's associations with HP, autonomous regulation and positive affect (Wang, et al., 2008) also make it an excellent indicator of healthy gameplay that has motivational pull and satisfies the player's need for competence (Deci & Ryan, 1985). Wang et al.'s (2008) study (outlined in section 2.1.1) conducted a cluster analysis comparing different levels of passion for play. Flow was significantly higher in the group with higher HP, which in turn was associated with more autonomous regulations. This suggests that the experience of flow is not only

associated with an aspect of wellbeing (positive affect), but also with the sense of autonomy within play (autonomous regulations). The scale used, the Dispositional Flow Scale (the authors have also provided a state version, the FSS-2), is a validated measure of flow developed by Jackson and Eklund (2002), based on the dimensions outlined by Csikszentmihalyi. Another measure of flow (as well as immersion, tension, competence, negative and positive affect and challenge) commonly used in video game play research, the Game Experience Questionnaire, has been found to have an unreliable factor structure (Brühlmann & Schmid, 2015), while the DFS was found to have acceptable reliability and convergent validity when applied to a study of internet gaming (Wang, Liu, & Khoo, 2009).

More recent research, however, suggests that assuming flow is more likely when there is a balance between skill and demand may be problematic. This is demonstrated in a study that experimentally manipulated levels of challenge in video game play and found unexpected relationships between the activity and reported flow (Klarkowski, Johnson, Wyeth, Smith, & Phillips, 2015). Flow was conceptualised as resulting from a balance of skill and demand, and any imbalances were anticipated to result in low levels of reported flow using the FSS-2. Specifically, the game *Left 4 Dead* was played in three conditions, with all players given a simple repetitive task to perform: boredom (players were not confronted with any enemies), balance (the game automatically adjusted the level of enemies to the player's skill- anticipated to produce the highest levels of flow), and overload (gameplay was made very difficult, e.g. increased number of highly reactive enemies). While the balance condition produced greater total flow than the overload condition, it did not significantly differ to the boredom condition. The boredom condition, however, produced higher levels of flow than the overload condition on some FSS-2 subscales (specifically, greater 'sense of control' and 'merging of action and awareness'). The authors suggest that these subscales privilege experiences that are easy to accomplish, rather than those that are challenging, and also that matching skill to demand may not always be necessary to generate flow. This suggests further work needed to explore these possible complexities between levels of skill and challenge and associated experiences of flow.

2.4.4 Presence and Immersion

Presence, or telepresence, is the experience of feeling present in a mediated world (Minsky, 1980). It has been split into two forms: social presence, indicating the sense of being with another (Biocca, Harms, & Burgoon, 2003), and spatial presence, the sense of being physically within a mediated world (Wirth et al., 2007). Immersion, however, is characterised as a total absorption in the mediated world, the loss of awareness of external surroundings, and a sense of control and challenge in the activity (Jennett et al., 2008). While closely related, the experience of presence could be said to relate more to the psychological sense of being physically 'in' the game (e.g. experiencing vertigo when a character falls off a cliff), while immersion relates more to being engaged over time (e.g. experiencing emotional involvement in narrative) (Jennett, et al., 2008). The range of game mechanics available also means that feelings of presence might not be possible, for example, in a game of *Tetris* (in which falling blocks need to be stacked in order to minimise free space), although the player could be deeply immersed in the playing of it; but a game such as *BioShock* (graphically realistic shooter game set in a dystopian world, with a morality-based narrative) could provide both experiences at once. The diversity of scales, which measure presence or immersion on a range of dimensions, also makes comparisons across studies difficult. For example, the Immersion Questionnaire (Cairns, Cox, Berthouze, Jennett, & Dhoparee, 2006; Jennett, et al., 2008), is made up of five factors: cognitive involvement, real-world dissociation, challenge, emotional involvement and control, while the PENS measures presence along the dimensions of physical, emotional and narrative presence.

The measurement of presence/immersion provided by the PENS rests upon the idea of 'the illusion of non-mediation' (Lombard & Ditton, 1997), and is comprised of items measuring physical, emotional and narrative presence. Unsurprisingly, using the PENS has found that the experience of presence is positively correlated with the use of intuitive controls (Ryan, et al., 2006), suggesting that controls providing the illusion of unmediated agency within the game world facilitate emotional engagement with it. A series of studies using the PENS measure also

found that presence was associated with greater competence, relatedness and autonomy in gameplay across different game genres (Ryan, et al., 2006), and with the experience of autonomy in games with both violent and non-violent content (Przybylski, Ryan, et al., 2009). In total, this suggests that the satisfaction of psychological needs in gameplay, enabled by intuitively experienced game interfaces, results in deeper game engagement. Alternatively, it is possible that other variables, such as the emotive quality of the sensory experience (audio, video), the depth of narrative or character development or some other game quality produces an immersive experience that allows the player to emotionally invest in the play—thus leading to greater feelings of autonomy, competence or relatedness.

While the association with psychological need satisfaction would suggest that greater presence equates to greater wellbeing, the research presents diverging relationships. While presence can enable game enjoyment (Przybylski, et al., 2011), be associated with greater levels of autonomy and competence (Ryan, et al., 2006) and amplify the effect of content on pro-social goals (Weinstein, Przybylski, & Ryan, 2009), other research has found an association with pathological levels of play (Seah & Cairns, 2008), and that presence can act to bridge the effect of violent perception on aggressive cognition (Nowak, Krcmar, & Farrar, 2008) and be negatively correlated with emotional stability (Johnson & Gardner, 2010). Interestingly, it has also been found to intercede in processes of in-game identification and thus affect the motivation to play (Przybylski, et al., 2011).

In terms of social play, both spatial presence (Ravaja et al., 2006) and immersion (Cairns, Cox, Day, Martin, & Perryman, 2013) are experienced in greater levels in play against human-controlled characters, relative to play against computer-controlled characters, across experimental studies. By contrast, survey data of social and solitary players supports the notion that presence (PENS) is greater among solitary players than social players (Johnson, Nacke, et al., 2015). Whether it is differences in the measures of presence being used, or differences in methodology, is unknown. Further research into the intersection between the social context of

play and player immersion or presence could test this by using the same measures across a multi-method research design.

2.5 THE SOCIAL CONTEXT OF PLAY

Beyond the immediacy of emotional engagement with gameplay is the framing of social context. The importance of social interaction in gameplay for those who engage in it is not to be understated. Games can provide a site of sociality where people negotiate status and roles and engage in the social construction of reality (Berger & Luckman, 1966). In this sense, social context is created through interactions that are meaningful and entail personal investment in the process, leading social interaction to emotionally engage the player (Kaye & Bryce, 2012). These interactions are also plastic, determined by both the players and the environment in which they play, suggesting that they are an important consideration for those wishing to positively influence both the player experience and wellbeing.

Yee (2006a) speaks to the value of the relationships in video game play in a survey of 30,000 MMO game players. He found that 22.9% of male players and 32% of female players had disclosed personal information to their MMO friends that they had never told their non-gaming friends, while a large percentage (39.4% male; 53.3% female) found that the friendships they formed in MMO play were the same or better than their non-gaming friendships. This is supported by an ethnographic study of the MMORPG *World of Warcraft*, which found that social interactions provided opportunities for social connection with physically and at times emotionally distant friends and family, as well as light interactions that provided relief from more intense offline relationships (Nardi & Harris, 2010). While a great deal of social play research has focussed on MMORPG play (Caplan, Williams, & Yee, 2009; Cole & Griffiths, 2007; Snodgrass, et al., 2011; Yee, 2006a; Zhong, 2011), other research uses a range of games and social contexts to study the effects of proximity (Gajadhar, De Kort, & Ijsselsteijn, 2009; Gajadhar, Nap, De Kort, & Ijsselsteijn, 2010) and familiarity (Mandryk & Inkpen, 2004; Ravaja, Saari, Turpeinen, et al., 2006; Trepte, et al., 2012), as well as competition and

Figure 2.3 Screenshots of *WoodPong* (Resinari, 2007) on the left and *The Last of Us* (Naughty Dog, 2013) on the right

cooperation (Adachi & Willoughby, 2011; Ewoldsen et al., 2012; Greitemeyer, Traut-Mattausch, & Osswald, 2012; Schmierbach, Xu, Oeldorf-Hirsch, & Dardis, 2012). Some of these studies are outlined in the following sections in order to establish differences in the player experience across different social contexts of play.

The social context of play, however, includes solitary as well as social play, and the popularity of solitary play (Brand & Todhunter, 2015) suggests that it must also offer proportionate rewards. Supporting this is evidence that solitude plays an important part in human wellbeing (Long & Averill, 2003). However, the great diversity of gameplay mechanics also means that solitary play in one game might be experienced quite differently in another. For example, solitary play in a game designed for solitary play might not present the same experiences as solitary play in a game with multiplayer options, or games featuring other characters with human-like characteristics and a role to play in a narrative. Playing against the computer in a game of *WoodPong* might be seen as fundamentally different to playing against a computer-controlled character (or agent) in *The Last of Us* (see Figure 2.3 above). While some researchers suggest that feelings of relatedness might be experienced for agents (Ryan, et al., 2006), there are practical challenges confronting the researcher wishing to test this, some of which are outlined in the next section.

The following breaks down the social context of play across four sets of contrasts: solitary or social play; play with agents or avatars; play with known others or strangers

(relationship type); and competitive or cooperative play (interaction type). In doing so, it investigates the player experience as framed by social interaction (or its absence), and their potential relationship to wellbeing.

2.5.1 Social and Solitary Play

Solitary gameplay is still the most prevalent gameplay experience (Brand & Todhunter, 2015). This suggests either certain compensations for the lack of human interaction, such as its convenience, or a preference for the experiences that solitary play can bring. Outside of video game play research, there is evidence that solitude itself plays an important part in human wellbeing. It provides opportunities for actual and mental freedom from obligations, for creativity, imagination and self-transformation, and for changing the very way that we think (Long & Averill, 2003)—all of which can potentially act to restore a sense of self. Researchers have detailed up to nine types of solitude (Long, et al., 2003), some of which have obvious relationships to video game play, in particular creativity and problem-solving, facilitated by games' problem-based learning processes (Inchamnan, Wyeth, Johnson, & Conroy, 2012); diversion (Sherry & Lucas, 2006); and self-discovery, which might be experienced in the exploration of incongruent-to-self characters and choices via immersive gameplay (Klimmt, Hefner, & Vorderer, 2009). These characteristics also loaded onto larger factors showing negative relationships with depression and positive relationships with achievement (Long, et al., 2003). That loneliness was also found to be a form of solitude does not mean that solo play is a lonely activity, or that social play one is not. One study found that greater time playing MMOs (massively multiplayer online games) has been associated with greater loneliness (Shen & Williams, 2011), implying that not all kinds of human interaction lead to feelings of connection, or alternatively that people are engaging in MMO play explicitly to forge relationships.

Conversely, there is the suggestion that feelings of relatedness might potentially be present for computer-generated personalities (Ryan, et al., 2006); this is supported by research showing that people can form emotional attachments to virtual others when certain conditions

are fulfilled (Coulson, Barnett, Ferguson, & Gould, 2012). This implies that the solitary context might also offer some of the benefits of social play. However, understanding solitary play's unique links to wellbeing is hampered by the scarcity of research actively contrasting it with social play; the difficulties of contrasting social and solitary play in an experimental setting (different task loads); and the different kinds of 'solitary' impairing the generalisability of results. However, broadly speaking, experimental gameplay research typically makes use of the solitary gameplay experience, unless specifically testing for social interactions—thus, the majority of the experimental findings previously mentioned can be said to demonstrate a link between solitary video game play and wellbeing.

Research contrasting solitary and social play includes Gajadhar, de Kort and Ijsselsteijn's study (2008) (detailed in section 2.4.2), which found that when people believed they were playing against a human, social presence, enjoyment increased, although when that interaction was mediated (online play), the difference in presence between playing with a human or a computer was only marginally significant. Players who were co-located, however, experienced significantly more social presence and enjoyment than those in the other two conditions. Whether the lack of significant differences between the mediated and virtual scores was due to the game having no humanoid-like character to oppose in the virtual condition, its relative lack of complexity or the measures used is uncertain, but further insight is provided by Cairns et al. (2013).

Cairns et al. (2013) carried out a series of experiments using three different games (*WoodPong*, *Midtown Madness 2* and *Mario Kart Wii*). The first experiment replicated Gajadhar et al.'s study (2008), including using the same game, however, participants were placed in separate rooms for the mediated and virtual conditions, and a measure of immersion was taken using the Immersive Experience Questionnaire (IEQ). The second experiment contrasted the mediated and virtual conditions using *Midtown Madness 2* (an arcade-style racing game), while the third experiment contrasted co-located to virtual using another racing game (*Mario Kart Wii*). Though the first two experiments showed that social forms of play were significantly more

immersive than solitary play (virtual), the final study, found no result for immersion, leading the researchers to conclude that proximity matters less than the perceived nature of the opponent, whether human or non-human. The diverse types of gameplay available make this result far from conclusive, but there is further support for this finding provided by a study contrasting violent and non-violent games (*Duke Nukem Advance* and *Super Monkey Ball Jr.* respectively) against a friend, stranger and computer (Ravaja, Saari, Turpeinen, et al., 2006). This study found that play against a human elicited greater presence, engagement, sense of threat, challenge and physiological arousal than play against a computer. That measures of arousal, engagement and sense of threat were more highly activated in social play, suggests that social presence raises the stakes already presented by gameplay. This study made no use of deception, however, which introduces the possibility that the two conditions were not equal in terms of the task load that they generated. This is partially supported by the social conditions being perceived as more challenging than the solo games.

Overall, though the different measures of immersion and presence used across these three studies (Cairns, et al., 2013; Gajadhar, et al., 2008; Ravaja, Saari, Turpeinen, et al., 2006) make the results incomparable, they all lend support to the idea that social play is more deeply engaging than solitary play. Other studies have found that arousal decreases in collaborative play of a violent MMO game relative to solitary play (Lim & Lee, 2009); that social play is less boring and relaxing, and more exciting and frustrating than solitary play of both violent and non-violent games (Ballard, Visser, & Jocoy, 2012); and that relatedness is greater in social play of a bowling game relative to solitary play (Tamborini, et al., 2010). Though this last finding might seem intuitive, the need to test whether interactions with virtual characters can lead to feelings of relatedness or attraction is suggested by other researchers (Coulson, et al., 2012; Ryan, et al., 2006). Applying measures of relatedness or connection in research contrasting play with avatars and agents would enable this idea to be tested.

In summary, playing against others compared with playing against a computer has been found to lead to increased feelings of relatedness (Tamborini, et al., 2010), immersion (Cairns,

et al., 2013), presence, engagement, sense of threat, physiological arousal (Ravaja, Saari, Turpeinen, et al., 2006), social presence, competence, positive affect (Gajadhar, et al., 2008) and challenge (Gajadhar, et al., 2008; Ravaja, Saari, Turpeinen, et al., 2006). Contrasting results have been found for physiological arousal when play was collaborative (Lim & Lee, 2009). This area of research would benefit from replication due to the diversity of measures, games and procedures used. In addition, using avatars and agents in certain games, while representing a form of social and solitary play, might suggest distinct relationships with the player experience.

2.5.2 Avatars and Agents

Many games allow players to visually represent themselves in the game world as a character (avatar), which can interact with computer-controlled game characters (agents). While the use of avatars and agents is common across a range of game genres, not a great deal of research has been carried out to understand how play with or against avatars or agents affects wellbeing. However, differences are being established in research concerned with the player experience.

For example, a study contrasting cooperative team play with avatars and agents in a first-person shooter found that play with a human was associated with greater relatedness and less flow and competence versus play with a computer-controlled character (Johnson, Wyeth, Clark, & Watling, 2015). The recorded brainwave activity also suggested that play with a human engages greater mentalising in the sense that there is more evaluation taking place in order to understand the other players' intentions. By contrast, greater challenge and task demands were shown to be experienced in the avatar condition. As the authors have discussed, the results could be explained by differences in avatar and agent behaviours, with a greater task load experienced by those playing against other participants. To better isolate the impact of playing with avatars compared with agents requires controlling the behaviour of teammates to ensure consistency.

This was partially achieved in a repeated-measures experimental study using the MMORPG *World of Warcraft*. Participants played cooperatively and competitively with both an agent and an avatar in four two-minute play sessions while being measured for physiological arousal and taking post-play measures of positive valence and presence (Lim & Reeves, 2010). A deception was used (the computer-controlled teammate was actually controlled by a human) to counteract any other influential variables, such as a computer-controlled opponent being consistently more skilled or predictable than human opponents. Greater arousal, presence and likability of the other were found to be experienced when the other player was perceived as being an avatar compared with an agent. However, greater arousal was experienced when play was competitive rather than cooperative, while cooperative play generated greater presence and likeability of the other than competitive play. In turn, valence was more positive only when play was with an agent and the task was cooperative rather than competitive. The cooperative task, however, involved trading with the other participant, and might not represent typical cooperative gameplay (e.g. opposing a common enemy together). The two conditions could also be seen to contrast violent and non-violent interactions, as the competitive condition involved a duel with the other character. This could in turn have affected their relationship to arousal and immersion, which other research partially supports (Ballard, et al., 2012; Barlett, Anderson, & Swing, 2009; Nowak, et al., 2008). Finally, the measure of presence was gauged by three semantic differential scales, one of which referred directly to the other player's realness. This suggests that the finding for presence was an indicator of how successful the deception was in convincing the participants that they were playing against a computer when they were not.

Further support for a positive relationship between player presence and play against a human-controlled opponent can be found in a study that used the MMORPG *NeverWinter Nights* (Weibel, Wissmath, Habegger, Steiner, & Groner, 2008). A comparison of competitive play with a human and computer-controlled opponent found that players experienced greater presence, flow and enjoyment when the opponent was perceived as being human-controlled. While this experiment used a deception, unlike Gajadhar et al.'s (2008), Cairns et al.'s (2013)

and Lim and Reeves' (2010) studies, participants in Weibel et al.'s study played against the computer in both conditions. Gameplay was also standardised so that all participants experienced losing by a narrow margin. The presence scale measured two dimensions—those of arrival (feeling present in the mediated environment) and departure (feeling no longer in the actual physical environment), while enjoyment was measured by a single item on a five-point scale. These findings replicate those of other research showing that play against a human leads to greater presence or immersion (Cairns, et al., 2013; Ravaja, Saari, Turpeinen, et al., 2006) and greater enjoyment than in play against a computer (Schmierbach, et al., 2012), lending further support to these results.

By contrast, Eastin and Griffiths' (2006) and Eastin's (Eastin, 2006) studies of human and computer-controlled opponents (using deception—all were computer-controlled) in first-person shooters found no significant main effect for the social context of play on presence. Rather, Eastin and Griffith's study found that participants reported high levels of presence across all conditions, though it did differ across variations in game activity (these were greater for shooting than fighting) and interface (these were greater for standard console than virtual reality). A possible explanation for the differing results to those detailed previously might lie in the different genre of game used in each study and everything that entails, including different points of view (third-person and first-person).

Overall, however, these studies largely replicate the trends identified in section 2.5.1. Although there is evidence that players can feel genuine liking for and attraction to virtual characters, dependent on players' personality and motivations, and characters attractiveness, friendliness and usefulness in the game context (Coulson, et al., 2012), the aforementioned research shows that typically, playing with a computer-controlled character is closer to the experience of playing alone than playing with humans. This is of particular use when designing experiments contrasting the social and solitary player experience, as it potentially provides a means of minimising differences across conditions. In turn, this could allow researchers to

answer whether it is just the perception of the other player's humanity that makes play impactful, or some other factor.

2.5.3 Relationship Type

Outside of the schoolyard, there are not many realms of entertainment where strangers are randomly approached for play. Yet games provide these opportunities, particularly during online play. This suggests that games are a site of complex negotiations of motivations and social conventions, which in turn can serve different purposes depending on who is being played with. For example, a qualitative study featuring interviews with 33 adult game players found that for those who knew each other, online and offline worlds overlapped, such that shared online play reinforced offline relationships (Eklund, 2015a). Conversely, playing with strangers was seen as a more convenient option for engaging in fast-paced competitive play. This might also explain why social play (compared with solitary play) and playing with strangers (but not family or friends) are associated with greater amounts of play (Eklund, 2015b). Whether the choice of who is being played with describes different priorities or motivations for play, such as prioritising connecting with others over experiences of competence and competition, suggests a direction for future research.

It seems likely, however, that who is being played with influences the player experience. For example, a previously mentioned study (in section 2.5.1) also found that playing against a friend elicited significantly greater perceptions of presence, engagement and both physiological and self-reported arousal than playing against a stranger (Ravaja, Saari, Turpeinen, et al., 2006). This contrasts with the findings of Cairns et al. (2013), who found no difference in terms of immersion for play with friends or strangers. Whether this was due to the use of a different measure of presence/immersion, or the disparity in numbers (Cairns et al.: friends = 30, strangers = 9; Ravaja et al.: an equal split) is uncertain, but these results should be viewed with caution. Interestingly, Gajadhar et al. (2008) found that friends experienced more social presence, verbal aggression and hostility than in play with strangers, but as the authors

have stated, it is not possible to know if these were experienced negatively or as good-natured displays of competition. As this study also found that friends experienced greater psychological involvement in play than did strangers, it seems likely that playing with friends raises the stakes and creates more exciting, and perhaps, more rowdy gameplay.

That play with friends might be more exciting than play with strangers is illustrated using objective and subjective measures in a study contrasting play between co-located friends and strangers, and the computer (Mandryk, Atkins, & Inkpen, 2006). In this study, 24 participants played *NHL 2003*, an electronic hockey game, while a range of physiological measures were taken: galvanic skin response (GSR), electrocardiography (EKG), EMG of the face ('smiling', and 'frowning') and heart rate (HR). Game ratings were also taken in the form of one item each measuring fun, challenge, frustration, boredom and excitement. While no differences were found between the conditions in terms of the participants' self-reported ratings, the modelled physiological emotions provided clear conditional effects. Playing with a friend was more exciting than playing against the computer, while playing with a friend was more fun than playing alone or with a stranger. No differences were found for frustration, boredom and challenge. This adds support to the notion that a hierarchy of enjoyment exists in social play that privileges interactions with those we are already familiar with over strangers, but holds both of these above no interaction with humans.

Whether these differences in the player experience could also be connected to differences in wellbeing has yet to be clearly established. However, research into MMORPG play (using ethnographic, interview and survey methods) suggests that play with offline friends helps to regulate gameplay, in that it becomes harder to immerse and potentially develop problematic playing habits such as excessive amounts of play (Snodgrass, et al., 2011), and play with family and friends increases certain forms of psychosocial wellbeing (Shen & Williams, 2011). This is also supported by research showing that familiarity and proximity with others online, as well as physical proximity, led to increased offline social support via the development

of online social capital (Trepte, et al., 2012). Relatedly, this study also showed a direct effect of physical proximity to offline social support.

In practical terms, playing with known others might also provide a performance advantage. A study of friendship and collaboration in gameplay compared survey data of 1191 players (94.9% male) of *Halo: Reach, a* multiplayer first-person shooter (Mason & Clauset, 2013). In addition to taking self-report measures, the study made use of behavioural data from game competitions and combined these to question how play style and friendships affected performance. Self-report measures included demographics (age, gender, location, highest level of education), amount of play, play style (whether players were team leaders or support players, framed as collaborative, or 'lone wolf' players, framed as non-collaborative), relationship with other players in their game history (defined as either online friend, offline friend or not a friend) and psychometric measures such as group cohesion, entativity and conflict. This data was also compared with that of another selection of random players to establish that the target sample was made up of a higher level of committed and experienced players than was represented in the general population. Of interest is that a proportion of players overlapped in terms of acquaintance. When asked if they regarded each other as friends, reciprocal responses were made 36.9% of the time for online friends and 60.9% for offline friends. The authors suspected this was due to participants not realising they could report friendships for the entire list, and go on to establish that these different categories reflect actual commitments by testing for patterns of co-play. As anticipated, both online and offline friends played together the most, then online (but not offline) friends, then offline (but not online) friends and least of all, strangers. Following from this, the researchers discovered that the more friends on a team, the more assistance was offered, while betrayal became less likely. Betrayal of the players' own team was more likely to occur when the opposing team had more friends in it, and would only turn around once their own team had more friends than the opposing team. As the authors have suggested, this implies that players in these teams prioritised relationships over performance. However, individual performance was also likely to improve in these teams, and this effect was shown to

operate independent of the games' matchmaking algorithms. The practical benefits of playing with friends suggest another way to approach matchmaking in team multiplayer games.

Finally, it is worth considering the benefits of playing with family members. While Shen and Williams (2011) found that playing with family members increased family communication time, offsetting some of the negative effects on family communication quality predicted by increased amounts of play. Additionally, there is preliminary evidence that intergenerational video game play can be useful in fostering parent–child communication and mentoring, though as the authors have noted, some games are better at fostering exchange than others (Chiong, 2009). Video game play between very distant age groups has also been identified as beneficial in an experiment using 53 elderly participants (average age of 76 years) and 53 young participants (average age of 17 years), paired randomly in young–old dyads (Chua, Jung, Lwin, & Theng, 2013). Participants played in one of two conditions: non-video game (with any interaction normally taking place at a seniors centre: watching television, chatting, playing cards, handicrafts) or video game (with Nintendo Wii titles: *Wii Sports*, *Cooking Mama* and *Wii Party*). Pre- to post-test comparisons found that intergroup anxiety (how anxious participants felt about their partner) decreased, and positive attitudes towards their partner increased, with the greatest changes demonstrated in the video game condition. Interestingly, the young participants showed a greater change in their attitudes than the elderly participants. While the participants in this experiment did not know each other, the study has obvious implications for intergenerational play within families, as well as offering a recommendation for creating more engaging spaces within elderly care centres.

Overall, these studies show that playing with known others might bring greater arousal, presence, engagement and enjoyment, as well as practical and psychosocial benefits. However, people play with strangers with some regularity (30% of players reported playing with strangers in an Australian sample of 3398 individuals (Brand & Todhunter, 2015)). Why this is so could be indicated by studies interrogating the types of interactions players have in games.

2.5.4 Interaction Type

The type of interaction with the other does much to affect the player experience. Dominating multiplayer games is the 'us versus them' narrative, or competitive play. Whether this is because competition facilitates the satisfaction of competence needs (Kazakova, et al., 2014) or because challenge itself is inherently enjoyable is unknown. Regardless, competition permeates most forms of gameplay and distinguishing wholly cooperative gameplay becomes a fraught task. Team-based play, for instance, offers a combination of cooperative and competitive play. To find purely cooperative gameplay entails playing against the game (rather than against humans), illustrated by games where two or more people collaborate to solve puzzles, negotiate terrain or world build. This is exemplified by puzzle platform games, such as *Portal 2* and *Rayman Legends* (players traverse levels by solving puzzles involving physics), and in simulation games such as *Minecraft* and *The Sims* (players control building blocks and humanoid characters, respectively). The lack of clearly defined goals in the latter category, however, opens up the question of whether they are games at all or if they are just virtual worlds that invite free play and have some game elements.

The nature of the opponent might also link to interaction type to influence the player experience, such that play in opposition to game elements might be experienced differently to play in opposition to more human-like artificial intelligence (AI). Collaborative play where a human team forms to fight game elements includes Horde mode in *Gears of War* (third-person shooter where a player can see their own character on screen; it features a military science-fiction storyline), and Mann vs. Machine in *Team Fortress 2* (a team-based first-person shooter with clearly defined roles, e.g. Pyro, Engineer, Medic). In this mode, a human team, or a combination of human and agents, fight off wave after wave of computer-generated enemies. Unlike game AI that attempts to replicate human-like intelligence and decision-making, these enemies have specific and varying traits with a range of skill levels, but without the unpredictability of a human player or human-like AI. In this sense, a division can be made between playing against an avatar or agent (human-like), and playing the game. This distinction

becomes particularly relevant when trying to distinguish between competitive and cooperative play in shooter games, which have ostensibly developed the most realistic game AI, and when designing an experiment contrasting competitive and cooperative play.

A great deal of the work attempting to distinguish between competitive and cooperative play has been addressed in studies focussing on partitioning the effects of the violent content and social contexts of play (Adachi & Willoughby, 2011; Ballard, et al., 2012; Ewoldsen, et al., 2012; Greitemeyer, et al., 2012; Schmierbach, 2010). For example, one study using two experiments found that playing a violent game cooperatively increased cooperative behaviour post-play (Greitemeyer, et al., 2012). In the first experiment, participants played in one of three conditions: cooperative team player violent, single-player violent and single-player neutral. The violent game was *Far Cry*, a first-person shooter (a Special Forces operator is stranded on an archipelago; shenanigans ensue), while the neutral game was *Tetris* (a tile-matching puzzle game) and participants played across two pairs. After play, the participants took part in an anonymised give-some dilemma: participants were given four chips and told that their partner (in another room) was given the same number of chips and the same instructions. Each chip was worth one Euro to the participant and two Euros to their partner. Each participant had to decide how many chips to leave for their partner—knowing this was an anonymous choice—with the number of chips they left behind used to gauge cooperative behaviour. Subsequent analyses found that both the cooperative violent game and single-player neutral game had increased cooperative behaviour compared with the single-player violent game, which remained significant even when controlling for perceived excitement. No significant differences were found between the single-player neutral and cooperative violent game. A second experiment using a different violent video game (*FlatOut,* a demolition derby racing game), no neutral game and additional measures also found that the cooperative condition produced greater cooperative behaviour as well as feelings of cohesion. Though this may seem to establish that cooperative play results in cooperative behaviour, this field of research is in need of studies that replicate the results across a range of games, and ideally with other measures of cooperative

behaviour. Tear and Neilsen (2014), for example, in a study of the effects of playing violent, non-violent and ultra-violent games on pro-social behaviour, made use of a tangram task and a potential charity donation. While the authors found no relationship between game type and pro-social behaviour, the participants also did not play cooperatively in any of the games. This further supports the notion that interaction type may be more impactful than content.

Supplementing the previous study is one contrasting the cooperative, competitive or solitary play of *Halo* (a first-person shooter using a military science-fiction backdrop) (Schmierbach, 2010). This experiment found that competitive players used a significantly higher level of aggressive terms than cooperative players. Solitary players reported the most anger, and no effect was found for the social context of play on arousal. Violent strategising was found to partially mediate the effect of interaction type on aggressive cognition. It is possible, however, that the three contrasted conditions differed in ways that could have influenced the comparison of competitive to cooperative contexts. In the solo and cooperative conditions, participants played campaigns or against the game, and no participants finished the game in the time allotted. However, the competitive condition was conducted in a 'death match' wherein the participants played multiple matches against another participant, which entailed restarting the level as often as needed until their time was up. These differences make comparison between the competitive condition and the other two fraught. While this study does not directly deal with wellbeing outcomes, it does suggest that cooperative play might act to lessen potential negative effects (aggressive cognition). It also highlights the difficulty of contrasting competitive to cooperative play.

A more recent study attempted to equalise competitive and cooperative play by having players play against the game using a split-screen in both conditions, but changing the goal structure (Waddell & Peng, 2014). In the cooperative game, the players' goal was to work with their partner to earn a combined score that was higher than their tutorial session, while in the competitive game, they were told to earn a higher score than each other. Additionally, a measure of how difficult they found the game was taken and entered as a covariate, while a similar

dilemma to that used in Greitemeyer et al.'s (2012) study was used to assess cooperative behaviour. Finally, cooperative play was found to produce significantly greater post-play cooperation than competitive play. Again, however, this raises the question of whether 'primed' competition, when players still play against the game, is the same as direct competition, where players compete directly with another player. This is also the case for a study contrasting competitive play with non-competitive play (Kazakova, et al., 2014). In Kazakova et al.'s (2014) experiment, participants arrived at the laboratory in pairs, and each played two games of a first-person shooter, one in which they were told to 'relax and enjoy the game' (non-competitive), and the other in which they were told that their scores would be compared (competitive). Players in the competitive condition experienced the satisfaction of competence needs to a significantly greater degree. While this type of gameplay is not typical of team-based play, it does resonate with the indirect competition of leaderboard scoring, and avoids the difficulty of finding tasks that are comparable to the interaction under study. For example, Lim and Reeves' study (2010), outlined in section 2.5.2, contrasted direct competition to a cooperative task (competitive: fighting duels; cooperative: trading items) and found greater arousal (skin conductance, heart rate) in the competitive condition, and greater presence in the cooperative condition. However, as mentioned earlier, the contrasted tasks suggested the potential for other variables affecting the results.

Taken as a whole, the research on competitive and cooperative play suggests the need for further experimentation across a range of game genres and tasks in order to see if the results converge, as the challenge of balancing external and internal validity is compounded by the complexity of the social factors affecting gameplay. This is illustrated by an experiment contrasting competitive and cooperative play with a manipulation of the playing partner's demeanour (Schmierbach, et al., 2012). In Schmierbach et al.'s study, participants were asked to either offer positive or negative comments to their partner while playing the sports game *Madden NFL '08* (based on American football) either competitively, cooperatively or alone. Unsurprisingly, greater partner liking occurred when they behaved in a friendly manner, while

no effect was found for the social context of play. A combination of competitive play with a friendly partner, however, produced significantly greater enjoyment than all other conditions. These results, and those produced by Lim and Reeves (2010), suggest that competitive play could be driving player enjoyment via the production of greater arousal, but unfriendly partnering might generate interference. Of interest is whether friendly behaviours are linked to interactions with familiar others and vice versa for unfamiliar others. Overall, the interplay of interaction type with relationship type brings greater nuance to understanding how social play might influence wellbeing.

Finally, the study of multiplayer games is greatly aided by already-established research into team psychology carried out in real-world sports. Team sports psychology offers insights into the impact of individual roles within a team (Cotterill, 2013) that might correspond to the experiences within team-based multiplayer games (Murphy, 2009). The designation of formal and informal roles without a team seems particularly pertinent to multiplayer games, in that while formal roles account for instrumental goals (e.g. being a Medic in *Team Fortress*), informal roles can be seen to develop organically from the interaction types that take place during gameplay. The kinds of informal roles identified by sports psychologist theorists include those of the comedian, distractor, enforcer, mentor, 'spark plug' (someone who inspires the group towards a common goal), cancer (someone who expresses negative emotions that spread throughout the team), informal leaders (leading by example or verbal commands), team player, star player, malingerer and social convener (Cope, Eys, Beauchamp, Schinke, & Bosselut, 2011). While not all of these are comparable to gameplay (e.g. 'the malingerer'—someone who prolongs sense of injury in order to gain attention), some are very pertinent (e.g. 'cancer', or a toxic player), and provide another means of both examining team multiplayer games and understanding how they can affect team cohesion and game enjoyment.

In terms of experimental research into the effects of interaction type on the player experience, however, comparisons are hampered by the use of off-the-shelf games, which are rarely designed to differ only in terms of the interactions players have. While this should not

prevent the use of further experimental research, it does suggest the need to both approach experimental research cautiously, and to explore other methods of investigating the potential effects of interaction type on both the player experience and wellbeing.

2.6 SUMMARY AND IMPLICATIONS

This literature review has provided an overview of the research pertaining to gameplay research and wellbeing, as well as the social context of play. As a result, it highlights various theories and constructs, and these provide useful variables to incorporate into the research design. In particular, SDT provides working links between the player experience and wellbeing, while SCT ties social interaction in gameplay to wellbeing via potential social support. The constructs of autonomy, competence, enjoyment, flow, presence/immersion, relatedness and the social context of play offer a means of examining the player experience in greater detail, and might also potentially influence or indicate differences in wellbeing. The study of the social context of play, in particular, suggests various contrasts: that of social and solitary play; play with known and unknown others; and competitive, cooperative and mixed play (see Figure 2.4).

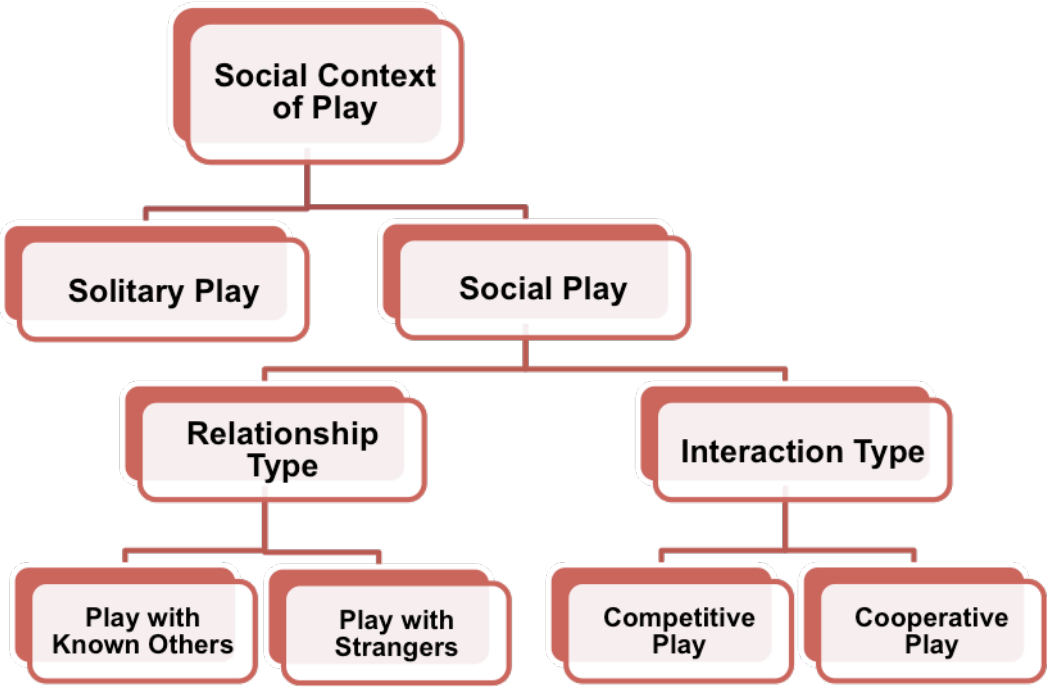

Figure 2.4 Social context of video game play

3 Methodology

A multi-method approach was used to study how the social context of play, the player experience and wellbeing coincide. While all the four studies proceeding from this point made use of quantitative analysis techniques, a range of methods were employed (survey, interview and experimentation), as were qualitative methods and analysis (Chapter 6). This approach was driven by the following considerations:

1. To advance the studies from exploratory to targeted.
2. To uncover not just the outcomes or associations between factors—or *what* is happening—but to discover the reasons *why* people do what they do.
3. To develop a holistic perspective of the research problem and not have any understanding gained to be framed, and perhaps distorted, by a single method.

These considerations follow from a post-positivist outlook, and as such, this thesis tries to remain critical of the methods employed, and to balance the weaknesses of one with the strengths of another. Thus, while the studies move in a linear fashion from the broadly explorative to more specific contrasts of the social context of play, this thesis makes use of multiple methodologies sequentially across multiple phases of study, as well as mixed methods within a single study. Using Greene, Caracelli and Graham's (1989) framework of mixed-method research purposes, this program of research (and the single mixed-methods study) aims to produce complementarity in that the various studies are designed to elaborate and clarify the results of each method employed. The key risks of this approach are that it can develop a patchwork, rather than focussed, study of the research question, and can result in loss of validity, particularly when findings contradict rather than support each other, and in findings that rely on the subjective interpretation of qualitative data.

Regarding the first point, maintaining a focussed and scoped program of research, the studies (described in greater detail in section 3.2) were designed to initially explore and test theories of human motivation and social interaction, then reduce this into both a richer analysis of the experience of play and a rigorous test of the key relationships identified earlier. In this way, this thesis produces results that funnel from broader associations to more granular understandings of motivation and then to specific causal relationships. Regarding the risk of validity loss due to differing results across studies, the best defence is to respect the assumptions of each methodology and thereby maintain rigour. Within mixed-method studies, clarity about the 'point of interface' (Morse, 2010, p.348) will also produce greater integrity. Within this program of research, this refers to combining quantitative and qualitative data, and clearly defining the core and supplementary components.

Additional concerns, not limited to mixed-methods research but certainly acknowledged in the field (Tashakkori & Teddlie, 2008; Teddlie & Tashakkori, 2009), include design suitability (does the method of study best answer the research question), maintaining internal and external validity (is the study designed and implemented to both best capture the data that will answer the research question), the appropriateness of the analytic strategy and the adequacy of the interpretation. The remainder of this chapter addresses some of these concerns by delineating the scope of the research and describing how the research questions are answered across four studies. The strengths and weaknesses of each methodology or method employed are briefly discussed. Tabulation of the links between objectives, research questions, method and the corresponding chapter are provided in section 3.3.

3.1 SCOPE

The problem this thesis addresses is a lack of knowledge regarding how the social context of recreational video game play and wellbeing interact; it achieves this by focussing on the player experience. In order to refine the scope of this endeavour, the following limitations and definitions were designated.

Only video games played recreationally and in popular use—a broad category in and of itself—were studied. 'Popular use' refers to all games that can be played on phones and other handheld devices, computers and consoles. This thesis does not, however, attempt to address games that are more experimental or rare in their occurrence, such as augmented reality games (games using real-world graphics augmented with computer-generated input), geolocation games (games that use real-world location tagging) or combinations of devices, such as pairing Kinect (a motion-sensing game device) with an Oculus Rift (a virtual reality head-mounted display). Nor does this research address 'serious games' (which have been developed with the aim of producing behavioural and attitudinal changes in the player), the use of popular games for pedagogical purposes or the use of gamification.

The social context of play has been defined as including solitary and various forms of social play. While there are diverse ways for people to play games together or alone, this thesis has restricted itself to contrasts between social and solitary play, and when focussing on social play, to relationship type (whether players knew each other or not) and interaction type (competitive or cooperative play) (see Figure 2.4). These categories formed the basis from which more nuanced categories were also formed, such as a mix of competitive and cooperative play, competitive play with strangers, etc. While it might also be possible to produce multiple types of solitary play, this thesis has simplified solitary play to refer to play that is alone, including when play is only with computer-controlled characters (agents).

Wellbeing herein only refers to elements of mental, not physical, health. The study of wellbeing is relatively new, and what constitutes wellbeing and how to measure it is still being refined. However, of the constructs this thesis refers to (Appendix A), the MHC (Keyes, 2002) is the one that it makes most use of due to its components of emotional, psychological and social wellbeing. Measuring aspects of wellbeing, such as positive affect, were also used when the methodology required a measure of emotional changes immediately resulting from gameplay. In this way, immediate post-play mood could be captured, rather than more global concepts such as social wellbeing.

Finally, while there might be other factors affecting player wellbeing, this thesis is concerned primarily with investigating the player experience. While this is also a broad category, the player experience herein only refers to the experiences of autonomy, competence, enjoyment, flow, presence and relatedness. The links between the social context of play, the player experience and wellbeing are examined through the lens of SDT and SCT.

3.2 RESEARCH DESIGN

In order to identify how the social context of play interacts with the player experience and wellbeing, this research began with an extensive review of the literature. The objectives of this research stage were to determine the key theories and constructs that would drive the research, gauge which methods and measures would be appropriate to take forward and establish differences in the player experience for different social contexts of play (as outlined in section 2.6, Figure 2.4). The following key theories, constructs and relevant measures were identified:

Table 3.2 Application of theories and constructs

Theory	Construct	Measure	Section
Self-determination theory (Deci & Ryan, 2000)	Autonomy Competence Relatedness/Connection	Player Experience of Need Satisfaction (PENS) (Ryan, et al., 2006) Connection – derived from the Overlap of Self/Ingroup/Outgroup measure (Schubert & Otten, 2002)	2.2 & 2.4.1
Social capital theory (Putnam, 2000)	Bridging social capital Bonding social capital	Internet Social Capital Scales (ISCS) (Williams, 2006)	2.3
	Flow (Csikszentmihalyi, 2000)	Flow State Scale (FSS-2) (Jackson, Martin, & Eklund, 2008)	2.4.3
	Intrinsic Motivation	Intrinsic Motivation Scale (IMI) (McAuley, Duncan, & Tammen, 1989).	2.4.2
	Positive Affect	Positive and Negative Affect Schedule (PANAS) (Mackinnon et al., 1999).	2.1.1

	Presence	Player Experience of Need Satisfaction (Ryan, et al., 2006)	2.4.4
	Wellbeing	Mental Health Continuum (MHC-SF) (Keyes, 2002)	2.1

These measures were applied, where appropriate, across a series of four studies in order to identify how the social context of play relates to both the player experience and wellbeing. While it was important to keep measures consistent across all four studies, it was not always practical due to concerns about player fatigue (leading to the exclusion of flow from Study 2 and 4), and the requirements of different methodologies (leading to the MHC being substituted with the PANAS and an additional measure of challenge in Study 4). Also, though the addition of ISCS in Study 2 overlaps with that of PENS relatedness, it allows exploration of how feelings of relatedness might transfer to or reflect social realities – that the quality and reach of our social networks bring with them the means of accessing practical and emotional social support. As such it provides an important dimension to the study of the social context of play and wellbeing, which does not obscure the benefits of feelings of affinity and connection with others. These decisions are presented in greater detail in the relevant chapter introductions and discussions.

3.2.1 Study 1

The next stage of the research empirically investigated the relationship of the player experience and the social context of play to player wellbeing. While the literature suggested that the relationship between wellbeing and video game play might be explained by the player experience (Boyle, et al., 2011; Przybylski, et al., 2010), this relationship was yet to be explored in a wide range of games or against a multidimensional measure of wellbeing. Additionally, while the social context of play had been shown to result in different player experiences (section 2.5), there was little to link it directly to wellbeing. Therefore, this study sought to answer the following questions:

RQ1. What elements of the player experience relate to wellbeing?

RQ2. Does the social context of play relate to wellbeing?

Additionally, it seemed likely that other factors that impinge on the player experience (amount of play, game genre, age and gender) could also affect player wellbeing. The objectives therefore included establishing that the player experience and the social context of play are predictive of wellbeing, and determining if they have an effect after taking into account other factors that might be influential. This was extended to account for the effect of the player experience after considering social context. In turn, to establish the foundations of the investigation into the social context of play, a broad contrast between social play and solitary play was used.

The survey methodology was chosen to answer these questions because of its ability to collect data from a wide range of participants, allowing for exploration across player demographics and game genres. A convenience sample was recruited and snowball sampling techniques were also used (Morgan, 2008). Convenience sampling offers a fast and inexpensive way of reaching the target population, and though it risks introducing bias (Henry, 1990), it is useful when seeking to access a specific population—in this case, video game players. Recruiting via multiple avenues also offsets some of the bias risks: using established research participant lists, a university games course, online forums, social media and the researchers' community. Attrition from the survey, due to the length and time it took to complete, was minimised by using validated short-form versions of scales wherever possible. While causality cannot be attributed to the analysis of survey data, which only shows possible associations between variables, the results can be generalised across the population. The use of survey also benefits the field of research by offering repeatability and further validation of the measures used. Additionally, while correlational findings do not provide insight into why people play the way that they do, they do answer questions of how they play and how wellbeing might be

affected by that play. Results from the survey aligned with some of the literature review findings, while also identifying which elements to focus on in a more targeted enquiry.

3.2.2 Study 2

This stage of the research extended the enquiry of Study 1 by asking more nuanced questions of the social context of play and its relationship to both the player experience and wellbeing. This study sought to establish differences in the player experience between social and solitary players, as well as between more complex social play categories. Differences in terms of social capital in gameplay were also explored, but for social players only. Social play categories were given greater specificity by combining elements of relationship type and interaction type to produce categories that were more representative (e.g. playing cooperatively with friends). The first set of questions were framed as follows:

> **RQ3a.** How do the different social contexts of play differ in terms of the player experience?
>
> **RQ3b.** For social players only, how do the different social contexts of play differ in terms of social capital?

Following this, questions were asked of the relationship between the social context of play and wellbeing. These questions were structured to establish if there were different predictors of wellbeing for solitary and social players, as well as to test which aspects of the social context of play were more predictive of wellbeing for social players.

> **RQ4a.** How do social and solitary players differ in terms of what influences their wellbeing?
>
> **RQ4b.** For social players, is relationship type or interaction type better at explaining the link between the player experience and wellbeing?

To answer RQs 3 and 4, a second cross-sectional online survey was employed, making use of the same recruitment strategy and measures used in Study 1, with the addition of a measure of in-game social capital. The measure of social context of play was expanded to include relationship type (playing with known others or strangers) and interaction type (competitive play, cooperative play or a mix of both). In order to maintain a reasonable length of time to complete the survey, the measure of flow was excluded.

The reasoning for using the survey methodology for the second study follows the reasoning of Study 1, as do its relative strengths and weaknesses. Unlike Study 1, however, Study 2 establishes key differences in the player experience of social and solitary players, while also detailing the relationship of specific social contexts of play (e.g. people who play cooperatively with known others) to different forms of social capital. Study 2 also reveals differences in the predictors of wellbeing for social and solitary players that both reflect and question some of the literature review findings. The use of survey also provided a means of collecting data for the next study, which presents a departure from the type of question asked in this and Study 1.

3.2.3 Study 3

While the previous studies answered questions relating to what kind of relationship the social context of play has to both the player experience and wellbeing, Study 3 asked why players play in particular social contexts. By better understanding the reasons behind the choice of social context of play, this study provides insights that can place other findings into perspective. Relatedly, rather than framing this enquiry around one recently played game (Study 1 & 2), it asked players to reflect on the way that they generally play. This takes into account the fact that players do not always engage in their most preferred form of play, provides a means of discovering why and queries the kind of play that is most likely to affect their wellbeing. And while players might express an enjoyment of particular forms of play, understanding how both pleasant and unpleasant experiences contribute to the overall experience of play, and how players prioritise these experiences, brings depth to the study of social context and video game

play. This in turn sheds light on how these choices might both flow from and impact player wellbeing. Hence the following questions:

RQ5. Why do people commonly play in a particular social context?

RQ6. How might these experiences interact with their wellbeing?

To answer these questions, a parallel mixed-methods study (Teddlie & Tashakkori, 2009) was conducted, making use of the open-ended responses collected in Study 2 and interview data collected from a separate sample. Specifically, open-ended responses collected in Study 2 were coded thematically using two raters until an acceptable level of statistical reliability was reached (Cohen's Kappa). These codes were then analysed for their distribution across the participants' preferred social context of play, categorised as either 'who' they played with (solitary play; relationship type: play with known or strangers) or 'how' they played with others (interaction type: competitive play, cooperative play or 'mixed play', which is both competitive and cooperative). This formed the core analysis.

In tandem, a series of semi-structured interviews were held. Participants were sourced using the same recruitment strategies as the previous two studies. The interviews were transcribed and sections pertinent to the participants' preferred social context were identified by one rater. The codes developed on the survey data were tested on 10% sections of this new sample, and applied to the entire sample once agreement was reached. Responses that matched the themes identified in the survey analysis were then applied to the interpretation of the coded distribution in order to supplement the core analysis and create richer meaning. Due to the likelihood of social desirability bias influencing the interviews to a greater degree (Kreuter, Presser, & Tourangeau, 2008), this data was used purely to supplement and enrich the analysis carried out on the survey data. As such, the interview data did not inform the development of the thematic codes, nor were the distributions of codes analysed.

Parallel mixed methods were employed in order to gain the strengths of qualitative research (Teddlie & Tashakkori, 2009), and counteract some of the weaknesses (e.g. small

samples when interview techniques are used; subjectivity of the coders influencing outcomes; sampling bias). In other words, this method provided insight into results from previous studies, which in turn could be used to reframe further enquiry beyond the scope of this thesis. Additionally, within the study itself, the coded distributions could be given greater depth and meaning when paired with the interview data, while the subjectivity of the interview data was anchored to a quantitative framework.

The analysis (coding) of Study 3 followed the practices of grounded theory. Grounded theorists, however, are still formulating positions around certain practices, specifically those reconciling the impact of pre-existing knowledge when approaching the coding of data (Kelle, 2005). This study's method diverges from more purist practices that demand the researcher have no prior theoretical knowledge that might 'force' data into concepts (Glaser, 1992). By contrast, this study followed more recent practices that acknowledge the impracticality of engaging with data in a theoretical vacuum (Kelle, 2005). Instead, prior knowledge is considered a source of insight that might encourage the emergence of concepts from the data. Some of the ways to achieve this include maintaining theoretical agnosticism (a critical stance towards theory), theoretical pluralism (flexibility in choosing theory/ies), staying grounded (prioritising the data), theoretical playfulness (creative thinking) and constant reflexivity (Thornberg, 2012). In turn, this iterative, constantly adjusting process stops only when pre-determined goals (such as an acceptable Cohen's Kappa statistic) are reached.

By maintaining both a critical and open-minded stance, this study determined some of the reasons people choose one social context of play over another, confirming some of the previous study's findings, but also contradicting some of the literature review findings—namely, those dealing with experimental studies.

3.2.4 Study 4

The literature review suggested that aspects of the player experience and mood would be positively affected by play with another human (Cairns, et al., 2013; Gajadhar, et al., 2008;

Johnson, Wyeth, et al., 2015; Lim & Reeves, 2010; Ravaja, Saari, Turpeinen, et al., 2006; Schmierbach, et al., 2012; Weibel, et al., 2008). However, these studies have either made use of different genres of game or different contrasts of the social context of play, or did not control for differences in avatar and agent behaviour. Study 4 fills a gap in the research by experimentally testing cooperative play with an avatar and an agent in a first-person shooter, with adjustments in the design to account for potential differences in the behaviour of human and computer-controlled characters. The study's objectives were to determine if playing with another human was enough to change the player experience or affect a wellbeing measure, and to establish causal relationships (lacking from the previous three studies). For example:

RQ7. Does playing with either an avatar or an agent affect the level of positive mood?

RQ8. Does playing with either an avatar or an agent affect the player experience?

This study used the experimental methodology in order to establish differences between different social contexts of play in a way in which was repeatable and controllable, and in order to show cause and effect. A repeated-measures laboratory-based experiment was conducted. This method provided the conditions under which causality could be determined and researcher biases minimised. Counterbalancing the design offset the risks of order effects, while a deception was employed to ensure that the variables measured were only influenced by the perception of the social context of play (Shaughnessy, Zechmeister, & Zechmeister, 2012). A double blind was not practical; however, the experiment was largely automated and scripted, thus keeping the researcher's influence to a minimum. The greater risk with the use of this methodology is the loss of external validity. In the case of video game play research, the very wide range of mechanics and content means that attempting to generalise results from the use of one game can be fraught. Laboratory-based experimentation on social context also suffers from an inability to fully reproduce the context in question (Levitt & List, 2007). This research does, however, add to the body of research explored in section 2.5, and as such, the results can be crosschecked against those produced by other methodologies and procedural choices.

Using the experimental method completed the program of research by providing evidence of significant relationships and causal directions between the social context of play and both the player experience and an aspect of wellbeing (Chapter 7). Additionally, the player experience was expanded to include measures that were not used previously, due to wishing to avoid participant fatigue (namely, enjoyment) in order to test the internal validity of the experiment (whether both conditions were equally challenging), and to further focus on the social context of play under study (cooperation). Though the findings were largely in line with the literature review, aspects contrasted with those of previous studies (2 and 3). Reflections on differences in outcome across methods and studies are discussed in Chapter 8.

3.3 SUMMARY AND STRUCTURE

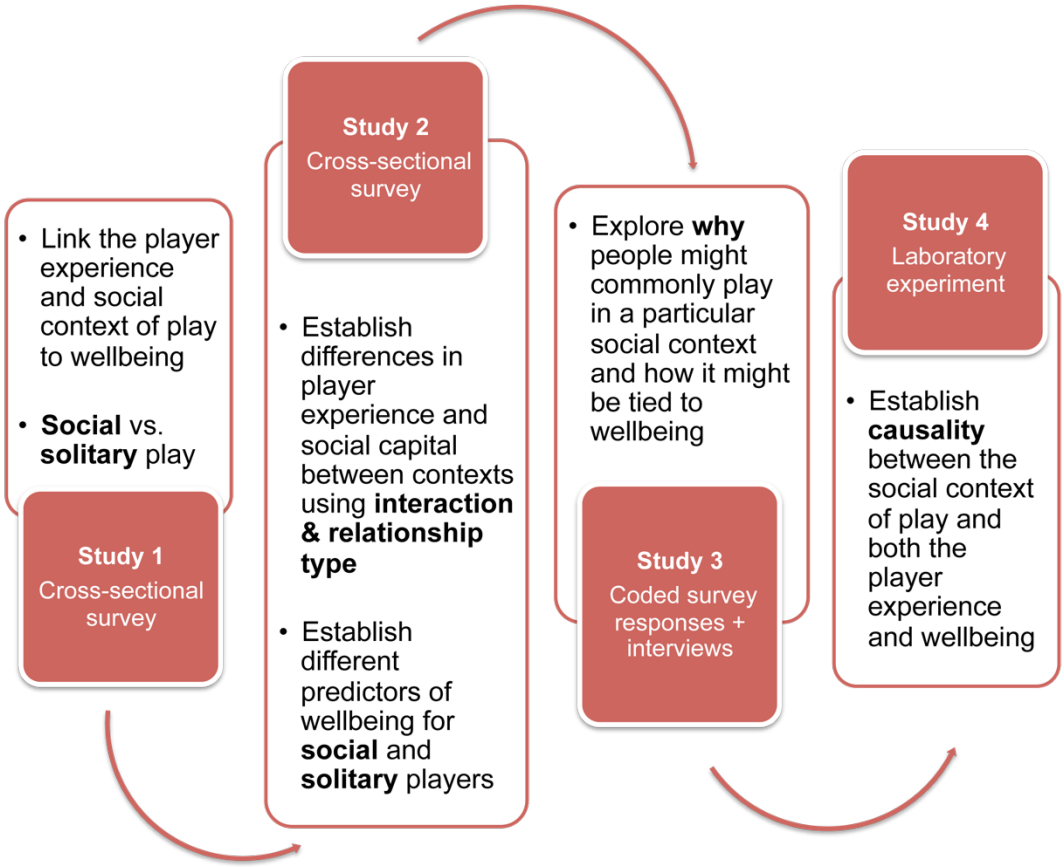

Figure 3.1 Research Design

4 Study 1

This research began with a broadly explorative study, looking at a range of gameplay experiences (diverse games and devices), with the aim of identifying the indicators of player wellbeing; it established that the social context of play and the player experience are worthy of further research. The research outlined in Chapter 2 suggested that the identified needs of autonomy, competence and relatedness, outlined by SDT, might account for a relationship between gameplay and wellbeing (Przybylski, Weinstein, et al., 2009; Ryan, et al., 2006), while other aspects of the player experience, namely presence and flow, brought depth to the enquiry. That the player experience was found to vary across social and solitary contexts of play (Cairns, et al., 2013; Gajadhar, et al., 2008; Lim & Lee, 2009; Ravaja, Saari, Turpeinen, et al., 2006; Weibel, et al., 2008), suggests that the social context of play might also indirectly impact wellbeing. Correspondingly, the following questions were asked:

RQ1. What elements of the player experience relate to wellbeing?

RQ2. Does the social context of play relate to wellbeing?

Factors such as age and gender, amount of play or game genre have also been associated with differences in the player experience or wellbeing (Behm-Morawitz & Mastro, 2009; Eckermann, 2014; Gajadhar, et al., 2010; Hamlen, 2010; Johnson, Nacke, et al., 2015; Johnson, Wyeth, Sweetser, & Gardner, 2012; Przybylski, Weinstein, et al., 2009; Wang, et al., 2008); thus, this study sought to establish that the player experience and the social context of play are predictive of wellbeing after controlling for their influence. Secondarily, it sought to discover if the player experience is predictive of wellbeing after controlling for the influence of the social context of play. In order to begin the investigation into the social context of play, the social context of play was presented as a simple contrast of social play to solitary play.

4.1 METHOD

4.1.1 Recruitment

The desired sample size was 200 to 400 participants to allow for testing of the impact of individual predictors via multiple regression (Tabachnick & Fidell, 2007). Approval was sought and granted by a Queensland University of Technology (QUT) ethical review board to recruit individuals aged 12 years and above, with an interest in playing commercially available games played electronically on any device, to complete an online survey. Participants were recruited from a video game studies course at a university, the general public) via gaming forums and social media) and a research database of participants from prior studies. Snowball sampling techniques (Morgan, 2008) were also used. Data collection ran from December 2012 to April 2013. Participants had the opportunity to enter a draw to win one of 10 $100 gift vouchers.

4.1.2 Procedure

After providing informed consent, respondents answered a series of questions regarding their demographics, and were asked to list the title of the 'most recently purchased video game that they had played at least once', referred to herein as the target game. This game was referred to in subsequent questions about the amount of hours in total that they had played the game, the game genre and the social context of play. A guided recall was used to prime respondents before the game experience questions, in which participants were asked to 'Think back to the last time you played [target game] [social context of play]. Try to remember where you were, what was happening in the game, and how you felt at the time. In the box below please explain (in about 30 words or less) which part of the game you were playing and what was happening'. Following this, the PENS, Flow State Scale (FSS-2) and MHC Short Form (MHC-SF) were listed on separate pages with the items randomised.

4.1.3 Measures

Demographics. Participants were asked to indicate their age and gender (male/female).

Amount of play. Participants were asked to indicate the total reported number of hours spent playing the target game in a text box.

Game genre. Participants indicated the genre of the target game from a drop-down box. They also had the option of listing an 'other' response in a text box. Responses were checked for consistency by the first author, and in some cases changed (e.g. *Angry Birds* was recoded as a casual game instead of a strategy game). To avoid having a large number of categories, genres were recoded into conceptually similar meta-genres: Action–Adventure (action–adventure, action–role-playing, text–adventure), Casual (board or card game, casual, dance, music, puzzle, platform), Role-Playing Games (MMORPG, role-playing game), Shooters (first-person, third-person), Sports & Simulation games (fighting, flight, racing, simulation non-flight and sports) and Strategy (real-time and turn-based).

Social context of play. Participants were asked, 'How do you most often play [target game]?' and could answer either: 1. online with people you know, 2. online with people you don't know, 3. offline with people you know, 4. on your own. Options 1, 2 and 3 were merged and contrasted with option 4 to form a variable that contrasted social and solitary play.

The full list of non-commercial items is displayed in Appendix B.

Player experience:

In-game flow. The FFS-2 (Jackson, et al., 2008), is a validated measure for assessing the experience of flow in a chosen activity. The scale is comprised of 36 items measured on a 5-point scale, an example being 'I did things spontaneously and automatically without having to think'. A total flow score was obtained by summing the item-average dimension scores.

In-game psychological need satisfaction. The PENS (Ryan, et al., 2006), a validated measure of the player experience with sub-scales of autonomy, competence, relatedness, presence and intuitive controls (last not used). Autonomy was measured with three items, competence with three items, relatedness with three items and presence with nine items,

examples being ‘I experienced a lot of freedom in the game’ (autonomy); ‘I feel very capable and effective when playing’ (competence); ‘I find the relationships I form in the game fulfilling’ (relatedness); and ‘When moving through the game world I feel as if I am actually there’ (presence). These were measured on a 7-point scale, from ‘Do not agree’ to ‘Strongly agree’. While flow was entered as a total score, rather than separate dimensions, the PENS is unable to produce a total score representing need satisfaction in gameplay (and not all dimensions were used, i.e. the scale measuring intuitive controls), and so were entered as individual scales.

Wellbeing. The MHC-SF (Keyes, 2002) is a validated measure of wellbeing with a total score, as well as emotional, social and psychological wellbeing subscale scores. It is comprised of 14 items, measured on a 6-point scale, and asks respondents how often they have experienced certain feelings over the past month, an example being ‘satisfied with life’. The total score is calculated by summing all items.

4.1.4 Data Preparation and Preliminary Analyses

All analyses were conducted using SPSS 21.0. A total of 460 participants aged 10 to 52 years attempted the online survey. Cases who did not provide responses on the demographic measures, the PENS, FSS-2 or MHC were removed (n = 106), as were two cases under the age of 12, 49 cases who had not recently played the target games for five or more hours, three cases that provided impossible values that led us to doubt the credibility of their other responses and three univariate outliers in the amount of play measure. The final sample was based upon data provided by a total of 297 participants aged 12 to 52 years (M = 25.60, SD = 7.99), 84.2% male, 15.8% female, 28.95% university students, 93.6% Australian.

Both genre and the social context of play were dummy coded into discrete variables. Each genre was compared with ‘shooters’, while social context compared ‘social play’ with ‘solitary play’.

The correlations between the continuous variables (Table 4.1, over page) were checked for highly correlated IVs. Descriptive statistics were collated: Table 4.2 (over page) displays the

wellbeing means and standard deviations of categorical variables; Table 4.3 (over page) displays the means and standard deviations for the continuous variables. Table 4.3 also displays the Cronbach's alphas of the scale measures. Amount of play showed a strong positive skew, so a logarithmic transformation was applied and the new variable was entered into the regression. The final sample size was sufficient for the planned multiple regression analyses (Tabachnick & Fidell, 2007) and all assumptions for hierarchical regression were met.

Table 4.1. Pearson's correlations (two-tailed)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Emotional Wbg	-										
2. Psych'l Wbg	.733**	-									
3. Social Wbg	.655**	.701**	-								
4. Total Wbg	.852**	.924**	.895**	-							
5. Age	-.009	.141*	.071	.091	-						
6. Amount of play	.030	.038	.013	.030	.086	-					
7. Flow	.148*	.162**	.157**	.175**	-.184**	.052	-				
8. Autonomy	.148*	.171**	.093	.152**	-.142*	.130*	.398**	-			
9. Competence	.169**	.105	.064	.116*	-.292**	.087	.543**	.469**	-		
10. Presence	.083	.027	.097	.073	-.255**	.027	.417**	.484**	.398**	-	
11. Relatedness	.198**	.156**	.180**	.194**	-.171**	.198**	.226**	.365**	.255**	.511**	-

*$p < .05$, **$p < .01$

Table 4.2. Wellbeing descriptive statistics for categorical variables

		Emotional Wellbeing		**Psychological Wellbeing**		**Social Wellbeing**		**Total Wellbeing**	
Gender	*N*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Female	47	9.62	3.53	19.66	6.29	12.77	5.64	42.04	13.7
Male	250	10.59	3.15	20.1	5.74	13.64	5.35	44.32	12.81
Context of play									
Social play	124	10.73	3.14	20.84	5.64	14.22	5.29	45.79	12.62
Solitary play	173	10.21	3.28	19.45	5.89	12.99	5.43	42.65	13.08
Genre									
Action-Adv.	82	10.5	3.1	20.01	5.57	13.11	5.62	43.62	12.49
Casual	20	11.6	2.56	22.05	4.37	15.95	4.41	49.6	9.9
Role-playing	27	9.74	2.97	19.56	4.78	12.67	5.52	41.96	11.73
Shooters	108	10.56	3.49	20.17	6.35	13.78	5.43	44.51	13.91
Sport&Sim.	26	10.12	3.06	18.92	5.47	11.58	4.85	40.62	12.31
Strategy	34	9.97	3.33	19.65	6.45	14.26	5.24	43.88	13.57

Table 4.3. Descriptive statistics for continuous variables and Cronbach's alpha for scales

	N	M	SD	α
1. Emotional Wbg	297	10.43	3.23	.84
2. Psychological Wbg	297	20.03	5.82	.81
3. Social Wbg	297	13.50	5.40	.76
4. Total Wbg	297	46.96	12.96	.90
5. Age	297	25.60	7.99	
6. Amount of play	297	110.72	258.03	
7. Flow	297	35.51	3.97	.92
8. Autonomy	297	5.17	1.24	.80
9. Competence	297	5.56	1.00	.76
10. Presence	297	4.04	1.35	.90
11. Relatedness	294	3.70	1.48	.66

4.1.5 Primary Analysis

Four hierarchical multiple regression analyses determined if social context and the player experience (PENS, FSS-2) predicted emotional, psychological, social or total wellbeing (MHC-SF). The effects of demographics, amount of play and game genre were controlled for and entered in a single step. To establish if the social context of play and the player experience (PENS, FSS-2) would have independent effects, they were also entered separately. Thus age and gender, game genre and amount of play were entered at Step 1, the social context of play at Step 2 and the PENS and FSS-2 at Step 3. Missing values were excluded pairwise. Both standardised and unstandardized coefficients are displayed in Table 4.4 (end of section 4.2).

4.1.6 Supplementary Analyses

To further answer RQ2 (Does the social context of play relate to wellbeing?), mediation analyses were carried out to determine whether the impact of the social context of play on wellbeing was being mediated by the construct of relatedness. Analyses were carried out on all the DVs using the PROCESS macro (SPSS add-on, applies listwise deletion to missing data) (SPSS add-on, applies listwise deletion to missing data, Hayes, 2013). Bootstrapped 95% confidence intervals are displayed. Due to the use of a dichotomous predictor variable (solitary v. social play coded as 0 and 1 respectively), unstandardised regression coefficients are reported as per the recommendations of Hayes (2013, p.43).

4.2 RESULTS

4.2.1 Emotional Wellbeing

The full model was statistically significant: $R^2 = .109$, $F(14, 279) = 2.438$, $p < .01$. The adjusted R^2 value of .064 at Step 3 suggests that 6.4% of the variability in emotional wellbeing was predicted by the final model. The addition of the social context of play to the model at Step 2 was non-significant ($p = .160$); however, the R became significant at the end of Step 3 with the addition of flow and the PENS, (R^2 change = .065). In the final step, only gender (being male compared with female) and in-game relatedness positively predicted emotional wellbeing. For this and all following regressions, see Table 4.4 for the regression coefficients.

Supplementary analyses revealed that the construct of relatedness was mediating the impact of the social context of play on players' emotional wellbeing, such that ab = .31, 95% CI (0.12, 0.65). The direct effect of the social context of play on emotional wellbeing was non-significant, ($p = .65$), suggesting that there is no evidence that social play impacts on emotional wellbeing (compared with solitary play) beyond its ability to generate feelings of relatedness. See Figure 4.1. Full model coefficients are provided in Appendix C.

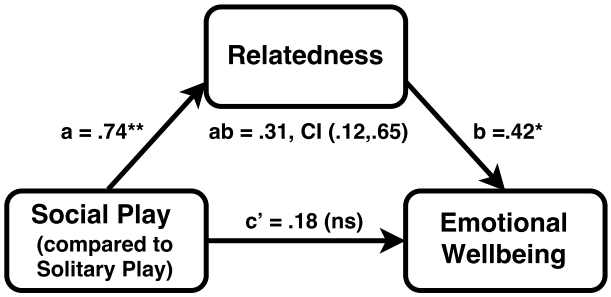

Figure 4.1 Mediation relationships—Emotional Wellbeing

4.2.2 Psychological Wellbeing

The full model was statistically significant: $R^2 = .135$, $F(14, 279) = 3.098$, $p < .001$. The adjusted R^2 value of .091 at Step 3 suggests that 9.1% of the variability in player psychological

wellbeing was predicted by this final model. The addition of the social context of play to the model at Step 2 was marginally significant (p = .052). The R became significant at the end of Step 5, (R^2 change = .078). At this level, only older age and the experiences of autonomy, relatedness and flow in gameplay significantly predicted a positive relationship to psychological wellbeing.

Supplementary analyses revealed that the construct of relatedness was mediating the impact of the social context of play on players' emotional wellbeing, such that ab = .40, 95% CI (.06, .94). Again, the direct effect of the social context of play on wellbeing was non-significant, (p = .16), providing no evidence that social play impacts players' psychological wellbeing (in comparison with solitary play) beyond its ability to generate feelings of relatedness. See Figure 4.2. Full model coefficients are provided in Appendix C.

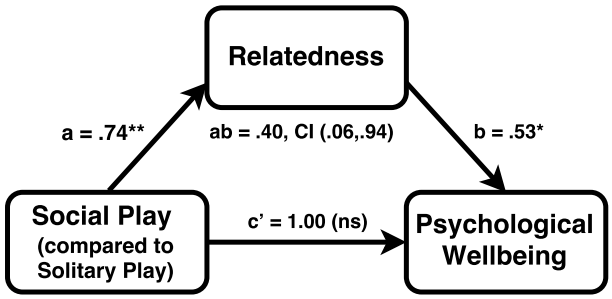

Figure 4.2 Mediation relationships—Psychological Wellbeing

4.2.3 Social wellbeing

The full model was statistically significant: R^2 = .116, F(14, 279) = 2.616, p < .01. The adjusted R^2 value of .072 at Step 3 suggests that 7.2% of the variability in player social wellbeing was predicted by this final model. The R became significant at the end of Step 2 with the introduction of the social context of play, R^2 = .058, F(9, 284) =1.933, p < .05 (R^2 change = .014). At Step 3, the addition of flow and the PENS sub-scales produced an R^2 change of .058. In the final model, only older age, casual games compared with shooters and relatedness and flow were shown to significantly and positively predict social wellbeing.

Supplementary analyses revealed that the construct of relatedness was mediating the impact of the social context of play on players' social wellbeing, such that ab = .44, 95% CI (.12, .93). Again, the direct effect of the social context of play on emotional wellbeing was non-significant (p = .25), suggesting that social play impacts social wellbeing (compared with solitary play) purely due to generating feelings of relatedness. See Figure 4.3. Full model coefficients are provided in Appendix C.

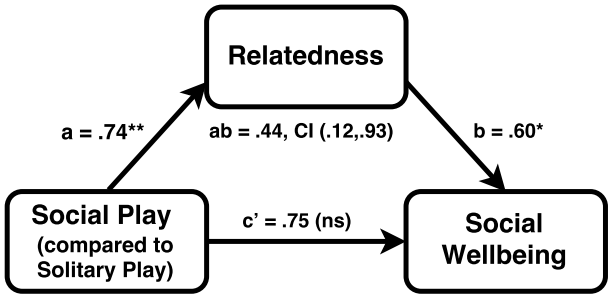

Figure 4.3 Mediation Relationships—Social Wellbeing

4.2.4 Total Wellbeing

The full model was statistically significant: R^2 = .133, $F(14, 279) = 3.068$, $p < .001$. The adjusted R^2 value of .090 at Step 3 suggests that 9% of the variability in player total wellbeing was predicted by the final model. The addition of the social context of play to the model at Step 2 was marginally significant (p = .051). The R became significant at the end of Step 3 (R^2 change = .076). At this level, only age, casual games compared with shooters and the in-game experiences of relatedness and flow positively predicted total wellbeing.

Supplementary analyses found that while social play predicted feelings of relatedness (a = .74) and relatedness predicted total wellbeing (b = 1.55), relatedness did not mediate the impact of the social context of play on players' total wellbeing: ab = 1.15, 95% CI (.36, 2.32). The direct effect of social play on total wellbeing was also non-significant: (p = .22). See Figure 4.4. Full model coefficients are provided in Appendix C.

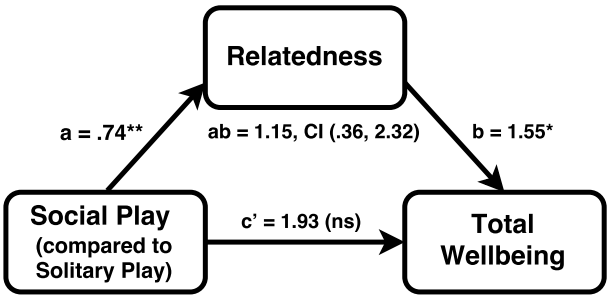

Figure 4.4 Mediation relationship - Total Wellbeing

Table 4.4. Coefficients of emotional, psychological, social and total wellbeing regressions

		Emotional Wellbeing				Psychological Wellbeing				Social Wellbeing				Total Wellbeing			
Step	Variable	*B*	*SE B*	β	sr^2	*B*	*SE B*	β	sr^2	*B*	*SE B*	β	sr^2	*B*	*SE B*	β	sr^2
1	Age	.029	.025	.071	.004	.157	.045	.215**	.038	.095	.042	.140*	.016	.280	.100	.173**	.025
	Gender	1.270	.516	.144*	.019	.843	.917	.053	.003	1.400	.860	.095	.008	3.514	2.043	.099	.009
	Genre: Act-Adv.	.099	.497	.014	.000	.627	.882	.048	.002	-.114	.827	-.009	.000	.612	1.966	.021	.000
	Genre: Casual	1.513	.796	.118	.011	2.444	1.415	.105	.009	2.890	1.326	.134*	.015	6.847	3.152	.133*	.015
	Genre: RPG	-1.055	.702	-.094	.007	-1.031	1.247	-.051	.002	-1.388	1.170	-.074	.004	-3.472	2.779	-.077	.005
	Genre: Strategy	-.467	.628	-.046	.002	.081	1.116	.004	.000	.953	1.047	.056	.003	.567	2.488	.014	.000
	Genre: Sport&Sim.	-.200	.703	-.018	.000	-1.081	1.249	-.053	.002	-1.985	1.171	-.104	.009	-3.266	2.783	-.071	.004
	Amount of play	-.283	.374	-.049	.002	-1.211	.664	-.115	.010	-.852	.623	-.088	.006	-2.346	1.480	-.100	.008
2	Social play	.316	.439	.048	.002	1.447	.781	.123	.011	1.078	.732	.099	.007	2.842	1.739	.108	.008
3	Autonomy	.195	.186	.075	.003	.771	.331	.165*	.017	.159	.310	.037	.001	1.125	.737	.108	.007
	Competence	.355	.244	.109	.007	.217	.434	.037	.001	-.194	.407	-.036	.001	.378	.967	.029	.000
	Presence	-.190	.187	-.080	.003	-.595	.332	-.138	.010	.016	.311	.004	.000	-.768	.739	-.080	.003
	Relatedness	.443	.157	.203**	.026	.646	.279	.164*	.017	.625	.261	.171*	.018	1.712	.621	.196**	.024
	Flow	.044	.058	.055	.002	.209	.103	.142*	.013	.209	.097	.153*	.015	.462	.230	.141*	.013
		F	2.438*			*F*	3.098*			*F*	2.616*			*F*	3.068*		
		R^2	.109			R^2	.135			R^2	.116			R^2	.133		

*$p < .05$, **$p < .01$

Step 1: age, gender, genre, amount of play

Step 2: social play (compared with solitary play)

Step 3: PENS (autonomy, competence, presence, relatedness), FSS-2 (flow)

4.3 DISCUSSION

The experiences of autonomy, relatedness and flow predicted aspects of player wellbeing after accounting for the effects of demographics, game genre, amount of play and the social context of play (RQ1). While social play (compared with solitary play) predicted social wellbeing when it was entered into the model, it did not predict social wellbeing when the PENS and flow measures were added at the next step. However, additional analyses suggest that relatedness was mediating the impact of social play on wellbeing (RQ2). Other predictors of wellbeing include age, gender and playing casual games compared with shooters.

Although the method engaged in this study was limited to exploring associations between the player experience and wellbeing, and no statements regarding causality can be made, the results are intuitively supported. Regarding relatedness predicting emotional wellbeing, it could be that gameplay is being used to create new friendships or maintain pre-existing ones, and that this brings emotional satisfaction. Alternatively, it could be that happier people are more likely to feel connected to others during play. While previous research (Ryan, et al., 2006) found no connection between relatedness and post-play mood, this could be due to that study being limited to MMO communities and not a broader range of gameplay experiences, as well as differences in the wellbeing measures being used (mood v. emotional wellbeing).

That relatedness also predicted psychological wellbeing suggests that players are either gaining social support via social play, or that players with pre-existing high levels of psychological wellbeing are more likely to feel connected to the people they play with. Whether this is due to play with pre-existing ties or because players high in social confidence are more likely to seek out interactions is unknown; however, it seems likely that both could be positively affecting wellbeing (Shen & Williams, 2011). In turn, the link between relatedness and social wellbeing again reinforces the notion of play that is socially integrated, or not at odds with other aspects of players' social lives. Whether this is due to socially confident players being more

likely to have enjoyable social gameplay experiences or because some forms of social play facilitate meaningful relationships (Yee, 2006a) requires further exploration. Similarly, that the experience of relatedness in gameplay predicted total wellbeing reinforces that warm and trusting connections with others in play might positively influence wellbeing or indicate its pre-existence.

While the social context of play (social play compared with solitary play) was not significant in the final model for any of the regressions, it was predictive of social wellbeing in its own step, losing power with the addition of the PENS and flow measures in the last step. This was followed up in the supplementary analyses, which indicated that relatedness was mediating the relationship between social play's effects on aspects of wellbeing. While mediation analyses necessarily assume a causal relationship (Hayes, 2013), social play relative to solitary play has been shown to generate different levels of relatedness (Tamborini, et al., 2010), but there is no research to support that differing levels of wellbeing will affect feelings of relatedness. The results then suggest that social play relative to solitary play impacts emotional, psychological and social wellbeing by being able to generate feelings of connection in gameplay (RQ2). That this relationship did not present for total wellbeing might be because this contrast of social context (social to solitary) encapsulates aspects of social play that do not produce feelings of relatedness. Social play, as was outlined in the literature review, could also include play with strangers or competitive play, which might not lend itself to connection with others. Alternatively, it could be that social play would have greater effects when the measure of wellbeing is taken closer to actual gameplay, such as in a measure of post-play mood. Taken together, this suggests the need to use more complex conceptualisations of the social context of play (measures of competitive and cooperative play were not taken in this survey), and for the use of other methodologies to further support the assumption that the social context of play affects wellbeing.

Finding that autonomy predicted psychological wellbeing suggests that choice of activity within gameplay facilitates a sense of agency, which in turn might help explain findings

in previous research linking autonomy to improvements in mood, vitality and self-esteem (Ryan, et al., 2006). It could also be that individuals already high in psychological wellbeing are more likely to engage with games in a way that heightens their sense of autonomy, and less likely to feel pressured to play in a way that lessens it. This is supported by experimental data showing that in-game autonomy produced increased self-esteem and positive affect (Ryan, et al., 2006).

It seems probable that those high in psychological wellbeing might be more likely to experience flow, supported by research finding worry negatively associated with experiences of flow (Jackson, et al., 1998). However, it might also be that flow can enhance psychological wellbeing by creating a stronger sense of self (Csikszentmihalyi, 1990), perhaps due to flow's components of self-acceptance and personal growth. These same qualities could explain flow's connection to social wellbeing, in that a stronger sense of self might lead to greater confidence in negotiating the social world. Alternatively, this might also be explained by flow's links to harmonious gameplay (Wang, et al., 2008), in that players who have integrated gaming into their life (including, presumably, their social lives) are more likely to experience flow. Finding flow to be predictive of total wellbeing suggests that peak experiences in gameplay in which the individual loses self-consciousness and performs at a level that is matched to the difficulty of the task might engender positive emotion, and perhaps even provide mental breathing space from which to negotiate everyday stresses. Of course, as this study could not determine causality, it is also possible that people with greater overall wellbeing are more likely to experience flow.

The positive association between casual gameplay (compared with playing shooters) and social wellbeing could be due to the use of casual games to connect with others. Alternatively, it might be due to casual game players being more actively engaged in non-game activities that generate a stronger sense of social agency. Given that the total wellbeing score is the sum of all items making up emotional, social and psychological wellbeing, the findings indicate that the play of casual games (at least compared with shooters) could be broadly

beneficial to one's wellbeing, and indeed it has been established that casual games can improve mood (Russoniello, O'Brien, & Parks, 2009a; Russoniello, et al., 2009b) and decrease anxiety (Fish, et al., 2014).

Finally, the positive result for social play (compared with solitary play) predicting social wellbeing in its own step reinforces the value of experiences of relatedness in gameplay. However, with the introduction of the PENS and flow, it lost power in the final model. As it is possible that not all social play generates feelings of relatedness, given the possibility for online toxic interactions (Kwak, Blackburn, & Han, 2015), it could be only those social encounters that generate feelings of relatedness that are capable of creating wellbeing. Alternatively, it might be that those high in social wellbeing are more likely to feel relatedness in their social interactions in gameplay. Either way, it seems likely that relatedness mediates the relationship between social play and social wellbeing. This suggests that, in order to parse out the effects of the social context of play, it is necessary to engage more detailed measures of social play, and other ways of explaining the relationship between social play and wellbeing.

The findings of the first study build on research linking video game play to aspects of wellbeing by extending this to include a relationship to emotional, psychological, social and total wellbeing. In addition, these results suggest that, in terms of wellbeing, your experience while playing is of greatest impact, as autonomy, relatedness and flow were predictive of aspects of wellbeing irrespective of demographics, genre, amount and the social context of play. Relatedness was also found to mediate the impact of social play on emotional, psychological and social wellbeing. This suggests that not all social play results in warm and trusting relationships with others, a finding that is supported by research on toxicity in gameplay (Kwak, et al., 2015; Shores, He, Swanenburg, Kraut, & Riedl, 2014). Thus, while RQ2 is answered with a qualified yes, the need for a more nuanced approach to the social context of play was also indicated (e.g. including measures of relationship type and interaction type) for subsequent studies, as is the need for a test of causality to reinforce that social context impacts feelings of connection, and in turn wellbeing. Similarly, by including other measures that link social

interaction to wellbeing (for example, social capital), a more detailed understanding of the relationship between social play and wellbeing can be explored. While the findings for age, gender and genre are interesting, they do not directly address the research aim of this thesis.

While the effect sizes of this study remain low, it seems likely that this is due to the use of both global measures of wellbeing and survey across a broad cross-section of gameplay experiences. Engaging measures of wellbeing more proximal to gameplay, such as may be engaged in experimental research, should capture greater variability, as would the use of measures that more accurately target the populations in question, such as the use of social capital measures with social players.

5 Study 2

The first study built on the literature linking the player experience to wellbeing, providing tentative evidence of the social context of play also affecting wellbeing. It did so using a broad cross-section of gameplay experiences in a predominately Australian sample. The strong finding for relatedness, and conditional finding for social play predicting greater wellbeing than solitary play, suggested the need to further detail the social context of play and its relationships.

This chapter revisits the use of cross-sectional survey to further delineate the relationship of the social context of play to the player experience. Measuring social play was refined by introducing relationship type (play with known or unknown others) and interaction type (competitive, cooperative and a mix of both competitive and cooperative play). Adding a measure of social capital provided another means of linking social interaction in gameplay and wellbeing, supplementing the use of SDT measures. In addition, by applying it to all kinds of gameplay, both online and offline, this study has built on research that has hitherto only applied measures of social capital to samples of online players (Collins & Freeman, 2013; Trepte, et al., 2012; Williams, et al., 2007; Zhong, 2011). Thus the initial research questions:

> **RQ3a.** How do the different social contexts of play differ in terms of the player experience?
>
> **RQ3b.** For social players only, how do the different social contexts of play differ in terms of social capital?

Furthermore, while research has established some links between video game play and wellbeing (Allahverdipour, et al., 2010; Collins & Cox, 2014; Durkin & Barber, 2002; Johnson, et al., 2012; Przybylski, 2014; Przybylski, et al., 2011; Reinecke, 2009; Russoniello, et al., 2009b;

Ryan, et al., 2006; Shen & Williams, 2011; Yee, 2006a), how this compares across solitary and social play is yet to be explicitly explored. In turn, while there is evidence that those who play with known others experience greater positive valence than those who play with strangers (Ravaja, Saari, Turpeinen, et al., 2006), it is unknown whether relationship type (who people play with) or interaction type (how people play with others) is more predictive of wellbeing. This led to the following questions:

> **RQ 4a.** How do social and solitary players differ in terms of what influences their wellbeing?
>
> **RQ 4b.** For social players, is relationship type or interaction type better at explaining the link between the player experience and wellbeing?

While the previous study produced results for genre and flow, these were excluded from consideration in Study 2. Genre was removed from the regressions in this study because the results of Study 1 suggested that it was redundant to include both genre and the social context of play due to overlap (e.g. MMORPG players tend to play with others, not alone). Furthermore, genre is a complex and ill-defined category that makes divisions both arbitrary and debatable.

Flow was removed from the second study for several reasons. Adding a measure of social capital and focussing on social questions increased both the length of the study and the possibility of participant fatigue, which the removal of the flow scale partially mitigated. In addition, flow already has established ties to both positive affect and harmonious gameplay (Wang, et al., 2008), which the previous study reinforced; however, it seemed unlikely that flow would present a direct relationship with the social context of play. This assumption is strengthened by recent research finding that different game genres (including genres associated with social and solitary play) did not differ in the degree of flow they produced (Johnson, Nacke, et al., 2015). This makes flow less useful in delineating differences in the player experience of various social contexts of play.

The PENS was left in the study because it provided a more complex means of measuring how gameplay might result in wellbeing when players engage in either social or solitary play. While the measure of relatedness may overlap with the measure of social capital, by continuing to use it wherever it did not pose a risk of multi-collinearity meant that further comparison could be made between this study and that of Study 1, as well as the relevant studies outlined in section 2.4.1. The addition of a measure of social capital also acts to explain how feelings of relatedness might translate to social networks that can be called upon when needed. Finally, the 'target game' was changed from the game that participants had 'purchased and played at least once' to the 'current favourite game', in order to establish that the game was one that participants had some familiarity with.

5.1 METHOD

5.1.1 Recruitment

The desired sample size was 300 to 500 participants to allow for testing of the impact of individual predictors via multiple regression (Tabachnick & Fidell, 2007). Data collection ran from September 2013 to February 2014. Individuals aged 12 years and above and with an interest in playing commercially available digital games played on any device were requested to complete an online survey. The sample was recruited from the same sources used in Study 1 (section 4.2.1). Participants had the opportunity to enter a draw to win one of two $100 gift vouchers at the completion of the survey.

5.1.2 Procedure

The procedure replicated that of Study 1 (section 4.1.2). However, this time, respondents were asked to complete the survey with reference to their favourite game that they were currently playing, referred to hereafter as the target game. Respondents were asked when they had last played this game, and only participants who had played it during the last month were included in the analysis.

5.1.3 Measures

Amount of play. Participants were asked to indicate the total number of hours they had spent playing the target game in the last month.

The social context of play. Participants were asked how they most often played the target game (options: online with people you know; online with people you don't know; offline with people you know; offline with people you don't know; on your own). People who played socially were then asked if they most often played the target game in one of these ways: competitive multiplayer; cooperative multiplayer; or mixed competitive and cooperative multiplayer. Participants who indicated a mix of competitive and cooperative could then indicate on a 7-point scale how competitively or cooperatively they played, ranging from 'mostly competitive' to 'mostly cooperative'. Those who indicated 1, 2 or 3 were added to the competitive multiplayer group (now 'mostly competitive'). Those who indicated 5, 6 or 7 were added to the cooperative multiplayer group (now 'mostly cooperative'). The 'mixed' category represented an even mix of competitive and cooperative play (those who indicated 4). This created more equivalent-sized groupings.

- To explore RQs3a and 3b, relationship type (playing with known or unknown others) and interaction type (mostly competitive, mostly cooperative or an even mix of competitive and cooperative play) were combined to create equivalent-sized groups for the Kruskal-Wallis analyses. Groups with a relatively small number of cases were excluded, such as people who played mostly cooperatively with strangers, or mostly competitively with friends (see Table 5.1). The final groupings were as follows: people who play mostly competitively with strangers; people who play mostly cooperatively with people they know; an even mix of competitive and cooperative play with both familiar and unfamiliar others (mixed play); or on their own.
- To explore RQ4a, social play was dummy coded within two discrete categories for the regressions: relationship type and interaction type.

In-game psychological need satisfaction. Measured using the PENS (Ryan, et al., 2006), described in section 4.1.3. The Cronbach's alpha for the three-item relatedness measure in the solitary player sample was low (α = .592); however, removing one item brought the alpha up to .816. Removing this item also improved the alpha for social players, bringing it up from .871 to .919. The removed item was the only one to refer expressly to other players, while the remaining items, by only referring to relationships, could be interpreted as referring to non-player characters. This new two-item measure was entered into the analyses. All other PENS measures remained the same as those used in Study 1.

Social capital. The ISCS (Williams, 2006) is a validated measure of social capital in online contexts, which captures two kinds of social capital: bridging and bonding. It typically consists of both online and offline versions, but the adapted scale captures social capital in all gameplay contexts, both online and offline. Non-gaming related social capital is not captured. It consists of 20 items in total, measured on a 5-point scale from 'strongly disagree' to 'strongly agree', e.g. 'Playing [target game name], I come into contact with new people all the time' (bridging social capital), 'There are several people I play [target game] with that I trust to help solve my problems' (bonding social capital).

Wellbeing. Wellbeing was again measured with the MHC-SF (Keyes, 2002) described in section 4.1.3.

The full list of items (non-commercial) is displayed in Appendix D.

5.1.4 Data Preparation and Preliminary Analyses

Analysis of the sample data was conducted using SPSS 21.0. A total of 478 participants aged 12 to 61 years attempted the online survey. Twenty-seven cases who did not provide responses beyond the name of the target game were excluded, as were four univariate outliers on the amount of play variable and one case who provided two favourite game names and recounted two experiences in the prompt. The final sample was based upon data provided by

446 participants aged 12 to 61 years (M = 28.05, SD = 8.017; n = 356 (79.82%) male; n = 86 (19.28%) female; n = 4 (.90%) unstated gender; 69.8% Australian).

The same checks were carried out as those detailed in Study 1. Descriptive statistics were produced to contrast the various social contexts of play (Table 5.1), contrasts of the social and solitary player samples on categorical measures (Table 5.2) and continuous variables (Table 5.3). Table 5.3 also displays the Cronbach's alphas for all scale variables. Pearson correlations of the solitary (Table 5.4) and social player (Table 5.5) samples are also provided.

Total hours played ranged from less than one to 200 (Mean = 33, Median = 20, Mode = 20, SD = 7.46). The amount of play was found to have a strong positive skew, so a logarithmic transformation was applied and the transformed variable entered into the regressions. The low Cronbach's alpha for the original relatedness measure suggested the use of a modified measure (described in section 5.1.3). Non-normal distributions across all variables (including instances of kurtosis) suggested the use of a non-parametric test for tests of difference. The assumptions of the Kruskal-Wallis test and hierarchical regression were met.

5.1.5 Primary Analysis

A series of Kruskal-Wallis tests were conducted to compensate for issues of non-normal distributions among some of the variables. These tested for differences in the player experience (autonomy, competence, relatedness and presence—RQ 3a) between:

- Solitary (n = 244) and social play (n = 185)
- Competitive play with strangers (n = 32), cooperative play with known others (n = 46), and mixed play (n = 43)

and additionally, for differences in social capital (bonding and bridging—RQ3b) between:

- Competitive play with unknown others, cooperative play with known others, and mixed play

Where appropriate, pairwise comparisons were performed using Dunn's procedure with a Bonferroni correction for multiple comparisons (1964); the adjusted *p* values are presented. The similarity of each group's distributions was assessed by visually inspecting a boxplot.

Following this, two hierarchical regressions were performed to determine what predicted wellbeing for solitary and social players (RQ4a), and whether relationship type or interaction type was more predictive of wellbeing (RQ4b). Missing values were excluded pairwise. The first regression was applied to solitary players only. To control for demographics and amount of play, the variables were entered in this order:

1. Age and gender, amount of play
2. Autonomy, competence, presence and relatedness.

The second regression was applied to social players only. Social play was split into dummy coded variables reflecting player relationship type and interaction type (RQ4b). These variables were entered before the PENS and ISCS in order to parse out the effects of the social context of play and control for its influence. Psychological need satisfaction and the social capital gained in gameplay were entered on the same level. The PENS relatedness measure was discarded due to theoretical similarity with the social capital scales, as well as its strong correlation with bridging social capital (α = .715, Table 5.3). The variables were entered in this order:

1. Age and gender, amount of play
2. Play with known others compared with play with strangers (relationship type); cooperative and mixed play compared with competitive play (interaction type)
3. Autonomy, competence, presence, bonding social capital and bridging social capital.

5.1.6 Supplementary Analyses

The single item removed from the PENS relatedness measure refers explicitly to other players, and thus should not be interpretable in terms of relationships to computer-controlled

characters. To test whether this item was impactful, the Kruskal-Wallis tests were rerun with this item replacing the two-item relatedness measure, as was the regression analysis for solitary players. It was anticipated that the Kruskal-Wallis tests would behave in the same way as the tests making use of the two-item measure, as solitary play should generate fewer feelings of connection with others than social play (Tamborini, et al., 2010), while the reference to other players would continue to be natural in contrasts of different types of social play. However, the solitary play regression using the one-item relatedness measure should not produce relatedness as a significant coefficient, as it should not be interpretable as referring to anything other than other (absent) players.

5.2 RESULTS

Initial analyses are displayed in tables 5.1 to 5.5. Playing mostly competitively with known others and mostly cooperatively with strangers was discarded from subsequent analyses in order to have groupings numbering greater than 20. Table 5.2 (over page) shows the MHC-SF means and standard deviations for each of the categorical variables used in the analyses (based on the final sample), while Table 5.3 (over page) shows descriptive statistics for the continuous variables used in the primary analysis.

Table 5.1. Cross-tabulation of relationship type by interaction type

		Play that is...			
		Mostly competitive	**Even mix of competitive & cooperative**	**Mostly cooperative**	**TOTAL**
Play with…	People you know	19	22	46	87
	Strangers	32	21	15	68
	TOTAL	51	43	61	155

Table 5.2. Wellbeing descriptive statistics for categorical variables

	Social players			Solitary players		
	N	M	SD	N	M	SD
Gender:						
Male	110	41.64	14.00	158	42.93	13.33
Female	20	44.60	14.09	43	43.84	12.13
Play with:						
Known others	73	41.07	13.50			
Strangers	57	43.40	14.64			
Play that is:						
Competitive	40	40.95	15.55			
Cooperative	53	42.40	13.46			
Mixed Comp/Coop	37	42.89	13.30			

Table 5.3. Descriptive statistics for continuous variables and Cronbach's alphas for scale variables

	Solitary players			Social players		
	M	SD	α	M	SD	α
Age	28.56	8.30		27.35	7.42	
Amount of play	21.84	25.29		47.74	45.13	
Autonomy	5.53	1.21	.76	5.25	1.29	.74
Competence	5.61	1.02	.73	5.64	1.04	.77
Presence	4.01	1.38	.90	3.67	1.29	.86
Relatedness (2-items)	3.19	1.40	.82	3.78	1.78	.92
Bonding social capital				2.93	1.15	.93
Bridging social capital				3.01	1.00	.91
Total wellbeing	43.11	13.00	.90	42.12	13.95	.91

Tables 5.4 and 5.5 (over page) display correlations, with the final sample split between those who played the target game alone (Table 5.4) or with others (Table 5.5).

While Table 5.5 provides the correlation statistics for social play using the Total MHC-SF score, a breakdown across the MHC-SF sub-scales and the ISCS (adapted) can be found in Appendix C, Table C.5.

Table 5.4. Pearson correlations two-tailed for solitary play

	1.	2.	3.	4.	5.	6.	7.
1. Total Wellbeing	-						
2. Age	.054	-					
3. Amount of play	-.107	-.040	-				
4. Autonomy	.277**	-.269**	.139*	-			
5. Competence	.171*	-.193**	.063	.423**	-		
6. Presence	.195**	-.264**	.138*	.509**	.335**	-	
7. Relatedness (2-items)	.237**	-.291**	.119	.372**	.238**	.686**	-

* $p < 0.05$, ** $p < 0.01$

Table 5.5. Pearson correlations two-tailed for social play

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Total Wellbeing	-								
2. Age	.147	-							
3. Amount of play	-.144	.068	-						
4. Autonomy	.223*	-.192*	.104	-					
5. Competence	.108	-.041	.242**	.432**	-				
6. Presence	.272**	-.096	.024	.589**	.417**	-			
7. Relatedness (2-items)	.156	-.122	.261**	.458**	.358**	.622**	-		
8. Bonding social capital	.132	-.148	.017	.291**	.100	.339**	.517**	-	
9. Bridging social capital	.303**	-.082	.223**	.476**	.350**	.589**	.715**	.334**	-

* $p < 0.05$, ** $p < 0.01$

5.2.1 Kruskal-Wallis Tests: Solitary v. Social Play

No significant difference between solitary and social play was found for experiences of competence in gameplay: $X^2(1) = .337$, $p = .561$.

Autonomy scores were statistically different between groups: X^2 (1) = 4.441, $p = .035$. Distributions of autonomy scores were similar. The autonomy median scores for solitary play (Mdn = 5.67) were greater for than that of social play (Mdn = 5.33).

Relatedness scores were statistically different between groups: $X^2(1) = 9.488$, $p = .002$. Distributions of the relatedness scores were dissimilar. The mean rank for social play (197.23) was greater than that of solitary play (163.29).

Presence scores were significantly different between groups: $X^2(1) = 5.683$, $p = .017$. Distributions of presence scores were also dissimilar. The mean rank for solitary play (187.80) was greater than that of social play (161.19).

See Figure 5.1 for graphed median scores of player experience measures; Figure 5.2 provides the mean ranks for the significant variables only.

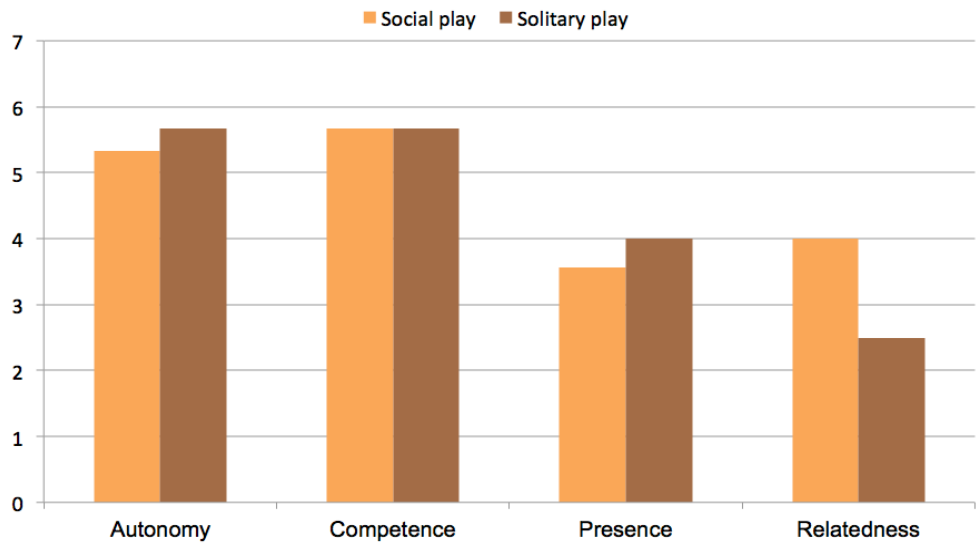

Figure 5.1 Median scores for social and solitary players

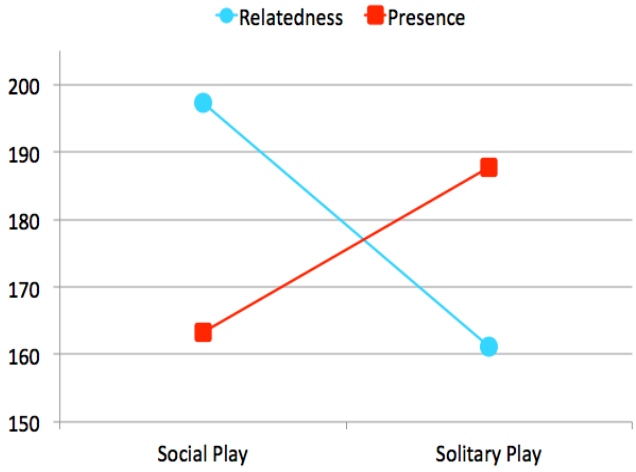

Figure 5.2 Mean ranks of the significant variables

5.2.2 Kruskal-Wallis Tests: Social Play

No significant differences across the different types of social play were found for autonomy: X^2 (2) = 3.020, p = .221; competence, X^2(2) = .554, p = .758; or for presence: X^2(2) = 5.347, p = .069.

Relatedness showed significant differences between the different types of social play: X^2 (2) = 17.659, p < .001. Distributions of the relatedness scores were dissimilar. Pairwise comparisons revealed significant differences between competitive play with strangers (35.12) and mixed play (53.48) mean rank scores (p = .044) and between the competitive play with strangers and cooperative play with known others (67.07) scores (p < .001), but not between mixed play and cooperative play with known others.

Bonding scores were significantly different between the different types of social play: X^2(2) = 43.209, p < .001. Distributions of the bonding scores were dissimilar. Pairwise comparisons revealed significant differences between the mean rank scores of all three contexts: between competitive play with strangers (30.25) and mixed play (59.13, p = .001), between competitive play with strangers and cooperative play with known others (82.79, p < .001) and between mixed play and cooperative play with known others (p = .004).

Bridging scores were significantly different between the different types of social play: X^2(2) = 8.411, p = .015. Distributions of the bridging scores were dissimilar. Pairwise comparisons revealed a significant difference between the competitive play with strangers (48.09) and mixed play (71.56) mean rank scores only (p = .012). Comparisons with cooperative play with known others (59.03) did not reach significance.

See Figure 5.3 (over page) for graphed median scores of all the player experience and social capital scale measures. Figure 5.4 (over page) describes the differences between relatedness, bonding and bridging social capital across different types of social play using mean ranks.

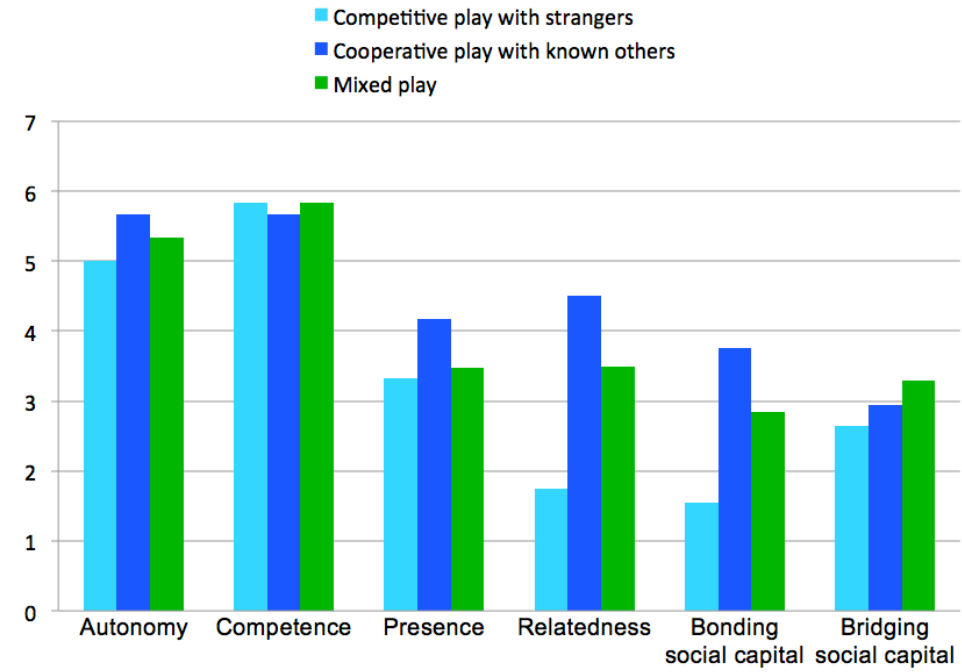

Figure 5.3 Median scores for competitive, cooperative and mixed players

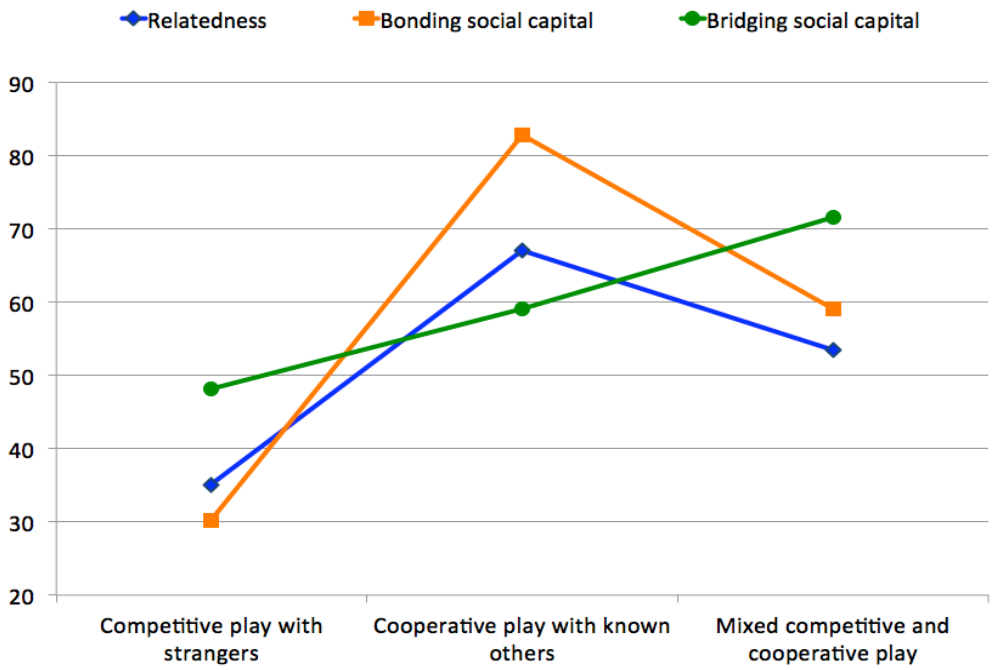

Figure 5.4 Mean ranks of the significant variables

5.2.3 Hierarchical Regressions—Solitary Play

The full model of age, gender, amount of play and psychological need satisfaction to predict wellbeing for solitary players was statistically significant: $R^2 = .154$, $F(7,188) = 4.874$, $p < .0001$. The adjusted R^2 value of .122 at Step 2 suggests that 12.2% of the variability in wellbeing associated with solitary video game play was predicted by this final model. The R only became significantly different from zero at the end of Step 2, where adding PENS to the model produced an R^2 change of .140. Of the variables included in the final step, only age, amount of play and the experience of autonomy and relatedness in gameplay were significant. Amount of play presented the only negative relationship to wellbeing. Final model coefficients are displayed in Table 5.6 (over page).

5.2.4 Hierarchical Regressions—Social Play

The full model of age, gender, amount of play, player need satisfaction and social capital in gameplay to predict wellbeing for social players was statistically significant: $R^2 = .245$, $F(11,116) = 3.426$, $p < .001$. The adjusted R^2 value of .174 at Step 3 suggests that 17.4% of the variability in wellbeing associated with social video game play was predicted by this final model. The R became significantly different from zero at the end of Step 3, where adding the PENS and ISCS to the model produced an R^2 change of .179. Of the variables included in the final step, only age, amount of play, playing with strangers compared with playing with familiar others and bridging social capital significantly predicted wellbeing among social players. Amount of play presented the only negative relationship to wellbeing. Final model coefficients, both standardised and unstandardised, are displayed in Table 5.6 over page.

Table 5.6. Regression coefficients for solitary and social players

		Solitary Players						Social players			
Step	Variable	*B*	*SE B*	β	sr^2	Step	Variable	*B*	*SE B*	β	sr^2
1	Age	.287	.113	.183*	.029	1	Age	.455	.159	.242**	.059
	Gender	-.757	2.147	-.024	.001		Gender	-3.122	3.535	-.080	.006
	Amount of play	-4.611	2.112	-.149*	.022		Amount of play	-8.548	2.871	-.266**	.071
2	Autonomy	2.917	.902	.271**	.047	2	Play with known others	-7.112	2.943	-.253*	.064
	Competence	.790	.959	.062	.003		Mixed play	-.816	3.018	-.026	.001
	Presence	-.545	.950	-.058	.001		Cooperative play	.879	2.889	.031	.001
	Relatedness	1.751	.728	.225*	.026	3	Autonomy	1.202	1.187	.111	.012
							Competence	.214	1.310	.016	.000
							Presence	.422	1.297	.039	.002
							Bonding social capital	1.698	1.408	.140	.020
							Bridging social capital	4.201	1.583	.302**	.091
	F = 4.874						F = 3.426				
	R^2 = .154						R^2 = .245				

Dependent variable: Total wellbeing (MHC-SF)

* $p < 0.05$, ** $p < 0.01$

5.2.5 Supplementary Analyses: One-item Relatedness Measure

Substituting the removed relatedness item for the remainder of the measure in the previous analyses produced the following results.

As anticipated, the Kruskal-Wallis tests comparing player experience measures showed that the one-item relatedness measure, like the two-item measure, was different across social and solitary play: $X^2(1) = 4.886$, $p = .027$. Distributions were dissimilar. As with the two-item measure, social play had a higher mean rank score (189.65) than solitary play (165.53).

Similarly, when comparing different types of social play, the one-item relatedness scores significantly differed: $X^2(2) = 11.644$, $p = .003$; distributions were again dissimilar. As in the analyses using the 2-item relatedness measure, both cooperative play with known others (62.30) and mixed play (56.64) were greater than competitive play with strangers (37.21). No significant difference was found between cooperative play with known others and mixed play.

Applying the one-item relatedness measure to the solitary play regression produced a significant model: $R^2 = .128$, $F(7,188) = 3.953$, $p < .0001$. The R only became significant at Step 2, where the addition of the PENS produced an R^2 change of .115. Of the variables in the final step, only age, amount of play and autonomy predicted wellbeing for solitary players. Importantly, the one-item relatedness measure did not reach significance, $p = .694$. Final model coefficients are presented in Table 5.7.

Table 5.7 Regression coefficients for solitary players using single-item relatedness measure

Step	Variable	*B*	*SE B*	*β*	sr^2
1	Age	.241	.113	.154*	.021
	Gender	-.554	2.181	-.018	.000
	Amount of play	-4.678	2.154	-.152*	.022
2	Autonomy	2.918	.917	.271**	.047
	Competence	.771	.974	.060	.003
	Presence	.809	.771	.086	.005
	1-item Relatedness	.181	.458	.028	.001
F = 3.953		$R^2 = .128$			

* $p < 0.05$, ** $p < 0.01$

5.3 DISCUSSION

In summary, solitary players reported experiencing more autonomy and presence than social players, while social players reported more relatedness than solitary players (RQ3a). Relatedness (RQ3a) and bonding social capital (RQ3b) were greatest for people who played cooperatively with known others, followed by mixed competitive and cooperative play (mixed play) and lastly, competitive play with strangers. Bridging social capital was greatest for those who engaged in mixed play, then those who played cooperatively with known others, then competitive play with strangers (RQ3b). In answer to RQ4a, solitary players reported greater wellbeing when experiencing autonomy and relatedness in play, while social players reported greater wellbeing when experiencing bridging social capital in play, or when playing with strangers as opposed to playing with known others. All players experienced greater wellbeing with age, and less wellbeing with higher amounts of play. Of the key variables, the strongest predictors of positive wellbeing were bridging social capital for social players and autonomy for solitary players. These findings also highlight that social capital had a stronger association than psychological need satisfaction in terms of the relationship between social play and wellbeing, and that relationship type predicted wellbeing, while interaction type did not (RQ4b).

Most of the findings comparing groups of players are intuitively supported. That solitary play should be marked by higher levels of autonomy than social play suggests that play without social obligation might allow the player to play at their own pace and in their own way. In turn, this suggests that play unhampered by social interaction might also facilitate greater presence, as players would be more able to focus on game mechanics, narrative elements or other sensory input. Alternatively, it might be that those who would choose solitary over social play could be pre-disposed to experiencing greater autonomy and immersion.

The finding that relatedness was higher for social players than solitary players was anticipated and supported by previous research (Tamborini, et al., 2010). Feelings of warmth and trust would be both more likely to occur in play with familiar others as well as in

cooperative settings; therefore, finding that experiences of relatedness decrease from cooperative play with familiar others, to mixed play, to competitive play with strangers is a logical extension of that premise. This is further supported by the fact that the bonding scores ranking (social capital associated with exclusive ties, e.g. close friends and family) aligned with that of the relatedness scores. By supplying common goals, opportunities for both providing and receiving assistance and facilitating communication regardless of the distance of the players, games provide a context in which to socialise. Combined with a lack of possible interpersonal conflict (associated with competitive play with strangers), this presents a foundation for maintaining and consolidating pre-existing social networks; hence the highest levels of bonding and relatedness were displayed by people who played cooperatively with known others. However, while cooperation with known others might support feelings of trust and connection with others, competition, by producing winners and losers, necessarily creates conflict. Combined with a lack of familiarity, this could produce a sense of separation from others. That the potential disconnect associated with competitive play might be mitigated by playing in a team, or by combining play with strangers alongside play with familiar others, would explain why mixed play is positioned in the middle.

Of interest is that mixed play showed the highest level of bridging social capital (links between individuals of different social networks with broad, but not deep, levels of connection). Being open to engaging in play with known and unknown others both competitively and cooperatively could bring these respondents into contact with players from a broad range of backgrounds, resulting in their social networks widening and their potentially forming new friendships. In addition, considering previous research showing that playing in a team resulted in greater social cohesion and trust (Greitemeyer, et al., 2012), it seems likely that the increased trust of team play would assist with forming relationships with unfamiliar others. When strangers face an opponent together, or share a common goal with a high level of reliance on each other, it provides grounds for feelings of camaraderie. The capacity of games to provide opportunities for collaborating and competing simultaneously, as well as connecting people over

great distances via online play, means that people can extend their social networks through a shared passion for gameplay (and thereby experience improved bridging social capital).

Regarding the regression analyses, the finding that autonomy was related to wellbeing for video game players aligns with previous research (Ryan, et al., 2006). That autonomy was the strongest predictor of wellbeing for solitary players, in tandem with it being a significant difference in the experience of solitary play and social play (based on the Kruskal-Wallis tests), suggests that this experience is a key benefit for engaging in play alone. This is supported by research finding that solitude is linked to the freedom to engage in desired activities and avoid undesirable ones (Long & Averill, 2003). In doing so, solitude can facilitate self-transformation and provide the space for gaining perspective on troubling aspects of life. Whether solitary play directly relates to experiences of relaxation or recuperation suggests a direction for future research (taken up in Study 3). In tandem, the unexpected result—relatedness predicting wellbeing for solitary players—also suggests the need for more targeted research. Given the measure was reduced to two items that referred generally to relationships, it is possible that players were responding with thoughts of non-player characters in mind, which has been shown to be possible (Coulson, et al., 2012). In turn, this suggests that players with high wellbeing might be more likely to respond empathetically to supportive non-player characters, or alternatively, that supportive characters might engender these feelings and thus increase player wellbeing. This is supported by the supplementary analyses (sections 5.1.6 and 5.2.5). While the one-item measure, which referred explicitly to other players, performed similarly to the two-item measure in the Kruskal-Wallis analyses, it failed to present as a significant coefficient in the solitary play regression. This lends support to the notion that participants in the solitary play regression, which made use of the two-item measure of relatedness, were interpreting the measure to refer to non-player relationships (discussed in greater detail in section 8.1). This finding suggests the need to make use of measures that capture other aspects of relatedness, and a more in-depth investigation into the social context of play.

That people who played with strangers were found to have higher wellbeing than those who played with known others is another unexpected result. This kind of play, however, being unfettered by social pressures, and offering individuals the chance to match with others who meet their skill requirements, offers the ideal conditions in which to experience the joys of winning and its concomitant boost to self-esteem. It is also possible that individuals seeking these experiences are already high in resilience or another psychological factor linked to wellbeing, such as being high in extroversion (Shen & Williams, 2011) or emotional stability (Hills & Argyle, 2001).

Finding that bridging social capital predicted wellbeing for social players suggests that widening one's social networks and making new friends via gameplay, as in any other activity, is beneficial to one's overall wellbeing. That relationships built or maintained via gameplay can be meaningful and provide a degree of social support is in line with previous research (Trepte, et al., 2012; Yee, 2006a). Alternatively, this finding could also signify that these players are high in social competence and already robust in their sense of self. Further research is required to determine whether gameplay that widens social networks predicts greater wellbeing because of the concomitant benefits of this kind of play or because these players already exhibit higher levels of emotional, psychological and social wellbeing. Irrespective of causal direction, however, this result suggests that video game play, when used by players to broaden social networks, is associated with increased wellbeing. This result is also partially supported by the finding that play with strangers is associated with greater benefits than play with known others.

Finding bonding social capital to not predict wellbeing for social players is also notable. Given that this measure correlated highly with relatedness (Table 5.5), and relatedness was such a consistent predictor of player wellbeing in Study 1, it was anticipated that bonding social capital would provide a positive result. It is possible that the number of social players who knew each other well was much smaller than the number of players who knew each other on a more casual level. Thus the inadequacy of the categorical item to capture these differences in intimacy (framed only as knowing or not knowing the person they played with) might have

produced a social player sample with a great number of casual relationships. However, the means for both the bonding and bridging social capital measures are relatively similar (Table 5.3: M = 2.93 and 3.01 respectively), suggesting that gameplay provides similar opportunities for both types of relationship (both new and forming, and older and established) to interact via gameplay. What seems more likely is that the benefits that bonding social capital produces do not include wellbeing, as it is conceptualised by the MHC. This is supported by the lack of correlation between these two measures using the MHC total score (Table 5.5), which could specifically be attributed to the lack of correlation between social wellbeing and bonding social capital (Table C.5, Appendix C). It is possible that a measure of social support would have been a more appropriate one for bonding social capital to impact on, as Trepte et al. (2012) have demonstrated.

While the findings for age and amount of play do not address the research questions, some points should be noted. The finding for age replicates that of Study 1, in that greater age was associated with greater wellbeing. This is inconsistent with other research using an Australian sample (Eckermann, 2014), and could thus be an interesting point of contrast for those interested in wellbeing variations across the lifespan. More pertinent to video game play research, however, is the finding that greater amounts of play were associated with lower wellbeing, which is supported by other research finding better mental health outcomes associated with low-to-moderate levels of play (Allahverdipour, et al., 2010; Durkin & Barber, 2002; Przybylski, 2014). To put this in perspective, the sample used showed large variations in the amount of play, which showed that most players were playing a small or moderate amount and a minority of players were playing a lot. There is no way to know from this study whether players engaging in large amounts of play were already experiencing lowered wellbeing and using gameplay as a coping strategy. There is also no way to know if their wellbeing would be better or worse if they were not playing games. For that, longitudinal studies such as those carried out by Lemmens, Valkenburg and Peter (2011) offer the best means of discovering the effects of excessive amounts of play. Future research could also consider investigating the social

context of play, as the social player sample more than doubled the mean hours displayed by the solitary player sample (Table 5.3)—this is supported by other research showing that the experience of relatedness predicted greater hours of play (Ryan, et al., 2006). That said, a greater detailing of the actual activities players take part in might be insightful, as it is possible that some players spend long amounts of time in solitary repetitive tasks while playing MMORPGs (Karlsen, 2011).

The findings of this study build on those of Study 1 by refining the social context of play, showing distinct predictors for social and solitary players and extending the measure of relatedness to deal with its practical outcomes: building social capital. Further investigation in this area would benefit from detailing the social context of play at a granular level to better understand why people might commonly choose to play in a particular social context. The two unexpected results shown by the regression analyses—that playing with strangers predicted greater wellbeing than playing with known others and that relatedness predicted wellbeing for solitary players—also suggests the need for further investigation. Relatedly, the finding that presence was greater for solitary players than social players contradicts research making use of an experimental methodology (Cairns, et al., 2013; Lim & Reeves, 2010; Ravaja, Saari, Turpeinen, et al., 2006). This also recommends exploring the social context of play in greater depth and detail. Additionally, while the effects sizes of this study are larger than in the previous study, the effect sizes of the social play regression are greater than that of the solitary play regression. This might suggest that measures more accurately targeted at the player experience, such as bridging social capital for social players, have greater explanatory power than more non-specific or global measures such as need satisfaction. This highlighted the need to explore the solitary player experience in greater detail, which was carried out in Study 3.

6 Study 3

Study 2 further defined the relationship of the social context of play to the player experience and wellbeing by extending the social context of play measurement to include a contrast of social and solitary play as well as categories of relationship type (who people play with) and interaction type (how people play with others). These were found to differ across the player experience measures; measures of social capital differed for social players only. Correspondingly, different predictors of wellbeing were found for social and solitary players, with some unexpected results suggesting the need for a more targeted exploration of the social context of play. Thus, Study 3 shifts from questions of 'what' to 'why'. In doing so, it responds to the argument laid out in Williams' (2005) essay on the methodological divide in video game play research. While Study 3 uses a largely quantitative methodology, it contextualises any effects uncovered by the remaining studies and investigates how these might also be explained by players' motivations for particular experiences. As such, this study has also built on research concerned with uncovering the benefits and motivation to play online with others (Cole & Griffiths, 2007; Shen & Williams, 2011; Snodgrass, et al., 2011; Yee, 2006a) by expanding the investigation beyond valued experiences to include both the likes and dislikes of the player across multiple social contexts. In turn, this creates a space in which to interrogate the compromises that players reach when choosing what social context of play to engage with. This also creates a basis for speculating on the relationship between the player experience and wellbeing, which may serve to explain any unexpected results produced by the other studies and reframe further enquiry. The following questions drove this study:

RQ5. Why do people commonly play in a particular social context?

RQ6. How might these experiences interact with their wellbeing?

This chapter's aims, therefore, are two-fold: to understand what frames the decision to play in a particular social context, and to understand how these opportunities intersect with wellbeing. To achieve this, the study took a mixed-methods approach. Survey data (open-ended responses) was used to analyse broad patterns in the likes and dislikes of the social context the participants generally played in. Concurrently, interview responses were used to provide insight into the player experience by highlighting relationships within the coded distributions and by acting as detailed examples of the coded themes. The social context of play was treated within this study as either whom participants played with (solitary play; relationship type: play with known others or strangers) or how they played with others (interaction type: competitive, cooperative or mixed competitive and cooperative play).

6.1 METHOD

6.1.1 Recruitment

Survey. This survey refers to the one detailed in Chapter 5; the recruitment procedures are thus the same as those carried out for studies 1 and 2.

Interviews. Face-to-face interviews were undertaken throughout February 2014 with 16 participants. The same ethical and recruitment procedures were followed as were undertaken for the survey, with the addition that participants were asked for permission to audio-record the interviews. Participants were each compensated for their time with AU$20.

6.1.2 Procedure

Surveys. Participants were first asked to indicate if they 'most often' played video games 'online with people you know, online with people you don't know, offline with people you know, on your own' (reduced to solitary play and relationship type). They were then asked: 'Please tell us what you like/dislike about playing video games [insert social context].' Participants who played with others were then asked to indicate whether they most often played video games competitively, cooperatively or a mix of both (interaction type), and then to report

what they liked and disliked about playing video games in that social context. The responses were written in comment boxes with no limit on the amount of characters they could input.

Interviews. The interviews took place either via Skype or in the same physical location. Participants were asked about their preferences for different social contexts of play (the same categories as used in the survey) and to talk about what they liked and did not like about them. The interviews were audio-recorded and transcribed.

6.1.3 Measures

The survey items and interview questions are described in full in Appendix E. The author created the interview schedule.

The social context of play. Participants were first asked how they most often played video games (options: online with people you know; online with people you don't know; offline with people you know; offline with people you don't know; on your own). People who played socially were then asked if they most often played the target game in one of these ways: competitive multiplayer; cooperative multiplayer; or mixed competitive and cooperative multiplayer. While participants who indicated a mix of competitive and cooperative could then indicate on a 7-point scale how competitively or cooperatively they played, ranging from 'mostly competitive' to 'mostly cooperative', this scale was not used as it was in Study 2, as there was no need to create equivalent-sized groupings.

6.1.4 Data Preparation and Preliminary Analyses

Analyses were conducted using SPSS 21.0 and Excel 14.4.9. Preliminary analyses conducted the checks carried out in the previous studies and produced descriptive statistics for the survey and interview samples. Table 6.1 and 6.2 display statistics based on the survey responses. Table 6.1 cross-tabulates the final count of the relationship and interaction types of social players. Descriptive statistics (count, frequency, mean and standard deviations where

appropriate) of the age and gender of players in different social contexts of play are given in Table 6.2.

A total of 478 participants aged 12 to 61 years attempted the online survey. Three hundred and twenty-seven respondents completed the likes and dislikes section of the survey. One case was removed for providing nonsensical responses across all questions. This left a final sample of 326 participants aged 12 to 56 (M = 27.97, SD = 7.85; male = 260, female = 63, unstated gender = 3) who provided responses to the first section (solo and social players). The social players were made up of 135 participants aged 12 to 50 (M = 28.18, SD = 7.79; male = 112, female = 22, unstated gender = 1). Eleven social players did not proceed from the first social context question (N = 146) to the second (N = 135; attrition of 7.5%). Initial responses to the first question (e.g. online with people you know, online with people you don't know, etc.) were combined to form the contexts of play with either known others, strangers or solitary play.

The interviews with 16 participants aged 12 to 48 (M = 30, SD = 10.42; male = 8, female = 8) ranged from 26 to 83 minutes in length. These were transcribed and responses that corresponded to the likes and dislikes of different forms of social and solitary play were sectioned out.

6.1.5 Primary Analysis

Survey. Respondents could provide as concise or detailed a response regarding their likes and dislikes as they preferred; however, each distinct idea was coded only once. For example: *'I can play at my own pace and am not beholden to someone else's availability (or my own)'* was coded as autonomy, while *'It's fun, it takes my mind off stressful thoughts, sometimes it emerges (sic) me in a different world, and sometimes I can feel a sense of accomplishment if we finish something difficult-ish together'* was coded as fun, escapism, immersion and teamwork.

The coding scheme was developed through an iterative process, in which coders refined initial codes, applied them and then refined them repeatedly until a final set of codes was

produced (Burla et al., 2008). Specifically, the first rater (the author) read responses repeatedly until a first draft of a coding scheme was developed. Discussion with a second rater led to refinement of the coding scheme. Ten per cent of the sample (randomly selected) was then independently coded by both raters. Inter-rater reliability was tested using the Cohen's Kappa test. If all the codes did not present a test statistic above .7, another discussion followed, with a second (new) 10% sample again rated independently by the same two raters. This process (seeking agreement on new 10% samples) was repeated until a reasonable level of reliability ($K > .7$) was achieved for each code (see Figure 6.1 over page). The coding scheme was finalised after four iterations. The remaining sample was coded in full by the first rater following the final version of the coding scheme (see Appendix H). Once the final coding scheme was applied, codes that occurred for less than 5% of the entire sample were discarded. Each category ('solitary play/relationship type' or 'interaction type') was then analysed to determine the distribution (%) of each code in a given context. Examples of codes applied to survey open-ended responses can be seen in Appendix I, Table I.1.

Interviews. Transcribed responses were collated under appropriate headings with all identifiers removed. The coding scheme was applied to the interview data using the same process as was used on the survey data (10% samples, codes having to exceed a Kappa of .7). Once agreement was reached on the coded responses, the first rater coded the entire set. Example responses that provided insight into players' decision-making are provided in the relevant sections. Examples of codes applied to interview responses can be seen in Appendix I, Table I.2.

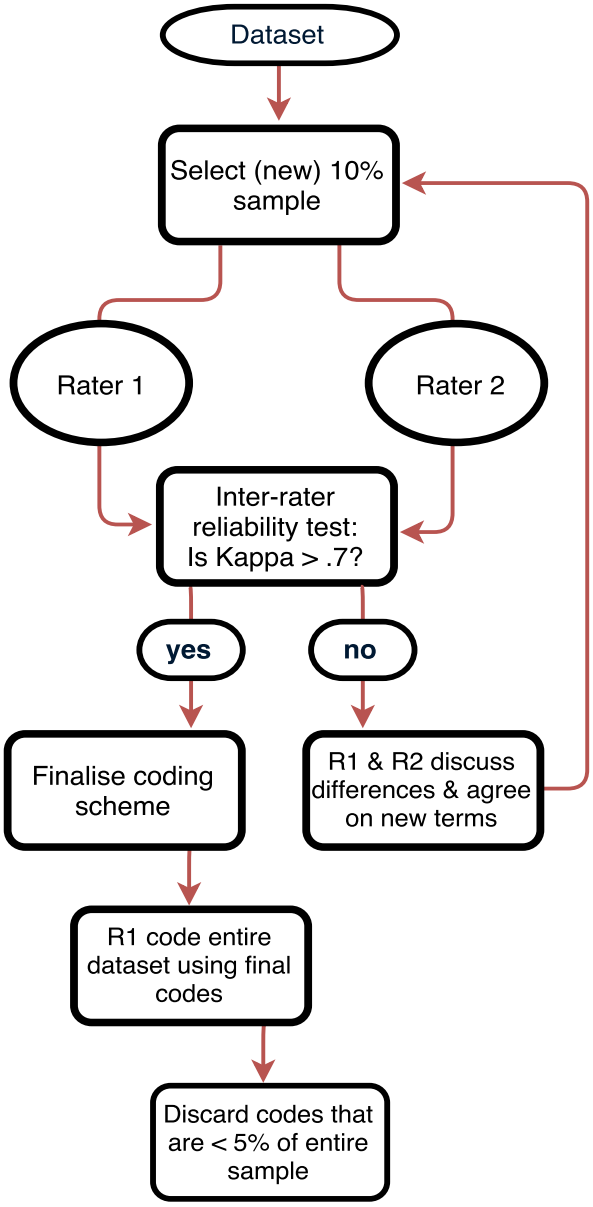

Figure 6.1 Coding scheme development process

6.2 RESULTS

Initial analyses are displayed in Tables 6.1 and 6.2 over page. Codes were aggregated or modified until all the codes exceeded a Cohen's Kappa of .70. The entire set of codes reached an average Kappa of .88 (see supplementary materials for Kappas for individual codes: Appendix G for both survey data and interview data). Applying the codes to the interview data

Table 6.1. Count contrasting different social contexts of play

	Relationship type...		
Interaction type...	Known others	Strangers	TOTAL
Competitive	9	9	18
Cooperative	25	7	32
Mixed	49	36	85
TOTAL	83	52	135

Table 6.2. Descriptive statistics of different social contexts of play

Social Context	N	Freq. %	Age Mean (SD)	% of Gender in each Context Males	Females
Known	87	26.7	28.1 (8.3)	80.5	18.4
Strangers	59	18.1	28.3 (7.1)	89.8	10.2
Solitary	180	55.2	27.8 (7.9)	76.1	22.8
Competitive	18	13.3	28.5 (7.9)	88.9	11.1
Cooperative	32	23.7	26.8 (8.7)	68.8	31.3
Mixed	85	63.0	28.6 (7.5)	87.1	11.8

resulted in a slightly different distribution of codes compared with the survey data. Some codes were not present (e.g. 'no toxicity' for *relationship type/solitary play—likes*), while others appeared (e.g. 'match of skill/play style' for *interaction type—likes*). All differences can be examined in the tables supplied in Appendix G. Only interview responses that match the distributions of the coded survey responses are used to provide insight.

Both survey and interview responses are italicised, but only interview responses are appended with the respondents' age and gender and are indented in a separate paragraph from other text. All written responses are quoted as they were written. All percentage values refer to the percentage of participants who mentioned a code within a single category (whom they played with or how they played with others). For example, when participants who played alone were asked what they liked about this context, 36.7% of their responses indicated 'autonomy'. Codes that occurred less than 5% of the time within a single context are not reported; hence the total % in a given context might not equal 100%. Contrasts of the distribution of the codes across different contexts are provided in Figures 6.2 to 6.5 over the following pages.

6.2.1 Solitary Play and Relationship Type—Likes

Players in all contexts enjoyed experiences of competence/challenge, but this was mentioned with greatest frequency in play with strangers, then play with known others and least of all in solitary play. The experiences of logistical advantage and autonomy were enjoyed in both solitary play and play with strangers. Teamwork was mentioned as an enjoyable experience for both play with known others and strangers. Immersion, relaxation, avoidance of other's toxicity, no performance pressure and escapism were all mentioned exclusively in regard to solitary play. Relatedness and fun were unique enjoyments of play with known others, while the enjoyment of meeting new people was only mentioned in regard to play with strangers. See Figure 6.2.

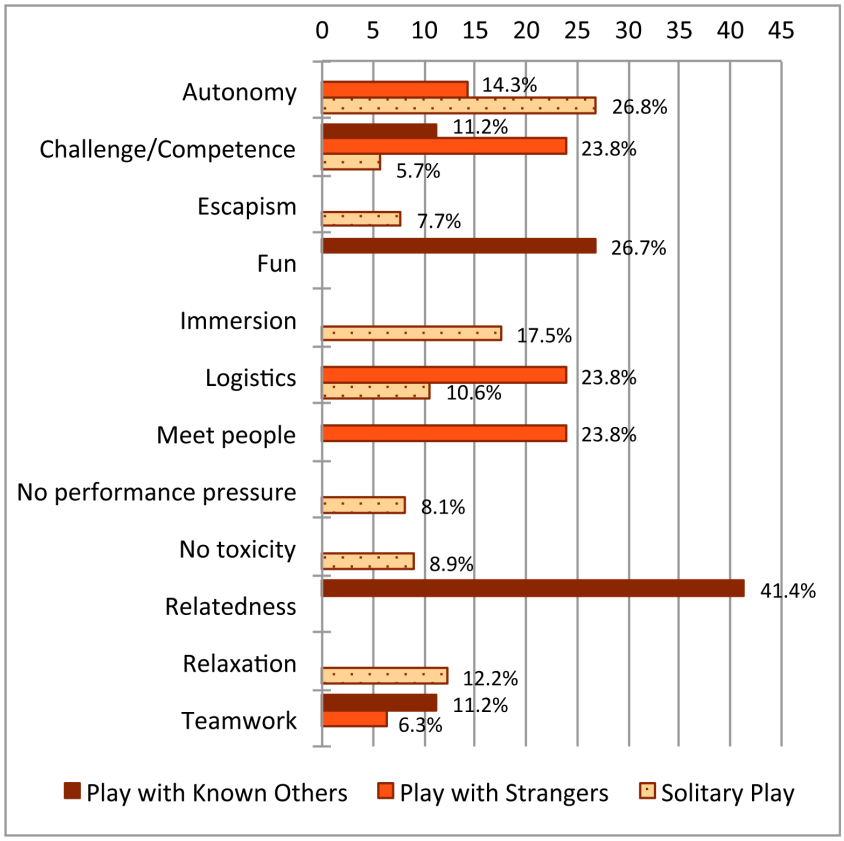

Figure 6.2 'Likes' of solitary play/relationship type

6.2.1.1 Solitary Play—Likes

Enjoyment through autonomy was articulated by solitary players as being in control of the experience, and was often linked to the freedom from social and performance pressures. For example, '*I can play at my own pace and don't feel pressured by others to perform well. Also, I like to take time figuring out puzzles on my own'*. This is also described in some of the interview data:

> *There's no pressure from other people to perform ... you can have a terrible day and play bad games and nobody will judge you.* (20-year-old female)

> *Playing by myself is a more kind of personal, selfish meditative thing. You actually get to spend a little bit of time by yourself doing something, rather than explaining things or having to work ...* (36-year-old male)

Single-player games were also described as providing an immersive experience, partially due to the higher-quality narrative experience—for example, *'usually a deeper story'*—but also because it lacked the distraction of social interaction: *'I can get into the story more because when other people are playing they tend to play out of character and the focus is on socialising rather than the game story',* and:

> *If you play with people, it means you sort of know that is not real, so it's not as, I think, immersive as [when] you're playing by yourself and people in the game are play-characters. They play inside their role more than people who are real.* (33-year-old male)

> *In some ways you feel ... like getting inside of that character more intimately and feeling like things that happen—take it more personally. It does make it more rewarding. You feel more involved in the story line.* (30-year-old male)

The experience of relaxation was also mentioned in conjunction with immersive gameplay. For example, '*Single-player games tend to have more in-depth story, and generally*

feel immersive to me. Also, it's a nice way to get some alone time after spending all day surrounded by people' (coded as immersion and relaxation) describes the use of gameplay to recuperate from everyday stresses.

Solitary gameplay was also the preferred context of play for individuals who found multiplayer difficult given their lack of access to fast internet, or who enjoyed the convenience of being able to play whenever they wished without having to coordinate with others (logistics). Similarly, an avoidance of unpleasant social interactions—'*Don't get abused by randoms. Don't have to compete with hardcore powergamers'* (coded as no toxicity and no performance pressure)—reinforced the preference for relaxing gameplay.

Survey respondents also referred to escapism in relation to relaxation: *'I find it relaxing, and an effective form of escapism from real-world stresses'; 'that I can just sit and relax and not have to think about stuff that's going on in my life.'* Relatedly, the experience of competence was mentioned in conjunction with 'no performance pressure': *'I am challenged to solve puzzles and am not intimidated by other players and their higher ability to play the same game',* or in general terms, such as *'working towards a personal goal'.*

6.2.1.2 Play with Known Others—Likes

References to relatedness, such as '*Good way to bond, have some fun, easier to organise than board games or outdoors stuff'* (coded: relatedness, fun and logistics), show games filling the role of other traditionally recognised social activities. Rather than supplanting standard ways of interacting with friends and family, however, it was described as an adjunct that can build stronger relationships:

> *If you find that rapport with someone in the gaming world on how you approach gaming, then it's just another facet to your friendship. It just polishes up that lovely stone some more ... in peripheral friendships or non-familial friendships or*

acquaintances, it's a way to sort of maybe throw a rope bridge over a ravine to see if there is an even better friendship there. (33-year-old male)

It's become quite a passion within the family unit and it's something we really get into, we really talk about it. (48-year-old female)

It's different to watching a movie because you are communicating, and it's different from having a conversation because you are trying to achieve a goal together. (28-year-old female, talking about playing with her sister)

Video game play also provided connection with physically distant others, as both survey (*'I live interstate from my brother, so I like bumping into him online'*), and interview data describe:

I must say I've been travelling a lot recently … it's kind of lovely just to have a couple of games going with friends and you can just meet. (48-year-old male)

It's become a convenient way for all of us to go, I've got 50 minutes, I can have a chat to you, I can do something fun while I am doing it and I can do it now. (36-year-old male)

The next most frequently cited 'like' of this kind of gameplay related to having fun. While survey responses were brief, such as *'it's fun'*, interview data describes the influence of familiarity and trust:

Just the level of familiarity and the kind of no-holds barred good-natured riffing and dissing and play, just play … with people you don't know, you're just going to wait a session or two, or a week or a month or two before that drops in. But if you already know someone, then that trust is there. (39-year-old male)

Teamwork was also valued, speaking perhaps to an overlap with cooperative and mixed play, as evidenced in Table 6.1. Teamwork was mentioned in tandem with experiences of challenge/competence, such as *'cooperation and achievement'* and *'accomplishing things*

together'. It was also mentioned with the concept of trust—for example, *'I trust them. We work well together. We can coop and strategise effectively'* (coded: relatedness, teamwork).

> *You can always trust your friends. When someone has a particular skill, you just make them do it rather than when you are not playing with friends, there's always that level of uncertainty.* (20-year-old female)

6.2.1.3 Play with Strangers—Likes

Playing with strangers appears to provide players with challenging gameplay and the concomitant reward of experiences of competence by providing an unpredictable and possibly better skilled opponent, as well as clear feedback: *'There's always a challenge of new players that are potentially better.'*

> *When versing strangers ... typically I won't know how well they are going to play. So it always keeps me on my toes and makes me play better.* (22-year-old male)

> *You get more feedback. If you are good and somebody doesn't like you, they'll tell you and it's really good.* (20-year-old female)

This might be due to online play allowing convenient access to a wide range of opponents and access to gameplay at any hour (logistics)—for example, *'I like the competitiveness of playing against other people. Due to me playing later at night, I play with randoms, rather than people I know, who usually play much earlier'* (logistics, challenge/competence), and *'I like the challenge of competing 1-on-1 against a wide variety of people all over the world'* (challenge/competence).

Play with strangers also brings with it the chance to forge new relationships—thus 'meeting people' was mentioned with some frequency: *'It's a chance to just chat with new people and if you feel like it you can choose to get to know them better.'* This is supported by interview data:

> *The cliché of people on the internet is that they are all jerks. For the most part that's true. What's nice is meeting people that aren't, people that are competent players and are really polite and friendly. And even if you screw up, they are there and saying, 'Oh bad luck man, everyone has these days.* (22-year-old male)

However, while the survey data supports the development of friendships online (*'I've cultivated several close friendships with people I've met playing games online'* and *'I like meeting new people from different places. I've made some amazing friends that way'*), the interview data provides another perspective:

> *I make friends … As I see this, I don't want them to be real friends, just want them to be people I can chat to.* (48-year-old male)

> *People started to recognise me, but I didn't want to have a commitment of knowing people online. I have had friendships with people online before and they take a lot of energy, which I didn't necessarily want in my gaming experience. They are difficult to sustain when you have another life. I found it easier when I was a student. But now that I work nine to five, I enjoy playing with strangers because I don't have to make any investment.* (28-year-old female)

Autonomy in gameplay appeared closely related to freedom from emotional attachments and social expectations: *'if you destroy their army and take their resources you don't feel so bad about it.'* Similarly, the convenience of choosing when and how long to play (logistics)—*'I don't have to stick around. Can jump in game or out whenever I feel like it'*—also reflects a high degree of personal autonomy. This was tied to the potential for anonymous and potentially disruptive interactions: *'Relaxed atmosphere—fewer boundaries/restrictions. (I'll never speak to these people again, generally)'*; *'I don't have to care about their emotions, so I can troll them into making mistakes'*; or, as one interviewee noted:

> *I like how I can act out of character around them.* (20-year-old female)

The enjoyment of teamwork while playing with strangers implies that some participants were engaging in cooperative or mixed play (illustrated by Table 6.1).

6.2.2 Solitary Play and Relationship Type—Dislikes

Players in all three contexts disliked mismatches in skill or play style, either between players or between players and the game, though this dislike was expressed the most often in the solitary context, followed by play with known others and lastly, play with strangers. Both playing with strangers and known others produced a dislike of others' toxicity; however, much more so in play with strangers than the latter. Players in both of these contexts also remarked on logistical issues. Solitary play and play with strangers were linked to a lack of relatedness, while those engaged in solitary play and play with known others reflected on negative impacts on life. Only play with known others produced a dislike of both losing and lack of autonomy, while only the solitary context was seen as less fun than others. 'No dislike' was only identified for those who played with known others or alone. See Figure 6.3.

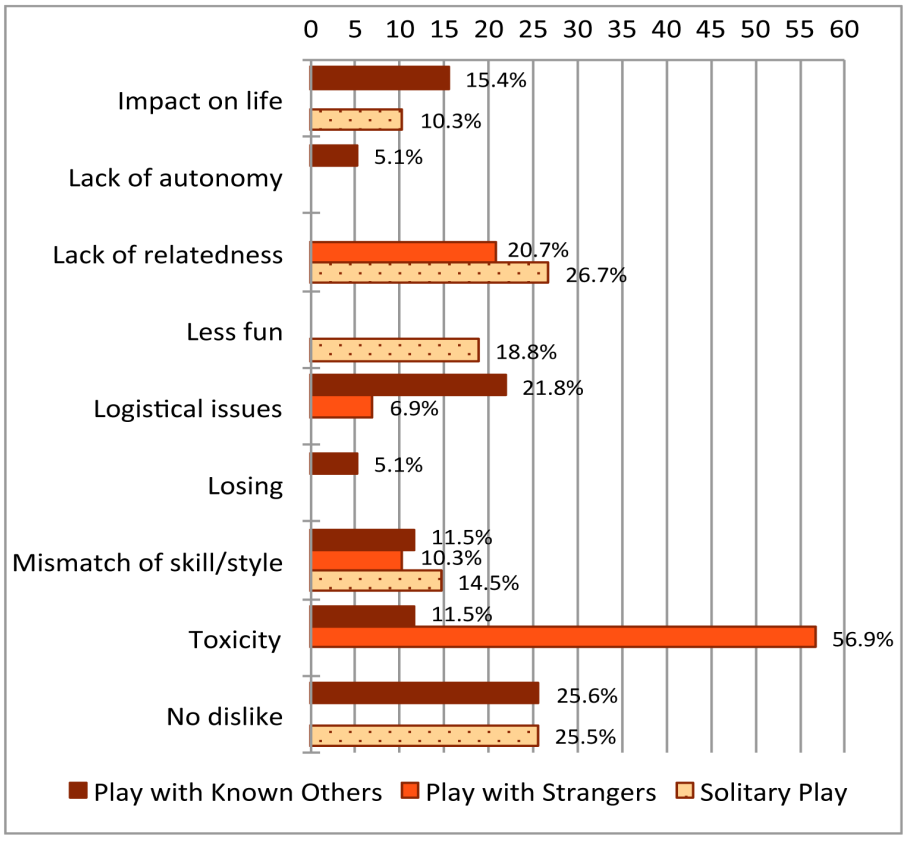

Figure 6.3 'Dislikes' of solitary play/relationship type

6.2.2.1 Solitary Play—Dislikes

Lack of relatedness was described in terms of isolation and an inability to share experiences with others. Why an individual might play a game in a context they have an aversion to is partially explained by survey responses such as, *'I really miss the social interactions of playing online, but with an internet connection as terrible as mine I have no choice'*.

When solitary play was perceived as less fun, it was either in reference to social games, such as *'Games can get boring without other people in them'*, or to repetition, such as *'Repetitive game mechanics',* or predictable AI, such as *'AIs become formulaic in their actions thus boring. Wins can become meaningless'*. The interviews contextualise these grievances in terms of compromise, such as putting up with less fun gameplay in order to avoid the toxic behaviour of other players:

> *Nothing ever changes ... and the thing that I actually did like about the whole MMO scene was that things would change. It's just the people were a problem.* (24-year-old female, referring to playing *Skyrim* alone)

The mismatch of skill/play style refers to both finding the game too hard to progress without help, or again, finding computer-controlled opponents too predictable and easy to overcome, such as *'Computer AI can often only provide so much of a challenge'* and *'Some games can't offer the same challenge as real opponents'*.

Finally, the sense of negative impacts on players' lives, framed as losing time due to long play sessions or frequency of play and possible effects on their state of mind or body was also a complaint about solitary play, such as *'I become antisocial and bad at communicating with people'* and *'Can lose track of time quickly'*. One interview respondent described a link between length of play and differences in game mechanics and social demands:

> *Different friendships and different games or different playing styles, like the game Tekken 2 or 3 or whatever … it lends itself to short periods of game play or tournament play done in an hour or two. With Skyrim, it's just sort of never-ending, and if you want to play it for days and days, you can.* (39-year-old male)

6.2.2.2 Play with Known Others—Dislikes

Logistical issues were by far the greatest complaint, largely due to the difficulties of scheduling a time to play that suited everyone, such as *'It can be difficult to play games with more depth because it is difficult to coordinate everyone's schedule'*. However, this could also relate to different availability time lengths, such as *'As a parent and a contract worker, I don't have hours and hours to commit at a stretch, yet that is often the commitment others want/need'*.

The intimacy of play with known others was a source of distress for players who found that ongoing social discomfort (impact on life) could be created by negative interactions in gameplay (toxicity), such as *'Potential arguments in real life, some friends are selfish'*. Conversely, being overly concerned about potential impacts could affect gameplay enjoyment, as illustrated in the interview data:

> *When you're playing and your mates are the guys screwing up you can't give them a hard time, because they are the people that you are going to have a drink with the next week or you're playing a game with them later that night. So it's sort of stressful in that you can't sort of chastise them for making stupid mistakes as you would a stranger.* (22-year-old male)

Toxicity was also an issue for players in this context, with respondents mentioning *'sledging/trolling'* and *'unnecessary abuse'*. This might have been due to the use of online play—for example, *'they can be smart arses since you can't get up them in person'* and *'sometimes people's personalities clash online (in voice chat)'*. It seems possible that some of these conflicts resulted from the mismatch of skill or play style: *'Some of them have annoying*

game play styles and don't seem to be improving.' It also seems likely that this would impact a player's sense of autonomy: *'There's an inherent requirement that I do my best and encourage others to do so. Sometimes I just want to goof around or leave and do something else'* (coded as 'no autonomy' and 'mismatch of skill/play style'). The unique challenge of playing with known others was prioritising relationships above gameplay:

> *If you know someone, it's bad because it means you feel you have to keep playing with them even if you're not enjoying the game, because you feel like you have to or they will get upset with you if you quit or something.* (33-year-old male)

The dislike of losing was expressed in general terms, and was not linked explicitly to playing with known others.

6.2.2.3 Play with Strangers—Dislikes

Toxicity in others was reported as abuse and harassment, cheating, team-killing and other negative behaviours that players recognised as supported by the relative anonymity of online interactions. For example, *'People on the internet can be amazingly abusive when they lose'*; *'You get a lot of assholes on the internet who like that there's a level of anonymity. People seem to feel less responsible for hurting people they don't know, or generally being less responsible themselves'*.

For some players, this led to a reduction in feelings of relatedness to other players, resulting in loneliness and alienation. For example, *'I am completely turned off by the MOBA genre, because the playerbase is so acerbic and critical … it can be generalised to other types of games to a certain extent; people dislike incompetency, and often won't cut slack for new players who are learning how the game works. I have also felt isolated and alienated from others, and even myself, because of the sheer number of people that play MMOs'* and *'No real sense of community'*.

For others, the mismatch of skill level or play style created team imbalances, such as *'with team games, it can be hard to find a group of similarly skilled players who act well as a team'*. Logistical issues also occurred when communication between members became challenging, and strategy thus became difficult to enact.

6.2.3 Interaction Type—Likes

All three contexts produced enjoyable experiences of challenge/competence; this was most often reported in regards to competitive play, followed by mixed play and lastly, cooperative play. Reversing this trend, teamwork and relatedness was enjoyed the most in cooperative play, then mixed play and lastly, competitive play. The experience of fun was only reported in mixed play. See Figure 6.4.

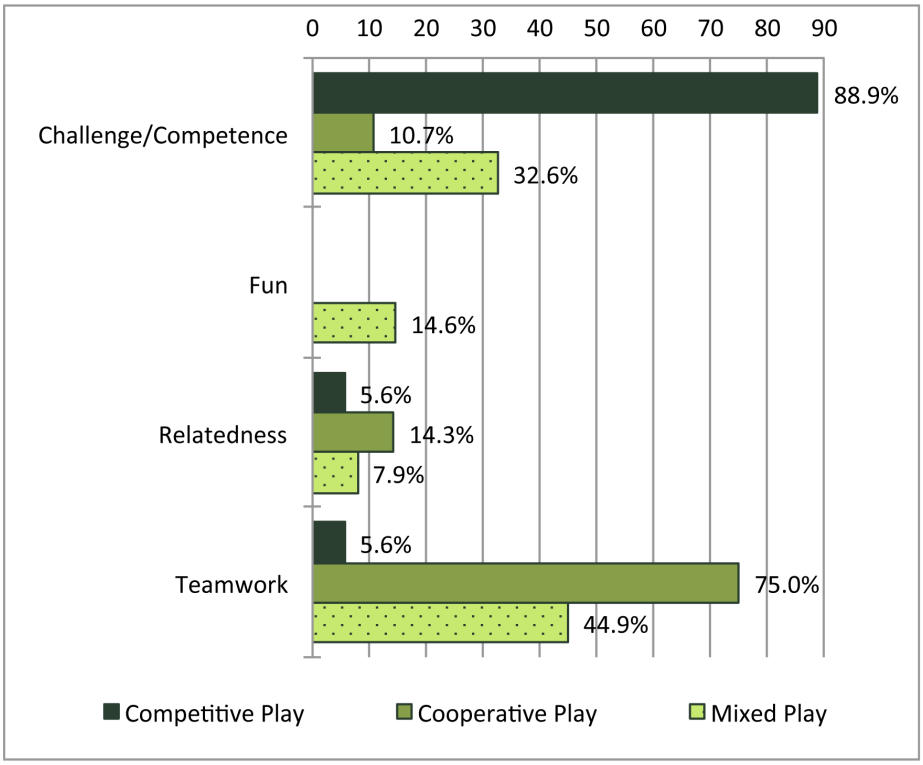

Figure 6.4 'Likes' of interaction type

6.2.3.1 Competitive Play—Likes

Challenge/competence was typically indicated as enjoyment of winning: *'The feeling of beating someone else is the best feeling you can have in a game'*. The clear outcomes of competitive play created a gratifying experience for the winners:

> *I think there is something satisfying about being very good at a game—being better than everybody else and being able to show them through empirical evidence that my score is better than yours.* (20-year-old female)

Comparisons were also made between the challenges of competing against another humans as opposed to AI: *'I generally prefer to compete against other players, who can present vastly different challenges compared to scripted AI (computer) opponents.'* On this last point, the predilection for human opponents was also indicated in the interviews as conferring a more meaningful experience:

> *I just feel like if I was playing against a bot, I'd be wasting time. If I am playing against a human, it's a more valuable way to spend time … I guess it's knowing another person is similarly invested in this battle.* (28-year-old female)

Social competitive play also increased both the risk and value of any potential rewards when well-matched opponents were successfully defeated:

> *A game where you have steamrolled the opposition is not interesting and losing a game where it has been incredibly tight is just as satisfying sometimes, as winning that same game*. (28-year-old female)

To a much lesser degree, teamwork and relatedness also factored into this group, suggesting that some competitive players were engaging in team play.

6.2.3.2 Cooperative Play—Likes

Teamwork is necessarily a cooperative activity, with potentially competitive aims. The enjoyment of shared goals was indicated by responses such as *'you can form a team and work effectively towards goals'* and *'We help each other accomplish goals'*. The interviews describe this in terms of clearly defined and meaningful social interaction:

> *I like it because you have a common goal and then you know what you both want to do. And you're doing something together.* (12-year-old female)

> *It's a genuine team feeling … I think you get something really genuinely social out of it. The interactions are meaningful rather than trivial*. (43-year-old male)

Support from other players to achieve a shared goal was also seen as creating more effective play in which achievement was a likely outcome, such as *'Cooperating with my team mate, progressing only because we worked together, otherwise we wouldn't have gotten further'*. This is explored in more detail in the interviews, in which each player's participation in a role leads to successful outcomes:

> *I like strategy, I like having more than one person on the team, thinking about ways to victory, I like knowing somebody has my back … it allows us all to play the way that we want … and there's always someone filling a gap.* (24-year-old female)

> *The most rewarding experience is when you encounter a player you haven't communicated with recently, but you both seem to have the intuitive understanding of the role. Like in Team Fortress 2, the person who plays the Pyro will protect the Engineer. The game is very much designed to reward people who cooperate. The high you get defeating the other team, because you have all understood your role.* (28-year-old female)

Relatedness was described in terms of warm social interaction, such as *'The commeraderie'*, and connection with known others, such as *'Playing with family'*.

Challenge/competence was described in terms of effective gameplay, such as *'Playing cooperatively means communication increases how effective we are at the game'*, and a sense of shared achievement, such as *'Sense of accomplishment if we finish a challenge or building together'*. Sharing these experiences appears to increase the satisfaction of the win:

> *I enjoy winning more, when playing cooperatively, because we were able to work together and win.* (28-year-old female)

> *It's the discovery, together, of getting to the next level.* (48-year-old female)

6.2.3.3 Mixed Play—Likes

While the descriptions of challenge/competence, teamwork and relatedness did not differ from those mentioned for cooperative or competitive play, unique mention was made of being able to vary between different competence-enhancing experiences, such as *'I like being able to switch between things that I like doing. I can go kill things—including people I like—or I can work with them to achieve the same goal. It lets me play how I feel like playing at the time, and I have friends who play in either category, and some friends who play both'*; *'It allows me to cooperate and compete with everyone'*; *'Variable and challenging'*. Mention was also made of MMORPG play, in which players can engage in competitive bouts while waiting to form a group for cooperative play. This allowed for faster character growth and the acquisition of specialised gear from both types of play. References to fun were linked to those regarding teamwork and challenge in different instances, as well as to having a choice between competitive and cooperative play.

6.2.4 Interaction Type—Dislikes

Toxicity in others and losing were the complaints mostly frequently mentioned regarding competitive play, followed by mixed play and lastly, cooperative play. Only mixed play and cooperative play produced the dislikes of mismatches in skill or play style, and lack of teamwork. Logistical issues were a greater complaint for cooperative play, than mixed play or

competitive play. The most satisfaction, 'no dislike', was experienced in mixed play, followed by competitive play and lastly, cooperative play. See Figure 6.5.

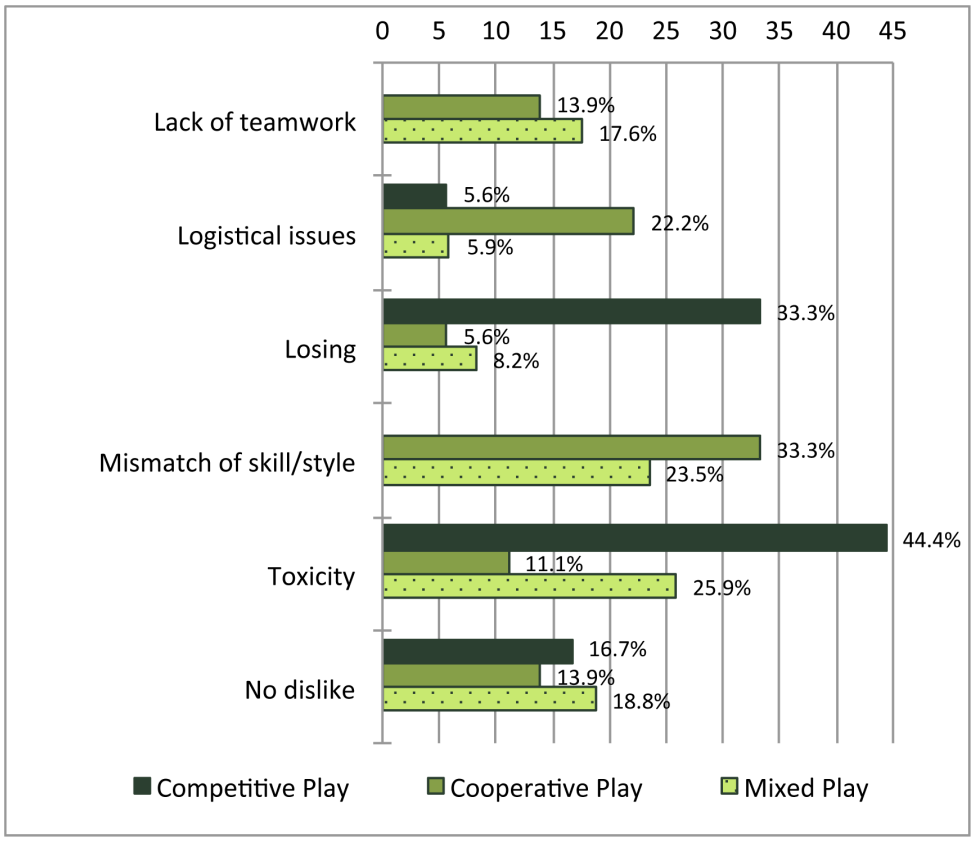

Figure 6.5 'Dislikes' of interaction type

6.2.4.1 Competitive Play—Dislikes

The complaint of toxic behaviour in competitive play was similar to that expressed by those playing with strangers—*'People, who ruin things on purpose'*—but interview data describes an exaggeration of competitive behaviours:

> *Just the level of needless aggression and meanness and sort of narcissism and over-gamesmanship that can be outlet in those realms, and people who are playing the game for the wrong reasons and who just stalk, spawn poison. Just shoot you in the back of*

the head just as soon as you spawn, because it increases their point count or something. (39-year-old male)

That losing to others would be an aversion of those engaged in competitive play is a natural outcome; however, the resilience people displayed to losses appeared to range:

If I lose, that means I have more to learn in a game. (33-year-old male)

When something either completely goes 'cause of one person, or if I mess up really badly, then that just … absolutely infuriates me. (22-year-old male)

The small mention of logistical issues took the form of complaints about sharing of equipment or changes made by the developer.

6.2.4.2 Cooperative Play—Dislikes

Complaints about mismatches in play style or skill could go either way in cooperative play—from concern over not being able to contribute effectively to the team, such as *'When my skills are well below my partner's'*, to disappointment in others, such as *'Sometimes your team mates suck so you lose'*, or as this interviewee stated:

Sometimes you do get a person who is too good for you or not as good and you're either weighing them down—and you spend the entire game feeling guilty—or the other person's weighing you down. (24-year-old female)

Logistical issues included game bugs resulting in lag or other players dropping out, poor game interface and difficulties in communication. Other issues overlapped those of playing with known others regarding schedule coordination:

You have to play with your friends sometimes and usually have to plan ahead which can get annoying. Especially at this age of 20, most of my friends are getting jobs and they have got more obligations so you can't really chill out like when you were 17 and had nothing to do. (20-year-old female)

What is unique is that a lack of teamwork was identified as a reason games were lost and gameplay was not enjoyable. This manifested in various ways: *'there is sometimes one person who wants to be top dog, regardless of the general feel of the rest of the group'*; *'people don't always stick to the plan'*; *'organising, team arguments'*; *'When the match becomes unbalanced because one of our teammates is a pickup (e.g. unknown player) and plays badly or makes negative comments to his own team'*. Some of these responses were coded as a mismatch of play style or skill or toxicity, but they also describe failures of leadership or the failure to put aside personal goals in order to focus on the team's goals.

Toxicity in others was also an issue for those engaged in cooperative play. Although it is not clear whether they were referring to the behaviour of people they know or do not know, the behaviours are similar to those described in 'Playing with strangers'. References to losing were linked to complaints about mismatches in skill or play style, where participants either apportioned blame to other team members or assumed responsibility for having let others down.

6.2.4.3 Mixed Play—Dislikes

No uniquely different qualities from competitive or cooperative play were reported.

6.3 DISCUSSION

In answer to RQ5, the reasons why people choose to play in a particular social context are various, but include a degree of compromise, as players juggle priorities and practical considerations to achieve the most desirable (or least undesirable) outcome. Though speculative, the desire for certain experiences is taken as an indication of how players seek to maintain or enhance their wellbeing via gameplay (RQ6).

Overall, those playing in the solitary context were driven by the need for relaxing, immersive, escapist and autonomous experiences, and to avoid toxicity in other players and performance pressure. In practical terms, solitary play was also convenient, as it requires no reliance on others' availability or ability. That participants who generally played in the solitary

context appeared to enjoy experiences of immersion more than those who typically played in social contexts supports the quantitative study conducted previously that focussed on the participants' favourite game (section 5.2.1). Like the results of that study, it is also partially supported by other survey research (Johnson, Nacke, et al., 2015), and contrasts with research making use of the experimental methodology (Cairns, et al., 2013; Lim & Reeves, 2010; Ravaja, Saari, Turpeinen, et al., 2006; Weibel, et al., 2008). It seems likely, however, that in terms of how people typically play games (outside of the experimental setting), the solitary context is more immersive due to the use of single-player games with stronger narrative elements. It seems that for some, the immersive quality of solitary play offers respite from the demands of other aspects of life, suggesting that this context provides mental breathing space—this is partially supported by the use of games for recuperation (Collins & Cox, 2014; Reinecke, 2009). While this might lend weight to the notion that immersive solitary play is more likely to result in feelings of connection with computer-controlled characters (raised in section 5.3), due to the noted stronger narrative and character development of single-player games, this was not raised by any of the participants. It is possible, however, that face-to-face interviews might exacerbate social desirability bias, and that this kind of information is best collected using a less personalised survey technique (Kreuter, et al., 2008). That this issue was not raised in the online survey could also be due to the very general nature of the questions (likes and dislikes). While future survey research (beyond the scope of this thesis) might consider more directed questions regarding a sense of connection to computer-controlled characters, as was carried out by Coulson et al. (2012) in regards to a single role-playing game, the next study (Chapter 7) tests this in an experimental setting.

The listed drawbacks of playing games alone included regret over not being able to share experiences or feel connection with others during play (lack of relatedness); the acknowledgement that it was less fun than social play (sometimes due to poor AI, or repetition of game elements); a dislike of finding the game either too hard to proceed alone or too easy and predictable (mismatch of skill or play style); and a perceived impact on their life (losing time to

a solitary pursuit). Some of these complaints suggest opportunities to improve on game design. This and responses to the complaints about other contexts of play are explored in greater detail in section 8.3.3. However, that some players reported enjoying solitary play as a means to escape from troubling thoughts and other aspects of life (escapism) raises the possibility that problems could arise if players become reliant upon video game play as their sole coping strategy. To place this in perspective, solitary play demonstrated a mean hours of play that is almost half that of social play (see Appendix F, discussed in section 8.1), also supported by other research using cross-sectional survey (Eklund, 2015b). Thus while some players in this context might consider their gameplay excessive, this could also be due to inculcated value systems, which place a greater emphasis on social interaction and devalue solitary pursuits. Greater clarity could be provided by logging actual hours of play and by establishing whether play is in fact harmonious or obsessive (Lafreniere, et al., 2009). Overall, this study suggests that solitary play provides an accessible means for those wishing to positively influence their mood via relaxation facilitated by experiences of autonomy and immersion.

Social play, overall, provided enjoyable experiences of competence and challenge, as well as relatedness, with other people providing the means to experience this. Whether people knew whom they were playing with or not (relationship type) determined whether the social or the play experience took precedence. In turn, these experiences were delivered through various interaction types: cooperation, in which teamwork allowed players to share risks and rewards; competition, and its clearly communicated feedback (winners and losers); and combinations of the two.

Play with known others was characterised by experiences of relatedness in which warm and trusting relationships provided a fun atmosphere for gameplay. An enjoyment of teamwork and competence/challenge also typified this context, suggesting that at least some play with known others was cooperative. This context also provided a means of connecting with physically distant friends and family as well as cementing bonds with those more closely situated; this is supported by a studies of online and offline play (Eklund, 2015a) and MMO

play (Nardi & Harris, 2010). In terms of teamwork with known others, being able to overcome challenges together, having shared goals and experiencing team synergy also created effective and enjoyable gameplay. The intensified sense of enjoyment, in which the risks and rewards of gameplay were given greater meaning, might have been aided by an atmosphere of trust. Empathetic, or trusting, connection with others might have multiplied the emotional components of gameplay, in which gains and losses were not experienced in a purely personal sense, but also reflected the gains and losses of others. That playing with known others might result in more effective gameplay than play with strangers could be due to greater team cohesion, which in turn is a result of greater team loyalty performed as a greater number of assistive actions and less betrayal (Mason & Clauset, 2013). These experiences would, in turn, support the value placed on feelings of relatedness. In this sense, playing with known others should also impact positively on players' psychosocial wellbeing, as other research supports (Shen & Williams, 2011). The emphasis on social relations could also explain why it was experienced as fun, while playing alone or with strangers was not; this finding is also supported by experimental research (Mandryk, Atkins, et al., 2006). The dislikes of playing with known others, however, largely revolved around social interaction and obligation: the inconvenience of relying on others or being relied on, negative impacts on their life (ongoing social repercussions), toxicity in others and a lack of autonomy.

People who played with strangers liked experiences of challenge and competence the most, found their gameplay to be largely convenient and enjoyed meeting new people, autonomy and teamwork. It seems likely that playing with strangers is facilitated by online play, and as such, people who play in this context have the opportunity to play with people based upon their skill level rather than due to any social obligation. As such, a greater level of personal freedom (autonomy) is likely to result in gameplay, as well as convenience in terms of choosing when and when not to play. That people in this context enjoyed meeting people is perhaps enabled by team play, evidenced by the enjoyment of teamwork, in which cooperative play can lead to increased cooperative behaviours and trust (Waddell & Peng, 2014). However,

the greatest dislike of this context was toxicity in others, followed by a lack of relatedness, mismatches in skill or play style and logistical issues. That players in this context remarked on an enjoyment of meeting new people, as well as experiences of alienation, suggests that players with very different emotional resources or resilience play in this context. Conversely, it could be that some multiplayer games have friendlier communities than others. While both explanations seem likely, it is clear that players value the relationships that form during play, an insight shared by studies of MMO play (Cole & Griffiths, 2007; Yee, 2006a).

In terms of how people played with others (interaction type), competitive play was characterised by an enjoyment of challenge and competence, but also relatedness and teamwork, implying that some self-identifying competitive players worked in teams or experienced a sense of relatedness through cooperation. It might also be that competition itself produces relatedness; if so, this would be an interesting area to explore. Relatedly, competitive experiences appeared to provide the greatest enjoyment of challenge and competence, compared with cooperative and mixed play. This might be due to the obvious goals and feedback of competitive play with the completion of gameplay typically resulting in an assortment of winners and losers. In this sense, the feeling of competence, for winners, would be clearly defined. While the previous study (Chapter 5) did not produce a difference in competence for different social contexts of play, this might be due to reliance on the PENS measure of competence. Research comparing competitive play with non-competitive play (closer to actual solitary play—see section 2.5.4) supports the notion that competition is associated with the satisfaction of competence needs (Kazakova, et al., 2014). Responses also suggested that competitive play with humans was seen to be of greater value than play against computer-controlled opponents (AI). However, whether this is due to the different level of challenge offered or the perception of shared (or not) investment in gameplay again suggests the need for more targeted research. The two key dislikes (toxicity and losing) seem to be a logical extension of the competitive environment, though the lack of sporting behaviours was seen as aggravated by online anonymity, as other research supports (Chen, Duh, & Ng, 2009; Suler, 2004). Of interest is whether engaging in toxic behaviours is a

product of, or would produce, lowered wellbeing. Regardless, it does seem that the benefits and risks to wellbeing in competitive play overlap with those of 'play with strangers', as the comparison of relationship type to interaction type (Table 6.1) supports.

The experiences of cooperative play reversed those of competitive play, as cooperative play was marked by an enjoyment of teamwork, then relatedness and least of all, experiences of challenge and competence. That teamwork was a key experience of cooperative play was reinforced by the logistical issues cited, which suggested a high reliance on others and on bridging technologies. The failure of teamwork was also a major complaint, although the examples provided suggest that this might be due to a combination of factors. While practical considerations such as skill balancing factored in, players' personal qualities and differing motivations could lead to in-fighting, a general lack of cooperation and ultimately, failure. Winning via cooperative play, however, was expressed in meaningful terms, much as if the whole was greater than the sum of its parts.

Those engaging in mixed play (both competitive and cooperative play) were able to enjoy the entire range of experiences appreciated by both competitive and cooperative players. In comparison with cooperative or competitive players, however, players in this context uniquely expressed that play was fun. Players in this context also expressed a relatively low level of dissatisfaction (characterised by 'no dislike' responses). Additionally, the complaints of mixed play did not result in anything not already covered by those who mostly played competitively or cooperatively. Whether this context—actually a blurring of contexts—might offer players greater opportunities to experience a range of need satisfactions would be better answered if it were clearer how players actually played. Though some responses imply that players were constantly changing their play styles (playing with friends, then strangers; competitively, then cooperatively), it is also possible that this category captured people who prefer to play in teams and value the competitive and cooperative experiences equally. In fact, this context highlights that further detailing the actual experiences of play would benefit the study of the social context of play overall.

This study sought to support the enquiry of the previous two studies by asking why players might commonly engage in a particular social context of play and what the wellbeing outcomes of that choice might be. Choice of context is shown to be a weighing up of practical and psychological factors. By bringing greater insight into those processes, this chapter is a resource for designers as well as for those simply wanting a better understanding of the desirable and undesirable characteristics of different social contexts of play. While there are differences between the presence of codes in the interview data compared with the survey data, this could be due to the differences in collection method, as interviews might be at greater risk of social desirability bias (Kreuter, et al., 2008). As such, the survey data has formed the core of the analysis. Two key limitations, however, suggest caution. The first refers to the gender distribution across the two stages of the study, suggesting the potential for skewed findings: 50% female for interviews, 19% for the survey. This gender distribution also differs to that demonstrated in the broader community, where female players make up between 44% (Entertainment Software Association, 2015) to 47% (Brand & Todhunter, 2015) of the whole population. Additionally, while this study outlines some of the decisions players make regarding the social context of play, as well as a potential relationship to wellbeing, it cannot ascribe causality, nor make definitive claims. In other words, it cannot determine whether choice of social context is an expression of wellbeing, if it maintains or enhances wellbeing or some combination of the two. For this, the experimental methodology is indicated.

7 Study 4

The previous three chapters have demonstrated variations in the player experience of different social contexts of play, and established distinct predictors of wellbeing and what players value about the social context of play that they generally engage in. The previous three studies, however, primarily made use of the survey methodology, and thus the causality of the findings are subject to interpretation. Chapter 7 extends the research described in previous chapters by applying measures of affect and the player experience to the cooperative play of a first-person shooter in an experimental study. Using experimentation at this stage of the overall research project allowed for a focussed examination of the impact of the social context of play on wellbeing and the player experience in a manner that was controllable, repeatable and could establish causality. Specifically, this study's objectives were to show a causal relationship between the social context of play and an aspect of wellbeing, and to determine if the perception of playing with another human is enough to create a different player experience compared with playing a computer. It achieved this by contrasting the cooperative play of a first-person shooter with both avatars (human-controlled character) and agents (computer-controlled characters), and asking the following questions:

RQ7. Does playing with either an avatar or an agent affect the level of positive mood?

RQ8. Does playing with either an avatar or an agent affect the player experience?

The choice to contrast cooperative play with an avatar or agent was due to a need to build on previous research. While Greitemeyer et al. (2012) found that playing a violent game cooperatively in a team produced cooperative behaviours post-play, their participants were paired with humans in all conditions. In actual multiplayer games, players may team up with computer-controlled characters in order to 'flesh out' teams, or enable a single player to engage

in a campaign. This character (agent) acts as a virtual human stand-in for a human-controlled character (avatar) and thus produces a comparable means of comparing the experience of playing with a human or a computer. How this impacts on the player experience is indicated by Johnson et al. (2015), who found that play with a computer-controlled teammate both impacted on players' brain activity and the player experience. Specifically, play with an avatar (human) produced greater feelings of relatedness, while play with an agent produced greater feelings of competence. However, Johnson et al.'s study used actual agents and avatars with no use of deception to equalise any potential systematic behavioural differences across conditions. The authors have acknowledged that this could have affected the findings. For example, agents are designed to support avatars, whereas human players might not always offer assistance to each other; therefore, the participants might have experienced greater competence in the agent condition because they were consistently supported.

Experiments where a deception was engaged to equalise the conditions, such that players played with or against either a human or computer in both conditions, include those of Gajadhar et al (2008), Lim and Reeves (2010) and Weibel (2008). The overall trend across these studies suggest that play with a human will result in greater presence, enjoyment, arousal or positive valence than play with or against the computer. This trend continues in studies not using a deception (Cairns, et al., 2013; Mandryk, Inkpen, & Calvert, 2006; Schmierbach, et al., 2012), although again, whether this is due to fundamental variations in the task load of the different conditions used is uncertain. While these studies differ in terms of what game genre they make use of, the measures used and whether contrasts engage competitive, cooperative play or both, what is consistent is the use of commercially available multiplayer games. This, of course, adds to the studies' ecological validity, but might affect the generalisability of the results. Relatedly, there is the question of whether solitary play in general is analogous to the single-player mode of a multiplayer game, and whether these results are applicable to games designed for single-player only. To build on previous research, however, this study also made use of a commercially available multiplayer game. A deception was employed to counteract any

possible influence of differences in the behaviour of computer- and human-controlled characters, such that participants actually played with each other in both conditions, but believed that one game was with a computer-controlled character. Cooperative play was chosen in order to produce conditions with equivalent activities. While the same could have been produced with two competitive conditions (players competing against each other or against a computer-controlled character), this is an obvious next step for future research. Additionally, while the ideas could be more rigorously tested if the conditions also included a deception where both players actually played against a computer-controlled character, time limitations and potential participant fatigue precluded this additional level being added to the design—nonetheless, this should be considered for future research.

The use of the experimental methodology also led to the deployment of a different measure of wellbeing and the addition of previously unused player experience measures. While the previous studies measured wellbeing using the MHC (Keyes, 2002), which captures players' emotional, psychological and social wellbeing over the period of a month, for a laboratory-based experiment it was necessary to have a measure that captured the players' wellbeing immediately preceding gameplay. The positive scale of the Positive and Negative Affect Schedule (PANAS) (Mackinnon, et al., 1999) was engaged in order to capture post-play positive affect. While previous research has determined that playing against a human produces more positive valence than playing against a computer (Ravaja, Saari, Turpeinen, et al., 2006), the study in question used competitive play, and the contrasting conditions for one of the games involved different game modes (e.g. the study using *Duke Nukem* operationalised single player using a campaign, while multiplayer used death match). By choosing to contrast cooperative play in both conditions for the current study, the gameplay experience only differed in terms of the players' relationship to their teammate (AI or human), and thus any differences in the players' affect must be attributed to that difference. The use of only the positive scale of the PANAS was due to the desire to constrain the number of items added to the post-play survey. Also, while dispositional positive and negative affect have been found to have no relationship,

when the measurement is attached to an occasion-specific event or state measurement, the two scales have been found to be negatively associated (Schmukle, Egloff, & Burns, 2002). It is therefore theoretically supported that greater state positive affect indicates a lessening of state negative affect. In turn, this makes the use of both scales redundant, while the use of the positive affect scale aligns with the general thrust of the program of research.

The measures of the player experience were also chosen to replicate or closely approximate those of the previous studies, with any additions used to test the equivalence of the conditions in terms of task load (e.g. there should be no difference in terms of how challenging the games are); to use as a point of comparison with other studies in the field (e.g. enjoyment should be greater in the avatar condition; Gajadhar, et al., 2008; Schmierbach, et al., 2012; Weibel, et al., 2008); or to focus on the social context of play under study (cooperation) and its relationship to other measures (e.g. connection). The measure of game enjoyment was previously withheld from the survey studies in order to reduce the likelihood of participant fatigue. The measure of connection, however, substituted the PENS relatedness measure, as the latter seemed to indicate a depth of connection not likely to occur in an experimental setting with brief bouts of gameplay and no communication allowed. The use of a brief visual measure of connection, however, presented an opportunity to capture an aspect of relatedness forming within a shorter period of time (as discussed in section 2.4.1).

As it is designed, this study offers both a means of building on previous research in the field and within this thesis in terms of confirming previous findings, providing causal direction and testing suppositions, such as those of Study 2 (that some of the wellbeing associated with solitary play might be associated with a sense of connection to computer-controlled characters). Its limitations are discussed in sections 7.3 and 8.5.

7.1 METHOD

A between-subjects repeated-measure design was implemented to test whether cooperative play with an avatar produced different effects to cooperative play with an agent.

The choice of cooperative play in both conditions was to eliminate the potential influence of difference in task types, such as one task being more arousing or more violent than the other. Additionally, a deception was employed, such that play occurred in both conditions against a human teammate—both players were, in effect, each other's agent companion for the agent condition, as well as each other's avatar companion in the avatar condition. This was to counteract any systematic difference in the behaviours of human- or computer-controlled characters. The decision to have both games played with avatars (humans) instead of agents was due to the technical limitations of the game in question, which made deceiving the participants unlikely (e.g. the agents would always remain close by, would never take initiative or act unpredictably). It seemed more likely that we could deceive participants by stating that we were testing 'new and more human-like AI behaviours', and this became the basis of the deception.

7.1.1 Recruitment

Approval was sought and granted by a university ethical review board to recruit individuals with experience playing shooters, who were comfortable with violent content and aged 17 years or older. Pairs of participants were recruited from a video game studies course at a university, from the general public via social media and from a research database of participants from prior studies. Snowball sampling techniques were also used (Morgan, 2008). Data collection ran from August 2014 to February 2015. Participants were each given a free coffee voucher and had the opportunity to enter a draw to win a $100 gift voucher.

7.1.2 Procedure

The experimental sessions took place in a computer laboratory. Only two participants were tested in any one session. To help with the believability of the deception, participants were told that this study was to test 'new, more human-like game AI behaviours and see how they impact on the gameplay experience'. Written informed consent was obtained. Participants were then seated in adjacent booths with a partition between them and asked to not speak to each other once the experiment began. Text chat was not supplied. Additionally, participants wore

headsets that delivered the game's audio in order to mask any sounds coming from the other participant. The participants first answered questions regarding demographic and previous experience, whether they knew the other participant, how they knew them and if they had played games/shooters/target game with them before. They then played two games in counterbalanced order (agent and avatar) for approximately 10 minutes each game. The researcher told them beforehand which game they were playing (agent or avatar). Each game automatically timed out and delivered the player to the corresponding survey. The approximate total time of each session was one hour. At the end of the experiment, the participants were asked on-screen to indicate whether they believed they were playing with AI or a human in the agent condition. Following this, they were also debriefed verbally regarding the deception.

7.1.2.1 Stimuli

The game used in this study was *Left 4 Dead 2* (Valve Corporation, 2009), a graphically realistic first-person shooter where the players are placed in a zombie-apocalyptic world (see Figure 7.1). This game was chosen because of its AI director, which provided a level of dynamic difficulty adjustment to level out any differing levels of player ability. The AI director determines the pace of the game via the number of attacking zombies, and is a direct response to

Figure 7.1 Screenshot of *Left 4 Dead 2* 'The Parish' (Valve, 2009)

how an individual performs and how well they work together. The level chosen was 'The Parish', which involved players negotiating an abandoned town while being attacked by zombies. Players were randomly assigned a character (mostly male and white), and began play in a safe room with a selection of weapons, ammunition and medical packs. Throughout the game, players were able to pick up additional weapons and medical packs that allowed them to defend and heal themselves and others. At random times, an event would be triggered in which zombies would swarm the participants' characters. The way that player health operated was modified to stop players from dying during the game—when their health bar dropped below a certain point, it automatically topped up. However, gameplay was sufficiently challenging to allow the players to stay in the same level before gameplay ended.

7.1.3 Measures

Mood. Positive mood was measured with the positive affect subscale of the short 10-item version of the PANAS. The PANAS-short form is a validated measure of positive and negative affect (Mackinnon, et al., 1999). The positive affect scale is comprised of five items measured on a 5-point scale, which asks participants to rate the extent to which they are 'experiencing a particular emotion right now', such as 'excited'.

Player experience. Player experience was measured across the dimensions of autonomy, competence presence, challenge, enjoyment and sense of connection and cooperation with the teammate. The in-game experiences of autonomy, competence and presence were measured with the PENS (Ryan, et al., 2006), described in section 4.1.3.

Challenge. Challenge was measured with three items on a 7-point scale, namely: 'I had to put a lot of effort into the game', 'I found this level very difficult', 'I found this level challenging'. This measure was created for this study and is not validated, though it provided an acceptable Cronbach's alpha (agent: $\alpha = .857$ / avatar: $\alpha = .866$, Tables 7.1 & 7.2). This measure was taken in order to check that both conditions were in fact of a similar difficulty level, and that differing task loads were not affecting other aspects of the player experience.

Enjoyment. This was measured with an adaption of the IMI's interest/enjoyment subscale. It is a validated measure of a participant's subjective experience of intrinsic motivation for an activity (McAuley, et al., 1989). The items were adapted to read 'game' instead of 'activity'. It consists of seven items measured a 7-point scale, an example being 'I thought this was a boring game' (reversed).

Connection. An adaption of the Overlap of Self, Ingroup and Outgroup Scale (OSIO) (Schubert & Otten, 2002) was used to measure participants' perceptions of connection with their teammate. The adaption is a one-item, 7-point pictorial measure (see Appendix J). Participants were asked to indicate which level best represented their level of connection with their teammate, with the distance between the circles indicating the level of connection. This measure was used as a substitute for the relatedness measure.

Cooperation. The perception of cooperative play was gauged by five items measured on a 7-point scale, e.g. 'I helped my teammate', 'My teammate was supportive', 'I cared about the fate of my teammate', 'My teammate was helpful', 'I supported my teammate'. This measure was created for this study and is not validated, but displayed acceptable Cronbach's alphas (avatar: $\alpha = .895$ / agent: $\alpha = .816$, Tables 7.1 and 7.2).

All items (non-commercial) are displayed in Appendix J.

7.1.4 Data Preparation and Preliminary Analyses

All analyses were carried out using SPSS 21.0. Preliminary analyses carried out the checks conducted in the previous studies. See Tables 7.1 and 7.2 for Pearson's correlations and Cronbach's alphas.

Sixty participants took part in the study, but 18 revealed that they were not deceived and were excluded from analyses; two participants were excluded due to sustained technical difficulties during the play session; as was one participant who did not respond to over 10% of the self-report measures. The final sample was based on 39 participants: 87.2% male, 5.1%

female, 7.7 % unreported; between 18 to 54 years of age (mean = 28.05, SD = 9.57). Their level of expertise was gauged with a 7-point scale, from 'no experience' to 'very experienced'. Experience mean levels decreased from general experience with video games (Mean = 5.74, SD = 1.29) and experience with shooters (Mean = 4.97, SD = 1.48) to experience with the target game (Mean = 3.62, SD = 2.27). Regarding familiarity, 59% of the final sample knew the participant they were paired with.

All assumptions of repeated-measures multivariate analysis of variance (RM-MANOVA) were satisfied. Order effects were tested for on the final sample. Order was dummy coded before entering into a multivariate analysis of variance (MANOVA).

7.1.5 Analysis

The primary analysis was a 2x2 mixed multivariate analysis of variance (RM-MANOVA), with the mood and the player experience measures (autonomy, challenge, competence, connection, cooperation, enjoyment, positive affect, presence) entered together as the entered together as the within-subjects' factors and relationship type (playing with known others, or strangers) entered as a between-subjects factor. Order of entry of IVs was avatar and then agent. A Bonferroni correction for multiple comparisons was applied to the entire set.

7.2 RESULTS

Preliminary analyses provided the correlations and Cronbach's alphas for all multi-item measures in Tables 7.1 (play with avatar) and 7.2 (play with agent – both found over page). Additionally, order effects (MANOVA) were found to be non-significant, $F(1,37) = 1.529$, $p = .175$.

The primary analysis found that the between-subject effect (familiarity) was not significant, $F(1,37) = .66$, $p = .72$. The within-subject effect of mode (agent or avatar) however, was significantly different, $F(1,37) = 4.37$, $p < .01$, $\eta_p^2 = .54$, qualified by an interaction between mode of play and familiarity, $F(1, 37) = 2.48$, $p < .05$, $\eta_p^2 = .40$.

Table 7.1. Cronbach's alphas and Pearson's correlations two-tailed for play with avatar

	1.	2.	3.	4.	5.	6.	7.	8.
Alphas	.812	.866	.711	-	.895	.892	.832	.880
1. Autonomy	-							
2. Challenge	.485**	-						
3. Competence	.347*	.099	-					
4. Connection	.159	.196	.095	-				
5. Cooperation	.443**	.155	.416**	.613**	-			
6. Enjoyment	.547**	.393*	.483**	.122	.377*	-		
7.Positive affect	.451**	.192	.265	.075	.170	.463**	-	
8. Presence	.699**	.435**	.353*	.067	.337*	.445**	.358*	-

* $p < .05$, ** $p < .01$

Table 7.2. Cronbach's alphas and Pearson's correlations two-tailed for play with agent

	1.	2.	3.	4.	5.	6.	7.	8.
Alphas	.908	.857	.761	-	.816	.908	.896	.893
1. Autonomy	-							
2. Challenge	.327*	-						
3. Competence	.287	-.036	-					
4. Connection	.020	.243	-.214	-				
5. Cooperation	.272	.575**	.109	.523**	-			
6. Enjoyment	.581**	.181	.400*	.046	.140	-		
7. Positive affect	.459**	.375*	.352*	.134	.317*	.527**	-	
8. Presence	.534**	.492**	.357*	.053	.499**	.289	.516**	-

* $p < .05$, ** $p < .01$

Follow-up univariate analyses revealed significant main effects and large effect sizes for connection, $F = 17.97$, $p < .001$, $\eta_p^2 = .33$; cooperation, $F = 13.58$, $p = .001$, $\eta_p^2 = .27$; and presence, $F = 6.79$, $p < .05$, $\eta_p^2 = .16$; in all cases indicating greater effects when participants were playing with avatars, than in play with agents. See Figure 7.2 over page.

There was also a significant main effect for enjoyment, $F = 11.39$, $p < .01$, $\eta_p^2 = .24$, which was qualified by a significant interaction, $F = 6.53$, $p < .05$, $\eta_p^2 = .15$. Analysis of simple main effects revealed that when participants were present with familiar others no difference for playing with an avatar (M = 5.65, SE = .2) or an agent (M = 5.47, SE = .24) emerged for enjoyment. In contrast when present with a stranger, participants reported significantly ($p <$

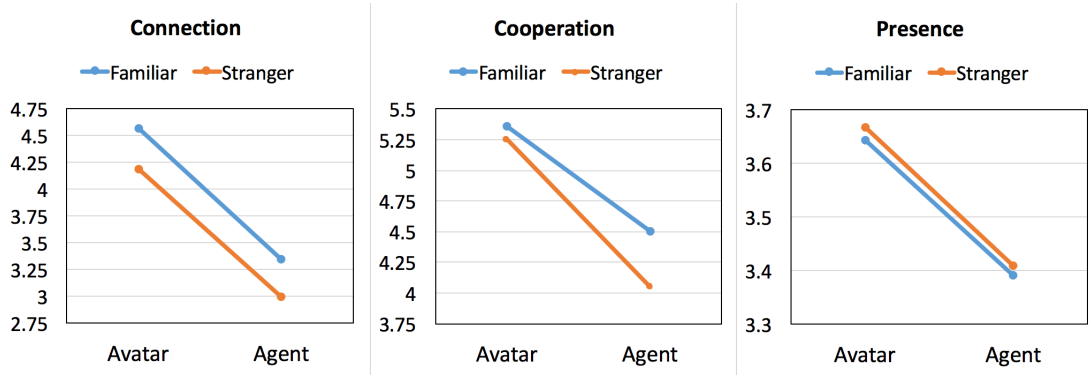

Figure 7.2 Estimated marginal means for connection, cooperation and presence scores

.001) higher levels of enjoyment when playing with an avatar (M = 5.55, SE = .25) than when playing with an agent (M = 4.8, SE = 0.3). No significant differences emerged in simple main effects on enjoyment between familiar others and strangers when playing with an avatar or an agent. However, a marginally significant difference and medium effect size ($F = 3.86$, $p = .057$, $\eta_p^2 = .094$) was found such that participants who were familiar with each other (M = 5.55, SE = .25) reported higher levels of enjoyment than strangers (M = 4.80, SE = .3) when playing with an agent. See Figure 7.3.

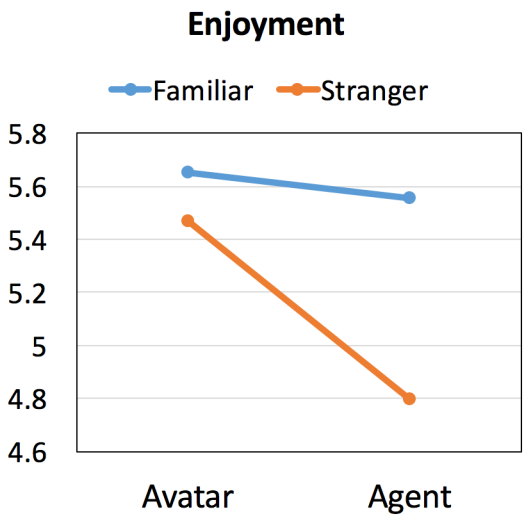

Figure 7.3 Estimated marginal means for enjoyment scores

A significant main effect and larger effect size (compared to enjoyment) was found for post-play positive affect, $F = 19.61$, $p < .001$, $\eta_p^2 = .35$, which was also found to be qualified by a significant interaction, $F = 14.22$, $p < .01$, $\eta_p^2 = .28$. Examination of the simple main effects showed that when playing with familiar others present there was no significant difference of play with an avatar (M = 18.17, SE = .75) or agent (M = 19.25, SE = .90), on positive affect. However, when playing with strangers present, there was significantly greater post-play positive affect reported ($p < .001$), when play was with an avatar (M = 17.91, SE = .9) than an agent (M = 16, SE = 1.05). No significant differences emerged in simple main effects on positive affect for familiarity when playing with an avatar or an agent. See Figure 7.4.

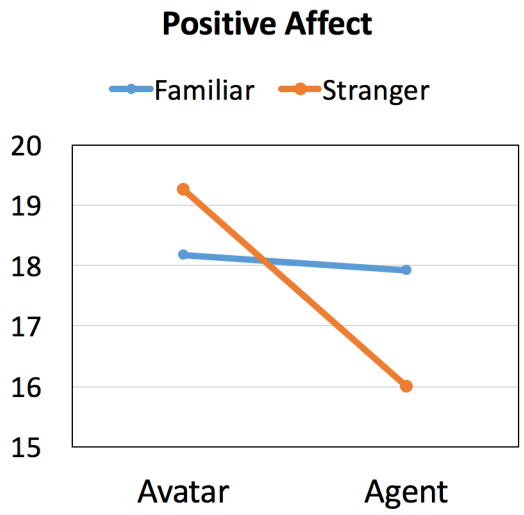

Figure 7.4 Estimated marginal means for positive affect scores

Autonomy ($F = .009$, $p = .92$), competence ($F = .006$, $p = .94$), and challenge ($F = .56$, $p = .46$), were not found to differ across mode. That challenge did not differ between conditions, supports that both conditions offered a similar degree of task load.

All mean estimates, standard errors and 95% confidence intervals can be found in Appendix K.

7.3 DISCUSSION

In response to RQ7, playing with another human (avatar) positively affected mood compared with play with a computer-controlled character (agent). Differences were also found between the two social contexts of play in terms of connection and cooperation with teammate, enjoyment and presence, in that they were all greater in play with a human teammate (RQ8). Interestingly, the impacts of playing with a human or avatar on enjoyment and positive affect were qualified by an interaction with the relationship type of the paired participants.

Playing with an avatar produced a greater sense of connection and cooperation, suggesting that this condition provided a stronger sense of relatedness. Given that no difference in levels of autonomy and competence were found across conditions, it seems likely that the more positive mood and enjoyment from playing with an avatar is at least partly due to the greater sense of relatedness it produces. This reasoning follows the tenets of SDT: that the experiences of competence, autonomy and relatedness result in wellbeing and intrinsic motivation for the activity that provides these experiences (Ryan & Deci, 2000). However, the impact of relationship type on both enjoyment and mood requires further unpacking.

Greater game enjoyment in play with a human compared with a computer is also supported by other experimental research in the field (Mandryk, Inkpen, et al., 2006). However, in the current study, this finding only held for players who were unfamiliar with each other, while players who knew each other experienced enjoyment regardless of whether they were actually playing with each other or not. While friends have been found to experience greater psychological involvement in play than strangers do (Gajadhar, et al., 2008), this study suggests that the social presence of a familiar other can impact on game experiences even if both are not actively in engaged in a task together. As such it has implications for further research in this field. That strangers found play with an avatar to produce greater enjoyment than play with an agent suggests that the higher social stakes of human interaction create greater investment in outcomes and therefore a more engaging experience. The lack of a prior relationship, and

subsequent lack of background knowledge regarding their partner's skill level or demeanour in play may also add to the excitement of the game and create a more arousing experience than play with an agent - typically understood to be a predictable experience. While the finding that familiar participants experienced greater game enjoyment than did strangers in play with an agent was marginal, it is anticipated that a larger sample size would bring this to significance. As such it can be understood as another effect of the social presence of being with a friend, which was greater than anticipated.

Positive post-play affect was experienced in a similar manner. Again, greater positive affect was experienced in play with avatars than agents, however this only held for players who were unfamiliar with each other. Players who knew each other enjoyed a positive mood post-play regardless of whether they played with an agent or avatar. As enjoyment and positive mood had a moderate to strong correlation in both conditions it seems likely that, for participants who knew each other, just the act of playing in the same room together was enough to produce both enjoyable gameplay and a sustained good mood (regardless of whether they were playing cooperatively in the same game or independently in separate games). That strangers experienced a better mood after play with an avatar, compared to play with an agent, suggests that the sense of being engaged in a shared task with another human is beneficial, and this was not significantly different to the mood produced in play with someone familiar. Though this might be considered an encouraging result for those engaged in regular play with strangers, the lack of communication allowed and the experimental setting itself forestalled the full range of social interactions online play can generate and future research should seek to confirm these findings in more naturalistic settings.

The finding for presence (higher for play with an avatar than play with an agent), corresponds with other experimental research contrasting play between a human and a computer (Cairns, et al., 2013; Gajadhar, et al., 2008; Ravaja, Saari, Turpeinen, et al., 2006), or between an avatar and an agent (Lim & Reeves, 2010; Weibel, et al., 2008). However, it contrasts with research finding that games that are typically played with other people produce less presence

than games that are played alone (Johnson, Nacke, et al., 2015). This suggests that multiplayer games, which for practical reasons are typically used in experimental contrasts of the social context of play, are designed to provide a more immersive experience when played with others, and additionally, fail to provide the necessary ingredients for an immersive game when played alone. It seems likely that the latter is the case, as a popular enjoyment of solitary play identified in Study 3 – a strong narrative – is not strongly developed in most multiplayer games. As such, presence may be experienced differently across single- and multi-player games, with the latter keyed to the social stakes of playing with another person.

Finding connection and cooperation to be greater in the avatar condition is intuitive, and most likely stems from a sense of shared investment in outcomes. This is partially supported by research finding that play with an avatar engages greater cognitive activity and relatedness than play with an agent (Johnson, Wyeth, et al., 2015). In order to test this in a way that ruled out the possible differences in the player experience of playing with a computer or human-controlled character (e.g. different levels of skill or predictability), this study enacted a deception—both players were each other's companion for the both conditions, but believed their companion to be a computer-controlled character for the agent condition. How much of the difference in the sense of connection and cooperation was due to a different ascribed value to play with humans or computers, and how much this different valuing impacted the way participants played the game with their companion, is unknown. It is possible that both players did not attempt to support the other that they perceived as being non-human. This could have affected their feelings of connection and cooperation with their teammate. However, as agents are typically designed to support human-controlled characters, and other research not using a deception has found that play with a human engenders greater relatedness than play with an agent (Johnson, Wyeth, et al., 2015), it seems likely that these results reflect the fact that people simply feel more connected and cooperate more when they are playing with an avatar (human) compared with an agent.

The null results of this study are also worth considering. The lack of a finding for competence contrasts with experimental research showing that play with avatars produced less competence than play with agents (Johnson, Wyeth, et al., 2015). However, as the current study equalised the level of difficulty across conditions by employing a deception, it might have also removed the potential for differences in feelings of competence. This is also supported by the null finding for challenge. In turn, the choice of game might have impacted the lack of difference in autonomy across conditions, as the need to constantly fend off attacks in a first-person shooter would necessarily curtail exploration and experimentation in both conditions.

The choice not to compare competitive play instead of cooperative play allowed for a meaningful point of comparison with the results of Study 2, which suggested that players might form feelings of connection to non-player characters. It seemed more likely that if this were to occur it would be with supportive characters. The choice not to add competitive play as another condition was largely due to concerns of player fatigue. However, while a direct contrast of competitive and cooperative play would be insightful, practical and experimental difficulties made it less desirable. Namely, when participants are cooperating to defeat the game, they have the support of another human; but when they are competing against each other, they both lack the support of another human, and are seeking to defeat a human either directly (killing a character, beating to finish line, etc.) or indirectly (for points). This potentially creates conditions with very different task loads (greatest in direct competition), or incomparable tasks (e.g. cooperating to finish a campaign together v. competing in death match). Future research might instead consider investigating the interwoven competitive and cooperative elements of team play by focussing on the roles that individuals play within teams. Much work on this has already been carried out in the realm of sports psychology (see section 2.5.4), which might directly apply to our understanding of team-based multiplayer games. Additionally, controlled field experiments such as that carried out by Williams et al. (2007) offer another means of studying the impacts of the social context of play that provide a basis for making causal claims. Future research could also consider investigating competitive play (with or without a human

opponent), as it could use a mirror-image deception, with players paired with computer-controlled characters in both conditions.

While the gender distribution (only 5% female participants in the final sample) makes these findings non-representative of the population of gamers as a whole (estimated at 47% from a study of Australian households, Brand & Todhunter, 2015), the disparity lessens slightly when looking only at players of first-person shooters (estimated at 34% female, from a study of games played worldwide, Conditt, 2014). However, while no significant difference in positive emotion for gender has been found in the play of a violent game (Kim, 2010), female players experience greater presence when there is a gender match between self and game character (Eastin, 2006). Given that participants were randomly assigned characters who were mostly male—in line with most commercially available games (Williams, Martins, Consalvo, & Ivory, 2009)—it seems possible that a more representative sample might have impacted the presence finding. Future experimental research exploring social play could consider both the impact of the gender of both player and avatar on the player experience. Relatedly, there is the possibility that the proportion of people who knew each other in this study is not representative of those who play cooperatively in the greater population. However, there is a lack of detailed usage data dealing with social video game play, so it is not possible to know how this study compares.

While the previous three chapters outlined associations between the social context of play, the player experience and wellbeing, this study built on those findings by showing that the social context of play creates changes in the player experience and impacts on a proximal-to-gameplay aspect of wellbeing (positive affect). In doing so, it also produces greater effect sizes than the survey studies produced, suggesting that the impact of video game play on immediate mood is larger than that on general wellbeing. Secondarily, it suggests that immediate, measurable differences in mood are best captured via experimental methodologies. By applying the experimental methodology to the study of the impact of the social context of play on the player experience and mood, this study also controlled for other potentially impacting factors in a repeatable format. While some of the results are intuitive and in line with other research in the

field (Cairns, et al., 2013; Gajadhar, et al., 2008; Lim & Reeves, 2010; Mandryk, Inkpen, et al., 2006; Ravaja, Saari, Turpeinen, et al., 2006; Weibel, et al., 2008), the finding for presence contrasts with the findings of studies 2 and 3, as well as those of another cross-sectional survey (Johnson, Nacke, et al., 2015). While these discrepancies could be due to the use of different measures, it might also be attributable to differences in the game mechanics between games that are typically played alone versus those that are typically played with others. In turn, the use of play with an agent as representative of solitary play could be problematic. Thus, while more positive outcomes were associated with play with an avatar than an agent, this result should only be generalised to games designed for multiplayer. In order to compare social and solitary play more broadly, other methodologies (experience sampling, field experimentation, ethnography) might build on these findings. The interaction with familiarity also suggests the need for further manipulation in an experimental setting. This and other points of discussion are outlined in full in the next chapter.

8 Discussion

This PhD has explored the relationships between the social context of play, the player experience and wellbeing across a series of four studies, using both quantitative and qualitative methodologies. The social context of play was found to be associated with diverging player experiences, which in turn presented different relationships with wellbeing depending on the social context of play. Additionally, the final (laboratory-based) study provided evidence that the social context of play directly influences the player experience and an aspect of wellbeing (positive affect). This chapter summarises the results of the four studies (see Table 8.1) in terms of solitary (section 8.1) and social play (section 8.2), as well as relationship type (section 8.2.1), interaction type and combinations (section 8.2.2), each juxtaposed against the research outlined in the literature review (Chapter 2). The contributions of this research to video game play research and the broader computer–human interaction community are outlined in section 8.3, with study limitations and directions for further research outlined in section 8.4. Finally, the conclusions are laid out in section 8.5, and final comments in section 8.6.

Table 8.1 Program of research – research questions and findings

Study	Research Questions	Findings
1. Survey	**RQ1.** What elements of the player experience relate to wellbeing?	• Autonomy, relatedness and flow. • Relatedness showed the strongest effects.
	RQ2. Does the social context of play relate to wellbeing?	• The impact of the social context of play on aspects of wellbeing was mediated by relatedness.
2. Survey	**RQ3a.** How do the different social contexts of play differ in terms of the	• Solitary play was associated with greater autonomy and presence, but less

	player experience?	relatedness, than social play.
	RQ3b. For social players only, how do the different social contexts of play differ in terms of social capital?	• Both cooperative play with known others (greatest) and mixed play were associated with greater relatedness and bonding social capital than competitive play with strangers. • Mixed play was associated with less bonding than cooperative play with known others, and greater bridging social capital than competitive play with strangers.
	RQ4a. How do social and solitary players differ in terms of what influences their wellbeing?	• Solitary play—autonomy, relatedness. • Social play—play with strangers (compared with play with known others), bridging social capital.
	RQ4b. For social players, is relationship type or interaction type better at explaining the link between the player experience and wellbeing?	• Relationship type (play with strangers).
3. Survey + Interviews	**RQ5.** Why do people commonly play in a particular social context?	• Solitary players enjoyed relaxing, immersive, autonomous experiences. • Social players enjoyed challenging gameplay, but differed in how they accessed it, with varying emphasis on competition, teamwork and connection with others.
	RQ6. How might these experiences interact with player wellbeing?	• Autonomy and relatedness offered a means of accessing wellbeing in solitary and social contexts respectively. • All gameplay offered experiences of

		competence, but it might be that competition/play with strangers provides it more readily. • Teamwork blended experiences of competence and relatedness. • Solitary play—'escapism' indicated solitary play might be used as a coping strategy. • Toxicity disrupted game enjoyment but some players showed greater resilience to it.
4. Experiment	**RQ7.** Does playing with either an avatar or an agent affect the level of positive mood?	• Playing with an avatar (human) produced greater positive affect than playing with an agent (computer) qualified by an interaction with relationship type.
	RQ8. Does playing with either an avatar or an agent affect the player experience?	• Playing with an avatar produced greater connection, cooperation, enjoyment and presence than playing with an agent. Enjoyment was qualified by an interaction with relationship type.

8.1 SOLITARY PLAY

While this thesis is concerned with social contexts of play, solitary play is a key element of this enquiry. Not only is it the most popular play experience (Brand & Todhunter, 2015), the current program of research has found that it is favoured because it is convenient in terms of scheduling times to play, it is broadly accessible and it offers the player stress relief by providing relaxing, autonomous and immersive play. Taken together, these results suggest that the solitary context of play is an important consideration when investigating how the play experience impacts wellbeing, and how to influence it for the better.

While Study 1 found autonomy to predict the psychological wellbeing of a broad cross-section of players, engaged in both solitary and social play (RQ1), Study 2 refined this to show that autonomy specifically predicts wellbeing for solitary, but not social players (RQ4a). This, in combination with finding that autonomy was significantly greater for solitary players (compared with social players—section 8.2, RQ3a), suggests that experiencing autonomy is a key benefit of engaging in play alone. In total, these results suggest that choice of activity within gameplay facilitates a sense of agency, which in turn could account for the link between autonomy and improvements in mood, vitality and self-esteem (Ryan, et al., 2006). As causality cannot be inferred from these findings, an alternative explanation might be that individuals already high in psychological wellbeing are more likely to engage with games in a way that heightens their sense of autonomy, and less likely to feel pressured to play in a way that lessens it. However, while autonomy is an experience potentially available to all video game players, the current research suggests that this experience and its associated benefits might be more accessible in the solitary context. Study 3 further supports this finding by linking the experience of autonomy to descriptions of being freed from social demands and performance pressure (RQ5). Players described an enjoyment of being able to play how and when they wished without relying on others, such as having the freedom to explore the game and play at their own pace. This suggests that the autonomy-enhancing qualities of solitary play offer players a unique means of accessing wellbeing.

It seems likely that the mental freedom of solitary play, when experienced as a form of self-expansion, might aid in the restoration of self (Long & Averill, 2003), which is also supported by research finding gameplay in general being used as a means of recuperating from everyday stresses (Collins & Cox, 2014; Reinecke, 2009). This is further supported by the other findings of Study 3, which associated solitary play with the enjoyment of relaxation and escapism. The enjoyment of escapism, in particular, suggests that some players who typically play alone do so as an emotion-focussed coping strategy. This is partially supported by research finding that players with a higher level of emotion-focussed coping style were more likely to

use games for recovery from everyday stresses (Reinecke, 2009). Study 3 also showed that solitary players were seeking to avoid others' toxicity and any form of social pressure, reinforcing the sense that this form of play serves a need for those wishing to regain mental breathing space, and perhaps a sense of self, in response to the demands encountered in day-to-day interactions with others. Whether these players exhibit lower resilience than players choosing other social contexts suggests that future research could consider the role of personal traits (e.g. trait resilience, extraversion) in influencing any associations with the social context of play.

The experience of presence also differed across the social context of play, which is of interest in terms of its positive associations with player vitality, self-esteem and mood, not to mention the strong association with game enjoyment and the intention to play again (Ryan, et al., 2006). Finding that solitary play was more strongly associated with greater presence than social play (Study 2) suggests that play undisturbed by social interaction (e.g. negotiating activities with friends or experiencing conflict with strangers) might facilitate more immersive gameplay. This could be because the player is more able to focus on narrative elements, and other game attributes that are engaging (mechanics, sound, graphics, etc.), without interruption. As the PENS presence subscale includes three items dealing with narrative presence (in addition to three items each for emotional and physical presence), it is also possible that single-player games might have stronger narrative elements, and that multiplayer games deliver complex multiplayer experiences at the expense of an immersive storyline. This is supported by Study 3, which found that solitary players mentioned experiences of immersion (often in reference to narrative immersion) more than those who played with others. This is also in line with a cross-sectional survey finding experiences of presence/immersion to be greater for solitary players than social players (Johnson, Nacke, et al., 2015).

The findings for presence across studies 2 and 3 (presence greater for solitary play compared with social play), however, contrast with Study 4 results, which indicate that playing with a human generates more presence than playing with a computer-controlled character (also

discussed in section 7.3). It seems likely that this is due to Study 4's use of multiplayer games. Other experimental studies using multiplayer games as stimulus material have found similar results despite using different measures of presence (Cairns, et al., 2013; Lim & Reeves, 2010; Ravaja, Saari, Turpeinen, et al., 2006; Weibel, et al., 2008). Additionally, studies 1, 2 and 4 made use of the PENS measure of presence across both survey and experimental methodologies. This adds weight to the possibility that it is not the measure creating differences in presence across studies; rather, it appears more likely that it is the type of game that players engage with. Games that are typically played alone might have more in-depth narrative and character development (reported in Study 3), which would encourage immersion, whereas games that are useful for experimental research on the social context of play are typically multiplayer. It is possible that games in the latter category do not offer the same immersive environment when played alone, or that they are designed to be more engaging and immersive when played with others. This suggests that while Study 4 found greater presence in social play of a multiplayer game, how people typically play when they play alone (captured in studies 2 and 3, and most likely single-player games) is more immersive than social play as a whole. Research across other methodologies, such as field experimentation or experience sampling, might provide further insight.

It could be that it is not just what experiences players have, but how they perceive them that matters. Study 3 outlined a number of complaints that players had about the context that they generally play in, which presents obvious opportunities for game designers wishing to improve the player experience (see section 8.3.3). Other grievances, however, indicate the value systems that players operate within. As was noted in section 6.3 (see Appendix F, Table F.1), people who generally played alone played much less than people who generally played socially, but only solitary players voiced any concerns regarding the amount that they were playing. This demonstrates two things. One, that while solitary players play less than social players, they are more conscious of the time they spend playing because of negatively valuing solitary gameplay. Gameplay is seen as something that 'takes away' from their life. Two, as social players'

complaints revolved largely around social issues (obligation to others, toxic behaviours, poor boundaries between gameplay and non-game life), but these players were seemingly unconcerned amount they were playing, it suggests that because gameplay provides a social function, they perceive time spent in gameplay as valuable. Taken as a whole, this suggests that some players have internalised cultural norms that position social activity as healthy and solitary activity as unhealthy or 'antisocial'. This runs contra to the findings of this program of research, which concludes that each context of play has the potential to enhance or diminish wellbeing. For example, Study 3 suggests that solitary play might allow players to recuperate from the demands of other aspects of life, just as it may help them avoid aspects of life, while Study 2 showed that the experience of relatedness mediates the relationship between social play and wellbeing (e.g. not all social play results in feelings of relatedness). It is also worth questioning whether value systems that position social above solitary pursuits might cause healthy players to reflect negatively on their solitary gameplay, or cause players with obsessive play styles to dismiss concerns because they play socially—this could lead to an interesting avenue of future research.

Finally, the finding that relatedness was associated with the wellbeing of solitary players (Study 2) was unanticipated. Possible explanations for this finding include the deletion of one item from the relatedness measure that referred specifically to other players, resulting in a measure that could have been interpreted by participants as referring to feelings of relatedness with computer-controlled characters. This is partially supported by the supplementary analyses, which found that the deleted item did not present as a significant coefficient when entered into the solitary play regression (see section 5.2.5). Additionally, the strong positive correlation between the two-item relatedness and presence scales ($p < .01$, $r = .686$, Table 5.4) suggests that people experiencing the 'illusion of non-mediation' (Lombard et al., 2000) while playing alone might be more likely to experience feelings of relatedness towards computer-controlled (non-player) characters. This is also supported by research finding that people can experience genuine feelings of liking and attraction for virtual characters under certain circumstances

(Coulson, et al., 2012). Coulson et al.'s study (2012) might also explain why no indication of connection to non-player characters was revealed in Study 3, as if the circumstances are rare enough that it would not naturally arise in a broad discussion of players' likes and dislikes of solitary play. However, given the brevity of the scale (two items), the non-specificity of the items and the inability to attribute causality from cross-sectional survey, this finding should be viewed with caution. To place it in perspective, when testing for feelings of relatedness in studies 2 and 4, greater relatedness (or connection—Study 4) was ascribed to playing with a human, rather than solitary play or play with a computer-controlled character. Thus while it is possible and interesting that feelings of relatedness in solitary play might be present and associated with greater wellbeing, it is not a key aspect of the solitary play experience. Instead, this combination of results suggests that feelings of relatedness, regardless of how they are produced, are an indicator of greater wellbeing.

Overall, the findings of this thesis suggest that solitary play provides opportunities for players to reap the benefits of relaxing, autonomous and immersive play that restores a sense of self. Additionally, as a context that is convenient to access (no reliance on others or internet connections) and thus broadly popular, those concerned with mapping or influencing player wellbeing might find solitary play a more important context to explore than social play. Considering solitary play as a means of positively influencing mental health also raises the question of how it might be integrated with complimentary modalities (e.g. cognitive behavioural therapy or mindfulness) within more targeted interventions (see section 8.3.3.3). Encouragingly, however, it seems that some players intuitively use the solitary play of recreational games as a means of emotion regulation, which potentially confers benefits over a much larger population than most interventions could have impact on.

8.2 SOCIAL PLAY

Social play offers complementary experiences to those of solitary play by offering competence-enhancing experiences and the opportunity for connection with others. These

experiences are shaped again by different types of social context to offer specific benefits, such as the clear goals of competitive play, the camaraderie of cooperative play, the freedom to focus on the game's goals when playing with strangers, or to share bonding experiences with known others, as well as combinations of these. Before discussing these different social contexts in detail in sections 8.2.1 and 8.2.2, however, social play is considered as a whole.

Social play, in its most general sense, is marked by experiences of relatedness. While Study 1 established that relatedness was the strongest player experience measure to predict wellbeing for players in general, Study 2 showed that it was a key experience of social play when compared with solitary play. This is both intuitive and supported by previous research (Tamborini, et al., 2010). In addition, across these two studies, relatedness was found to predict emotional, psychological, social and total wellbeing. Given that the experience of relatedness refers to warm and supportive relationships (Ryan, et al., 2008), it seems likely that the link between this experience in gameplay and wellbeing is due to either the immediate emotional rewards of playful interaction with others, which might further facilitate other psychological needs being met, or the gaining of social support via social capital. Conversely, it could be that socially confident players and those higher in wellbeing are more likely to feel connected to others in social play.

Study 2 also showed that the wellbeing of social players was predicted by the accumulation of bridging social capital in gameplay, as well as play with strangers (compared with play with known others). This demonstrates a natural accord: feelings of relatedness define the experience of social play, while social capital shows how these feelings are practically manifested (e.g. broadened social networks). However, while play with known others is intuitively linked to greater wellbeing, an association partially supported by previous research (Shen & Williams, 2011; Snodgrass, et al., 2011), Study 2 found that play with strangers was associated with greater wellbeing, and that the type of interaction was not impactful. This, combined with the finding for bridging social capital, suggests that wellbeing is associated with the expansion of networks, and not the maintenance of pre-existing relationships in gameplay.

While this is supported by the null finding for bonding social capital, this might be due to the social wellbeing scale of the MHC not capturing the benefits of bonding social capital, demonstrated by the lack of correlation between the two (Table C.5, Appendix C). The most likely explanation is that feelings of relatedness, however they are shaped by social context, are impactful on wellbeing as operationalised by the MHC. This is supported by the mediation analyses performed in Study 2, which showed that the impact of the social context of play on aspects of wellbeing was mediated by relatedness (RQ2), as well as the unanticipated association between relatedness and wellbeing for solitary players found in Study 2 (discussed in sections 5.3 and 8.1). Overall, these findings suggest that feelings of relatedness during gameplay are a signal of wellbeing in the player, regardless of whether they originate from interactions with strangers, computer-controlled characters or are due to other pre-existing factors.

The decisions framing the social context of play are complex, as illustrated by the results of Study 3. This study showed how wanted and unwanted experiences are weighed up, along with practical considerations, to inform the choice of social context of play. Social players enjoyed experiences of competence and challenge, teamwork and relatedness in varying amounts, saw other people as the means to experience these and found social play to be fun (conversely solitary play is mentioned as being less fun than social play by people who typically play alone). However, the complaints of social players show that play dependent on other people could also result in alienating, non-autonomous play driven by issues of availability or obligation. This is further supported by Study 2's findings that social players experience less autonomy and presence than solitary players. Study 3 provides further evidence for this pattern, as participants indicated that other people interfered with the believability of the game narrative, and the ease with which they could immerse themselves in it, while single-player games were said to have stronger narratives than multiplayer games.

However, the benefits of playing socially are underscored by Study 4, which established that social play generated a more positive mood, greater game enjoyment and sense of

connection with others than play with a computer-controlled character. The findings for positive affect and enjoyment are supported both by previous research (Lim & Reeves, 2010; Mandryk, Inkpen, et al., 2006; Ravaja, Saari, Turpeinen, et al., 2006) and partially by Study 3's findings (fun in play with known others, less fun in solitary play). Similarly, the findings for connection and cooperation are in line with those of Study 2 (relatedness), as well as research finding that cooperative play with other humans can promote feelings of cohesion and trust (Greitemeyer, et al., 2012) and greater feelings of relatedness than play with agents (Johnson, Wyeth, et al., 2015) or the game (Tamborini, et al., 2010). The finding for presence in Study 4, however, suggests that play with an avatar teammate is not necessarily the same as play with no teammate at all in a game designed for solitary play (also discussed in sections 7.3 and 8.1). The findings of Study 4 could thus say more about the experiences and wellbeing available in multiplayer games than all types of gameplay. Relatedly, positive affect was positively correlated with enjoyment in both conditions ($p < .01$, $r = 463/527$ avatar/agent, Tables 7.1/7.2), supporting research finding that recreational gameplay can lead to positive shifts in mood (Russoniello, et al., 2009b; Ryan, et al., 2006). Understanding what makes social play enjoyable, however, is better served by exploring the different relationships and interactions people have within it.

8.2.1 Relationship Type

The kinds of relationships people express in gameplay run the gamut of playing with complete strangers to playing with intimate loved ones, with valuable experiences described across the spectrum. This program of research limited itself to contrasts of playing with known and unknown others, and this simple division yielded insights into the benefits arising from both contexts of play. Overall, people who typically played with known others enjoyed experiences of relatedness and teamwork, while those who tended to play with strangers enjoyed autonomous and challenging gameplay (Study 3). While playing with strangers predicted greater wellbeing than playing with known others (Study 2), it seems likely that this indicates personal differences between these two groups, such as greater resilience among those who played with strangers (also signalled by a resilience to others' toxicity shown in Study 3). The

addition of a measure of social capital in Study 2 also showed how different relationships with others, and their concomitant benefits, might be facilitated by gameplay.

In Study 2, introducing the measures of relationship type and social capital, as well as splitting the sample across solitary and social players, explained greater variance in the data relative to the model used in Study 1. In other words, using categories of relationship type (who people play with), interaction type (how people play with others) and measures of social capital supplied a means of explaining more precisely when and how wellbeing was impacted in social play. Relationship type was shown in studies 2 and 3 to impact the player experience and wellbeing. Specifically, Study 2 showed that play with strangers as opposed to play with known others, as well as bridging social capital, predicted greater total wellbeing for social players.

This is contextualised by the findings of Study 3, which showed that people who generally played with strangers enjoyed greater convenience and autonomy in gameplay, and greatly valued experiences of challenge and competence. The low commitment and freedom from emotional attachments of play with strangers, as well as the relative anonymity of online gameplay, allowed players to act out of character. While this was enjoyed, the lack of connection between game actions and real life were also seen as contributors to player toxicity—a key complaint of this context. Additionally, some players indicated alienating aspects of MMO play, which were described in terms of a poor sense of community and the 'alone in a crowd' phenomenon. What is notable, however, is that regardless of the weight given to others' poor behaviour, some people playing in this context still enjoyed meeting new people and could prioritise positive interactions with strangers and recall friendships being formed.

What sets these two sets of experiences apart (friendly and unfriendly interactions with others) indicates directions for future research, such as an exploration of personality traits, communication mechanisms within gameplay and game cultures. For example, players with greater trait resilience might be better able to manage the toxicity common in online play with strangers. This is supported by research finding that resilient individuals use positive emotions

to recover from stressful encounters (Tugade & Fredrickson, 2004). Additionally, players higher in traits such as extraversion might be more likely to form new relationships with strangers and to benefit from these relationships, supported by research linking extraversion with better psychosocial outcomes from online play (Shen & Williams, 2011). Following from this, for players high in resilience and/or extraversion who value autonomy and challenging experiences, the rewards may outweigh the risks. As Study 2 illustrates, these rewards can include expanded social networks and the accumulation of bridging social capital—the latter associated with the practical and emotional benefits of social support (Putnam, 2000; Trepte, et al., 2012). This makes play with strangers a means of enhancing wellbeing for those able to afford the cost of admittance.

Play with known others was not directly associated with wellbeing in this program of research. However, play with known others might have a protective effect. This is indicated by research on MMORPG play, which has found that playing with offline friends can protect against excessive levels of play, making it harder to immerse and to allow players to share their experiences offline (Snodgrass, et al., 2011), while play with family can increase family communication time (Shen & Williams, 2011). This is reinforced by Study 3's findings, where which play with known others was shown to offer fun social interaction and challenging experiences that build trust. Conversely, the dislikes of playing with known others largely described the disadvantages of interdependence with valued others: no freedom to play, or even criticise as they wished, due to ongoing relationship obligations and the inconvenience of having to schedule times to play. However, with its relatively few negative impacts compared with the potential toxicity of play with strangers, play with known others (being able to share fun experiences with friends and family, keeping in touch with physically distant pre-existing friendships) might be a means for those with lower resilience or extraversion to benefit from social play.

Of particular interest is that Study 4 found relationship type to qualify the impact of game condition (play with avatar or agent) on game enjoyment and post-play positive affect.

Specifically, the presence of a known other generated no differences across conditions, while the presence of a stranger led to greater enjoyment and post-play positive affect in play with an avatar compared to play with an agent. While the latter result is intuitive and in line with other research in the field (Lim & Reeves, 2010; Ravaja, Saari, Turpeinen, et al., 2006), the equalising of enjoyment and mood for participants who were present with a friend suggests that the impacts of familiarity are greater than anticipated. It seems likely, in retrospect, that participants arriving with a friend may have been able to sustain the same mood across an entire session simply because the experiment acted as an extension of their social outing, and this social connection was more influential on their mood than the kind of sub-activity they were engaged in. Even video game play research can be bonding! This overall sense of the experiment as a shared experience may also have made these participants more receptive to enjoying the game with the agent, which is supported by the moderate to strong correlations between positive affect and enjoyment in both conditions (Table 7.1 and 7.2). Though the need for further testing of this hypothesis is clearly indicated, it has potential ramifications for any experimental research making use of participants that are familiar to each other.

In summary, while play with known others offers a chance to reinforce existing bonds, play with strangers presents benefits that could positively impact player wellbeing—namely, the opportunity to form new social connections and the freedom to focus on experiences of competence and challenge with a sense of shared investment in the outcome. That those who played with strangers were forming connections with players who were 'on their team' is supported both by the realities of online play, in which strangers can be engaged to fill out a team, and by research finding that cooperative team play leads to greater social cohesion and trust (Greitemeyer, et al., 2012). However, it might also be that those who play with strangers are already high in resilience and thus able to cope with the vicissitudes of online interactions. Further insights into these processes are gained when examining the benefits of different types of interaction.

8.2.2 Interaction Type and Combinations

Asking how people play with others provides another way of examining the player experience. Study 3 most clearly outlines differences across the player experiences of competitive, cooperative and mixed competitive and cooperative play (mixed interaction type).

Competitive players, like those who play with strangers, greatly enjoyed experiences of competence and challenge. The clear goals of competitive play, such as achieving a higher rank or defeating opponents, created an unambiguous sense of achievement when carried out. Interestingly, competitive experiences with humans were seen as providing more meaningful wins than those with computer-controlled opponents (agents), which players ascribed to both the different level of challenge offered and the perception of shared (or not) investment in gameplay. The two main dislikes, toxicity and losing, can also be seen as a predictable consequence of the competitive environment, with toxic behaviours linked to the disinhibition of anonymous online play (Chen, et al., 2009; Suler, 2004). This raises the question of whether the enjoyment of inflicting toxic behaviours on others is also tied to lowered wellbeing (Chen, et al., 2009). Future research could consider whether the methods traditional sports employ to encourage self-control and fairness might be engaged in online gameplay.

Cooperative players, on the other hand, shared similar appreciations to those who typically played with known others. Relatedness and teamwork were the key experience of this context, reinforced by the complaints about logistical issues (suggesting a high reliance on others), while the failure of teamwork was a major complaint. The overlap between cooperative play and play with known others potentially provides these players with the advantage of team synergy, though this was noted as also possible among teammates who had never met before. This could be because cooperative play provided players with the opportunity to fulfil a needed role within a team. Understanding how these roles differ from game to game or overlap (e.g. a specific role such as ‘healer’ versus the general role of leader) would generate insight into how personal satisfactions are provided in cooperative play. As sports psychology has already begun

the investigation into formal and informal roles teams generate (Cope, et al., 2011), it seems logical to explore these roles in online team play, and their impact on gameplay and team cohesion (Murphy, 2009). The need for the latter is also indicated by evidence that cooperative players differed in terms of how they prioritised personal goals in relationship to the group's goals. This could account for some of the complaints describing the failure of teamwork, wherein a team could pull apart due to 'personality clashes', or disagreements over leadership. Designing game features that allow players to form teams based on more than just skill matching might be beneficial, and this is discussed in greater detail in section 8.3.3.

The combination of relationship and interaction type (competitive play with strangers, cooperative play with known others) used across this program of research shows a similar pattern of results to where type is kept separate. For example, Study 2 showed that both relatedness and bonding social capital decreases from cooperative play with known others, to mixed play, to competitive play with strangers—a finding that is intuitively supported. As was discussed in section 5.3, warm and trusting relationships would be both more likely to occur in play with familiar others as well as in cooperative or mixed play, and this is likely to build stronger ties. Competition, on the other hand, combined with less familiarity between players, could affect players' ability to bond with others and feel relatedness. This pattern of results is similar to those of Study 3, where interaction and relationship type were separated such that relatedness was greatest for those who played cooperatively or with known others. In terms of unexplored categories, however, it would be interesting to see if competitive play is experienced differently when played with known others, or, for that matter, if cooperative play impacts on play with strangers.

Insight into how combined categories affect the player experience is partially supplied by the mixed play context. While studies 2 and 3 differed in terms of how the 'mixed' group was formed (Study 2 was a mix of relationship and interaction type; Study 3 was a mix of interaction type only), Table 6.1 shows that the point is moot, as both contexts were in reality comprised of a mix of both types. Knowing this, finding that the mixed group exhibited the

greatest bridging social capital in Study 2 showed that playing with known and unknown others, both competitively and cooperatively, might provide the best foundation for forming new friendships and extending social networks. This could be because play with existing relationships provides an enjoyable buffer from the less trusted behaviours of play with strangers, allowing the player to stay open to friendly communication with unknown others.

What is unknown, however, is whether mixed play refers to play that is inherently a mix of these types in the one instance (e.g. team against team play), or if this context changes over time (e.g. playing one session cooperatively with friends, and then competing against strangers in another session). In the former case, team play can promote greater social cohesion and trust (Greitemeyer, et al., 2012), and this could explain how players in the mixed play category negotiate new social networks. In the latter, mixed play would describe adaptable play in which the player actively changes their play in order to achieve satisfying experiences (supported by players in this category reporting that play is 'fun' and expressing 'no dislike' more often than players in purely cooperative and competitive contexts—see Study 3). It seems likely, however, that both occur and that both team play and 'adaptable play' might describe different ways of accessing or expressing wellbeing. Additionally, given that players in the mixed play context were shown to enjoy experiences of competence and relatedness, and displayed the agency to switch between them, it follows that this context might also be associated with the greatest wellbeing (Ryan & Deci, 2000). It is also possible that people who typically play in this way are already higher in wellbeing (or extraversion), making them more likely to benefit from play that ranges across contexts. Future research could consider these factors when examining how the social context of play influences wellbeing, as it seems likely that the combination of personal resources and motivations, as well as the player experience, are impactful.

8.3 CONTRIBUTIONS

This PhD builds on the established links between video game play and wellbeing by exploring the influence of the social context of play on the player experience and wellbeing. The

results have important implications for those wishing to positively influence wellbeing, or simply to understand how the social context of play might influence their own and others' experiences. The growing popularity of video game play as an entertainment choice is also matched by the increase in research focussing on understanding gameplay as an extension of human agency and, potentially, self-actualisation. This PhD contributes to that effort.

8.3.1 Contribution to Literature

This thesis builds on research linking the psychological processes forming the player experience to wellbeing by embedding these processes within the social context of play. Specifically, by applying the PENS measure to contrasts of social context, this thesis extends the findings of Ryan et al. (2006) by showing that different types of need satisfaction are available in social and solitary play, in that social play offers greater opportunity for experiences of relatedness (and that relatedness mediates the impact of social play on aspects of wellbeing), while solitary play provides greater autonomy. Additionally, while the ISCS (Williams, 2006) has previously been applied to studies of online multiplayer games (Collins & Cox, 2014; Collins & Freeman, 2013; Skoric, 2011; Trepte, et al., 2012; Williams, et al., 2007; Zhong, 2011), this thesis demonstrates that levels of bridging and bonding social capital vary across different social contexts of play, which include offline social play. While the ISCS has been applied to separate measures of happiness and loneliness (Williams, et al., 2007), applying the ISCS to the MHC (Keyes, 2002) uniquely ties it to a multidimensional measure of wellbeing via video game play, and establishes that the bridging social capital gained in play is positively associated with wellbeing. The null finding for bonding social capital, however, suggests the need to explore other ways of capturing the benefits of social capital accrued from gameplay—as with, for example, the measure of social support used in Trepte et al.'s (2012) study of e-sports players.

By contrasting social play experiences to those of solitary play, and by exploring social play in terms of relationship and interaction type, this thesis also extends research focussed on

the social aspects of online multiplayer games (Caplan, et al., 2009; Cole & Griffiths, 2007; Nardi & Harris, 2010; Shen & Williams, 2011; Skoric, 2011; Snodgrass, et al., 2011; Trepte, et al., 2012; Wang, Liu, Chye, & Chatzisarantis, 2011; Williams, et al., 2007; Yee, 2006a; Zhong, 2011). In doing so, it contextualises the relative merits and risks of all play types. For example, while Nardi and Harris (2010) and Snodgrass et al. (2011) found many benefits to playing with pre-existing friends in *World of Warcraft* (a MMORPG), this research establishes the advantages to play with strangers (e.g. convenience, access to highly skilled players), as it does with other contexts of play, and across a range of multiplayer games. This program of research thus shows that the practical aspects of play (scheduling games, internet access, skill matching and time commitments), combined with its psychological aspects (need satisfaction and other motivations, e.g. enjoying being highly challenged v. enjoying relaxing gameplay), will directly impact whether play takes place alone or with friends or strangers, or is cooperative or competitive. Additionally, while Snodgrass et al. (2011) found that playing with friends can disrupt the immersive aspects of social play, and potentially protect against excessive levels of it, this thesis found that solitary play is more immersive than social play, and that this is associated with relaxation and recuperation (and much fewer hours of play, compared with social play). This suggests that immersion *per se* is not a driver of problematic play, and that perhaps player motivation and need satisfaction in everyday life have greater explanatory power, as other research suggests (Przybylski, Weinstein, et al., 2009). These findings also build on those of Reinecke et al. (2009) by showing that while gameplay can be used for recovery from stressful situations, this most likely results in solitary play (with the proviso that future research might find this relationship influenced by personal trait).

Acknowledging the value of synthesising both questions of *how* gameplay might affect the player and *why* players engage with games the way that they do—in the one program of research (Williams, 2005)—balances the study of video game effects against the study of player motivations, as well as the context in which the game is played. This strategy offsets the weaknesses of quantitative and qualitative methodologies, as well as making best use of their

strengths. In using both survey and experimental methodologies, this program of research contextualises other research that has primarily used experimental methodologies to contrast the social context of play. Specifically, while some experimental studies (Cairns, et al., 2013; Lim & Reeves, 2010; Ravaja, Saari, Turpeinen, et al., 2006; Weibel, et al., 2008) found that presence is greater in social rather than solitary play conditions (or in play against a computer-controlled character), the findings herein further stipulate that this result might only be generalisable to multiplayer games.

In sum, by moving beyond a focus on content (e.g. violent content) and behavioural outcomes (e.g. amount of play), this thesis concentrates on the psychological processes inherent in both social and human–computer interaction during video game play. Indeed it suggests that theories such as SDT may be more useful in determining the correlates of wellbeing than theories that focus on the effects of content and exclude those of player motivation, such as the General Learning Model (Buckley & Anderson, 2006)(discussed in greater detail in section 8.4). By utilising SDT, this thesis positions video game play as providing different opportunities to maintain or enhance wellbeing, which diverge across the many social contexts of play. While detrimental effects are also possible, by focussing on the psychological and social processes that are expressions of modern video game play, this thesis advances media research concerned with how humans have their needs met via interactions with technology, and through technologically facilitated interactions with others. It thus supports research concerned with player motivation and agency (Ferguson, 2014; Przybylski, et al., 2011; Przybylski, Weinstein, et al., 2009; Ryan, et al., 2006; Williams, Yee, & Caplan, 2008; Yee, 2006b), and contributes by widening the focus on psychological processes to include the framing of social context.

8.3.2 Recommendations

This thesis challenges the notion that video game play is socially isolating and shows that there are benefits to all contexts of play, including solitary play. In doing so, it dispels some of the myths surrounding video games and their potential to encourage negative mental health

outcomes. However, while different social contexts of play are shown to provide different opportunities to access or express wellbeing, not all forms of play are desirable or even possible for all players. Additionally, the proviso that low-to-moderate amounts of play are associated with better outcomes than large amounts (Allahverdipour, et al., 2010; Durkin & Barber, 2002; Przybylski, 2014) is supported by this research. However, being an association, causation should not be assumed, and this pattern of results may reflect that other factors that do impact negatively on wellbeing, such as unemployment or disengagement from education, open up the time to play excessively and provide a welcome relief from stressful thoughts. Thus, as a recommendation, it may be better to consider whether gameplay is situated in harmony with other aspects of life, or if it presents as an obsession and disharmonious activity, rather than focus on amount of play as an indicator of wellbeing.

To recap, solitary play is by far the most practical means of engaging in gameplay, and is thus the most common (Brand & Todhunter, 2015). It offers the player the space in which to relax and recover from everyday stresses via autonomous and immersive play (Long & Averill, 2003). The results of Study 3 imply that players are intuitively engaging in solitary play to manage their own emotional resources. However, the question remains as to whether the use of gameplay as a coping strategy is effective in the long term. Nevertheless, casual gameplay (games requiring low commitment, and short spans of play) has been shown to improve mood and reduce anxiety (Fish, et al., 2014; Russoniello, et al., 2009b). As a whole, this thesis supports the notion that video game play can help reduce the impacts of the stressful aspects of everyday human life—with solitary casual play being the most convenient way of achieving this.

Social play, however, offers more fun and connective experiences, and can potentially increase bridging social capital via friendly engagement with strangers. This last point is pertinent. While player toxicity is a common complaint of those who play with strangers or in competitive online settings (Kwak, et al., 2015; Shores, et al., 2014), play with strangers also increases opportunities to meet new people and potentially form new friendships (Study 3, and

implied in Study 2). This has practical considerations (e.g. new friends cannot be made without encountering strangers and potentially risking exposure to unfriendly people); and psychological ones (e.g. do some people have personal qualities that stop unpleasant interactions from overwhelming an enjoyment of pleasant encounters?). High levels of resilience would act to buffer negative encounters (Tugade & Fredrickson, 2004), allowing players to focus on the benefits of play with strangers. Play with known others could also potentially buffer players from more toxic encounters with strangers, and it seems likely that teams made up of a mix of known and unknown others could lead to new friendships via the increased social cohesion and trust generated by cooperative teamwork (Greitemeyer, et al., 2012). As such, this thesis recommends that only players with the emotional resources to cope with player toxicity engage in play with strangers, or play with a mixture of strangers and known others. In doing so, the resulting challenging and autonomous play, and potentially new friendships, present a means of attaining wellbeing.

Play with known others has been shown to maintain or enhance existing relationships (Nardi & Harris, 2010), and is herein demonstrated as a means of having fun, connective play, especially when play is cooperative. In fact, this program of research shows that cooperative play with known others is associated with higher levels of bonding social capital than other forms of social play. It offers a way of cementing tenuous relationships as well as maintaining physically distant ones. Bonding social capital provides a wide range of social and emotional supports, which video games facilitate by creating shared goals and experiences while remaining relatively inexpensive and accessible. Therefore, this thesis recommends video game play as a means of strengthening a wide range of relationships: familial, friendly, intimate and collegial. In particular, video game play could be of great value to increasing communication in parent–child relationships (Chiong, 2009) and bridging the gap between young and old (Chua, et al., 2013).

Finally, those who engage in a range of play types, both with known and unknown others, in cooperative, competitive or team play settings, appear to experience the most

enjoyment and psychological benefits. By having access to experiences of autonomy, competence and relatedness (Ryan & Deci, 2000; Sheldon & Filak, 2008), these players seem able to make best use of the potential of video game play to be both fun and beneficial—though again, this type of play might not be practical or desirable for all. The use of team play can, however, potentially offer the same social and competence benefits as other forms of teamwork (e.g. sports), and employers could consider it another means of building team cohesion. Unlike other team building activities, it has the advantage of being able to occur across multiple physical sites at once, lending itself to a dispersed workforce.

8.3.3 Design Opportunities

Study 3 outlined many of the likes and dislikes of different social contexts of play, and in doing so provides the basis from which to improve on the experience of players in different contexts. Additionally, though they result from reflection on video game play, there have potential application across the range of computer–human interaction technologies that engage social or playful elements. While the challenges of solitary play involve engaging with content and wanting to share experiences, those of social play all emanate from engaging with others. The following are suggested starting points for exploring design solutions.

8.3.3.1 Solitary Play

Improving the experience of solitary play means addressing the complaints of predictable game AI, repetition and the desire to share game experiences with non-playing friends. Resolving the predictability of computer-controlled opponents is an area of research already heavily invested in (Hingston, 2010), and thus will not be explored here, save to state that predictability might be less of an issue for players being challenged at their skill level (see 'flow', section 2.4.3). For example, *Left 4 Dead*'s AI Director dynamically adjusts the number and timing of opponents based upon the player's health status and number of kills, rather than placing opponents in predictable locations. This might also be achieved by using physiological signals of stress or arousal to trigger game events (Chanel, Rebetez, Bétrancourt, & Pun, 2011;

Dekker & Champion, 2007; Nacke, Kalyn, Lough, & Mandryk, 2011), or via the use of facial expression recognition software (Blom et al., 2014).

The sense of repetitive gameplay in solitary play could be minimised on two fronts: encouraging emergent gameplay, and making shorter, or episodic, games. Emergent gameplay essentially occurs when the player has a less directed experience, and greater choice in terms of how they engage with the games goals and/or environment (Bycer, 2015)—or autonomy-enhancing gameplay. In turn, this could be supported by procedural generation, which uses procedural algorithms to generate game characters, environments, animation and mechanics—for example, the actions of *Left 4 Dead's* AI Director described earlier are an example of procedurally generated gameplay. More controversially, the production of shorter games with less padding is another way to avoid repetition. While some independent game makers are already addressing this by producing short-focussed games for a lower price point, others are delivering complex content episodically.

Finally, while solitary play necessarily takes place alone, Study 3 showed that some people who played alone also wished to share their experiences with others. While some players do this via streaming services, it is worth considering other forms of solitary play in which social play could occur indirectly. For example, asynchronous online content can allow players to leave messages or replays of gameplay for others playing at a later date, while online sandbox games can allow players to leave 'messages' in the form of a manipulated environment. By considering solitary play as one end of a spectrum of experiences leading to social play, the potential for connecting people who do not want to directly play with others is exponentially increased. However, this research cautions against forcing players to engage in a particular social context of play in order to progress.

8.3.3.2 Social Play

Improvements to social play unsurprisingly revolve around improving interaction. The many complaints of social players can be simplified into three broad challenges: scheduling, matchmaking and minimising toxicity.

For people who played with friends and family, finding the time to meet for a game was described as inconvenient, particularly when negotiating other work/life demands. Casual games have the advantage in that gameplay can be asynchronous and occur in quick bursts on mobile devices; however, for cooperative games, synchronous play is part of the appeal. While real-world sports have scheduling applications, there is space for the development of video game apps that will notify players of others availability and time limits, so that players do not have to seek out this information or can offer it en masse to a pre-selected community. Additionally, designing different length play sessions, as well as systems that will account for the sudden loss of a team member, will allow players greater autonomy in choosing how long to engage in cooperative play.

For those who play in teams with strangers, one of the key challenges is finding a team that will function well. While matchmaking in games (when a game system groups available players into teams based on performance ratings) is typically determined by skill level, the responses of cooperative players suggests that teamwork relies on a more complex set of criteria, including personality, maturity and shared motivations. While system-delivered psychological profiling would be a challenge to operationalise effectively, allowing players to rate those they have played with and choose what personal characteristics they prioritise might decrease the number of bad matches, as might the simple prioritising of placing friends in the same team (Mason & Clauset, 2013). Encouraging the development of personal profiles and engagement with the gaming community (e.g. forums, online events, offline meet-ups) might also serve to enhance personal relations both in and out of gameplay. Rewarding the informal roles players take on in multiplayer games might also encourage positive connections between

people—for example, one of the informal roles identified in real-world sports is that of the 'social convener' (Cope, et al., 2011).

Finally, player toxicity potentially affects all forms of social play, but appears to be most closely associated with competitive play and play with strangers. As in traditional sports, the linking of behaviours to reputation and future inclusion in desired events (or repercussions) could be effective for committed players. Riot Game's interventions with player toxicity (e.g. introducing a 'Tribunal' to give feedback on player behaviours; priming players with messages prior to play; changing communication options) show how a games company might use psychological experimentation and intervention to both increase player satisfaction and reduce some of the negative effects of a toxic online culture (Cummings, 2013). Of particular interest is that by providing feedback on players' interactions, many players were willing to reform behaviours (McWhertor, 2012). However, to also have an impact on less committed players, it would be worth examining the role particular game mechanics have in terms of player frustration and team cohesion. For example, are all team members equally rewarded for bringing down an opponent, or only the player who delivers the last blow? Can new players be supported by the game system in order to create a skill-balanced team? It is also possible that some of the earlier suggestions regarding matchmaking might forestall toxicity within teams, although it seems likely that a multi-pronged approach is needed to create a sustainable shift.

8.3.3.3 Serious Games and Gamification

Games and their mechanics have been used for pro-social ends via serious games and gamification. While serious games are fully formed games, but with a primary 'serious' goal, e.g. *SPARX* (a role-playing game integrated with cognitive behavioural therapy, used to treat depressive adolescents, Merry et al., 2012), gamification uses game mechanics in order to motivate a particular activity, such as badges on *TripAdvisor* (a travel review website and application) in order to motivate more reviews. For those desiring to use the motivating aspects of games to design health-targeted interventions, this thesis suggests the necessity of

understanding the challenges of different social contexts of play. For example, knowing that the inconvenience of coordinating schedules with friends is why some people prefer to play with strangers, or that player toxicity is why some people prefer to play games alone, can frame design decisions so that these contexts can be integrated into broader interventions. These could include making use of turn-based play if wanting friends to engage easily, or making communication between strangers optional or moderated to offset the possibility of toxicity.

However, while serious games and gamification have become a popular means of engaging 'hard to reach' audiences, there is a risk of this medium being viewed as a gimmick rather than a contextually responsive intervention, with well-researched content that is fun to engage with (Hughes, 2014). This is partly due to poorly integrated motivational design, such as the 'stick a badge on it' approach. As such, there exists an opportunity to take the experiences that promote both intrinsic motivation and wellbeing (autonomy, competence, relatedness) and work them into the user's experience of using an application. This research further strengthens the proposition laid out by Nicholson (2012) regarding user-centred design to create meaningful gamification. As such, the findings from Study 3 could be used, for example, to inform the design of applications that harness the competence-enhancing elements of competitive play, or the meaningful and social cohesion-enhancing interactions of team play, with richer narrative content for solitary use. This has direct applications for group-based work or learning environments, and presents opportunities tailored for both collaborative and solitary content engagement in a way that enhances the positive aspects of these social contexts, and discourages the negative ones. For example, forming teams of students with clearly defined roles and competitive components might motivate online learning such as is being delivered in massive online open courses (Tan, 2013). Knowing of the risk of toxic behaviours in competitive online play, however, also suggests the need for carefully moderated communications, while team makeup could be guided by matchmaking algorithms based on a combination of skills, interests and reputation as a team player. To reiterate a point above, however, while options to engage in

social play might be intrinsically motivating for some, solitary play is a popular choice, and it wise to keep that as an option if wide acceptance is a goal.

8.4 LIMITATIONS AND FUTURE RESEARCH

While the results of this PhD are broadly consistent with previous research in the area, some unanticipated findings provide new, key insights and suggest directions for future research.

Study 1 explored a range of player experience measures, of which flow and genre were shown to impact wellbeing. Though these variables were not examined in subsequent studies due to concerns around participant fatigue, they could be examined in future studies directed at player wellbeing. More recent research, however, suggests that flow as it is conceptualised by the FSS-2, may need to be considered more carefully as the scale may not differentiate reliably between tasks that are very easy to complete and those that show a match between ability and demand (Klarkowski, et al., 2015). Additionally, as the FSS-2 is closely matched to Csikszentmihalyi's (1990) criteria, there may be value in reconsidering which aspects of flow are most useful when it comes to measuring flow in video game play, and indeed to perhaps reconsider the construct of flow itself.

Also, while Study 1 found casual play (compared with shooters) to predict wellbeing, this was perhaps more due to casual games causing improvements in mood (Fish, et al., 2014; Russoniello, et al., 2009a, 2009b) than any specifically detrimental effects of playing shooters. As Study 4 showed, the social context of play can positively influence mood in the play of a first-person shooter. This suggests that future research consider factors affecting the player experience that can be precisely assessed, such as the social context of play, game mechanics, length of play or reward types. Additionally, while it is interesting that studies 1 and 2 showed significant relationships between demographic variables and wellbeing (namely that females experienced lower wellbeing than males in Study 1, and that wellbeing increased with age in studies 1 and 2), these were not variables of concern and were rather used to control for their

influence before determining the influence of the player experience measures. However, further contrasts of these subsets (women to men, young to old) might produce a means of understanding how to positively influence the wellbeing of these populations via gameplay, and could be considered in future research.

The under-representation of female responses collected in the cross-sectional surveys, however (16–19% female, compared with between 44% (Entertainment Software Association, 2015) and 47% female (Brand & Todhunter, 2015)), contrasts with the representation in the interviews (50%), and the experiment (5%). Whether this difference was impactful in terms of the findings is unknown, but there is clearly a need to address gender in further video game play research. Relatedly, the frequencies of people who played cooperatively with people they knew differed across the last three studies (Study 2: 53%; Study 3: 19%; Study 4: 59%). This was partially due to the different analyses used in studies 2 and 3, which led to the groupings being composed differently (see sections 5.1.3 and 6.1.3), and all studies used non-probability-sampling methods, which might have produced biased results. Comparison with the distributions of the broader community is hampered, however, by the lack of targeted studies of social play patterns. For example, Brand et al.'s study (2015) indicates that 35% of the people surveyed report playing with friends, but no indication as to interaction type is given. As such, future research producing detailed statistics on the demographics and social play patterns of the broader community, using probability-sampling techniques, would be beneficial as a point of comparison.

Finding that greater amounts of play was associated with lowered wellbeing in Study 2 is consistent with other research finding the best psychosocial outcomes in low-to-moderate levels of play (Allahverdipour, et al., 2010; Durkin & Barber, 2002; Przybylski, 2014). However, as stated in section 5.3, Study 2 involved participants with large variations in their amount of play. Additionally, the amount of play measures showed that most players were playing a small or moderate amount with a minority of players playing a lot. The use of self-report also brings into question how accurate the amounts reported are, and indeed the accuracy

of the recall of the gameplay experience. The survey method, however, was chosen to allow collection of a large sample of cross-sectional data (people playing on a wide range of platforms and devices). Future investigation with the use of logged amount of play data would do much to clarify this finding. Further research could also consider comparing the motivation for play in contrasting social contexts against amount of play and player wellbeing, as well as controlling for factors that may exert a greater influence over wellbeing than does amount of play, or even account for the amount of play, e.g. socio-economic measures, employment/education status, level of offline social support, etc. Study 2, in making adjustments to the relatedness measure (reducing it to two items), also indicates the need for a measure of relatedness that can be interpreted unambiguously to refer to other players, in order to avoid potentially capturing feelings of connection with non-player characters. In turn, the need for further investigation of the potential for players to consider computer-controlled characters as the foci for feelings of connection or rapport is indicated. The failure to find a relationship between wellbeing and bonding social capital in Study 2 also indicates the need for future research to engage measures that more adequately capture the impacts of bonding social capital, such as could be provided in a measure of online or offline social support.

While presence and autonomy were found to be greater for solitary players than social players in studies 2 and 3, Study 4 found no result for autonomy, and found social players to experience greater presence. This might be due to procedural choices, or, as was discussed in section 7.3 and 8.1, it is possible that the type of game being played was influential, such that the results reflects differences in the game mechanics of single and multiplayer games. Extending this research to the use of different content and mechanics will only benefit this field of research, as will the use of diverse methodologies to triangulate the subject matter and the standardisation of measures used across the field.

The lack of finding for competence across all studies except Study 3 is also notable. Study 3 was the only study to not make use of the PENS measure of competence, and found that experiences of challenge and competence are enjoyed the most in play with strangers, followed

by play with known others and lastly, solitary play. Challenge and competence also decreased from competitive play (greatest), to mixed competitive and cooperative play, to cooperative play. These findings are intuitively supported, and competition has been shown to support the satisfaction of competence needs relative to non-competitive play (Kazakova, et al., 2014). Thus, this program of research does not provide results that definitively align competitive play, or play with strangers, to greater feelings of competence compared with other social contexts. Further research in this area could consider comparing a variety of measures of in-game competence in order to determine if some social contexts of play produce greater feelings of competence than others.

Study 4 also produced its own set of directions for future investigation. As the experiment was necessarily limited to a comparison of cooperative play with avatar or agent, it would be beneficial to know if these results will be replicated when the play is competitive. It would also be useful to replicate the experiment as it stands with a larger sample and replacing the deception with one in which players are partnered with a computer-controlled character in both conditions. This will test if there are behavioural differences that might impact the player experience independent of the effects of perception (whom the players *believe* they are partnered with). Additionally, the finding that participants who were friends did not differ in mood or enjoyment across either game, while strangers did, suggests the need for further exploration of the effects of playing with friends or strangers in a co-located environment. If indeed, just the physical presence of a friend over-rides the emotional effects of some game mechanics, it may be useful to know which ones and under what circumstances.

Other factors possibly affecting the relationship between the social context of play and the player experience includes those of personal traits such as resilience, extraversion and emotional stability. Game genres have been found to be associated with different personality types (Johnson, et al., 2012), so it is likely that different social contexts will also. It could also be that pre-existing wellbeing is informing the choice of social context of play—for example, solitary players might have a greater need for relaxing and recuperative gameplay than players

in other contexts. Whether this is the case or not requires research in which everyday wellbeing and need satisfaction is compared with the need satisfaction provided by gameplay, and/or the motivation to play games. This has been carried out in part by Przybylski et al. (2009); however, framing this within the social context of play is largely unexplored territory.

In turn, while games might be used for recuperation, play might also be obsessive, and other measures need to be engaged to learn what determines healthy or unhealthy engagement with games. Research using theories of harmonious or obsessive engagement with games (Przybylski, et al., 2011), coping styles (Reinecke, 2009) or motivations to play (Ryan, et al., 2006; Yee, 2006a) could offer greater insight. More recent research also suggests that the study of healthy engagement in gameplay would benefit from engaging both players and mental health professionals to determine the risk factors facing players (Kneer, Rieger, Ivory, & Ferguson, 2014), as it seems likely that both contextual and psychological factors might be affecting the player experience. This last point is supported by this thesis, in that both practical and psychological elements are determining the choice of social context of play. For example, having both the access and desire to play with both known and unknown others opens the player up to a range of player experiences, while those desiring relaxation and without gaming social circles might choose to play alone, resulting in greater autonomy and immersion in the game.

While SDT and SCT were used to conceptualise the relationship between wellbeing and video game play, the application of other theories may be of use in further research into the social context of play. For example, Bourdieu's concept of habitus (Swartz, 2002) both underwrites the theory of social capital (Portes, 1998) and explains how emotional responses result from cultural influences (Scheer, 2012). As such, the application of Bourdieu's theories and constructs, combined with ethnographic techniques, could be used to investigate how social expectations are shaping players' value systems (raised in section 8.1, regarding solitary players being concerned about their amount of play, but playing much less than social players), while behavioural logging of actual gameplay would serve as a useful point of comparison. Deconstructing the social context of play might also generate understanding of how players

derive meaning and create equitable and personally satisfying interactions. The continued use of SDT is recommended, however, as it has greater applications in terms of explaining the link between intrinsic motivation and wellbeing.

In terms of theories that deal with media effects, such as the General Learning Model (Buckley & Anderson, 2006), SDT has the advantage of accounting for the motivations of the player. As such it takes into consideration the impact of personal differences, and can explain why players may be impacted by the same content differently and why, in fact, people develop preferences for one experience over another and why these too can change over time. SDT also has the advantage of being better situated to interrogate the impacts of differences in socio-economic background, parenting, and education – altogether more potent influences on human wellbeing than which game one played earlier in the day – being as they are, reflections of how need satisfaction is gained or thwarted in everyday life. The study of trait may also hold greater promise than media effects, showing as it does that individuals with higher levels of trait hostility might prefer games with violent content (Przybylski, Ryan, et al., 2009), and that their playing these games might be linked to real-world downturns in crime simply due to the time spent playing (Patrick M. Markey, Markey, & French, 2015). However, as mentioned earlier, video game play can also be understood as a cultural practice informing the development of personal dispositions, á la Bourdieu. As such, future research might consider how Bourdieu's sociological theories complement SDT in terms of explaining the motivations and consequences of different social contexts of play.

Finally, further investigation in this area would also benefit from expanding the social context of play to explore the experiences of solitary players in greater depth. It seems likely that there are different kinds of solitary play, just as there are different kinds of social play, and that it might be possible to form a richer spectrum of solitary and social play, as other research suggests (Stenros, 2011). Removing two groups of players from the regressions and comparisons performed in Study 2, due to their smaller size (people who played cooperatively with strangers, and competitively with friends), also suggests the necessity of revisiting these

groups in future research. Applying more detailed categories, with an understanding of how players adjust play to meet changing needs and requirements, would create a fuller picture of how people use technology to positively impact their wellbeing. Survey, interview and other ethnographic techniques would be of benefit in this endeavour.

8.5 CONCLUSION

This research provides empirical evidence of the influence of the social context of play on the player experience, and through those experiences, wellbeing.

Study 1 (Chapter 4) laid the foundations by establishing links between the player experience and wellbeing via a survey of a broad cross-section of players (RQ1). Specifically, the experiences of autonomy, relatedness and flow were found to be predictive of wellbeing after taking into account the possible influence of age, gender, game genre, amount of play and the social context of play. Interestingly, relatedness was also found to mediate the link between social play and wellbeing, such that the greater the feelings of connection with others in gameplay, the greater the associated wellbeing (RQ2). This study provided evidence that the social context of play and the player experience are tied to wellbeing.

The online survey conducted in Study 2 (Chapter 5) found that gameplay in different social contexts was associated with different levels of psychological need satisfaction and social capital (RQ 3a,b). Namely, play with others in general was associated with greater feelings of relatedness relative to play alone, while those playing alone experienced greater autonomy and presence in play. Importantly, this established that both social and solitary play offers a means to experience wellbeing, via the link between need satisfaction (autonomy, relatedness) and wellbeing. For social players, both relatedness and bonding social capital was greatest for those who played cooperatively with known others, then mixed play and least for those who played competitively with strangers. Bridging social capital, however, was greatest for those who engaged in mixed play, then cooperative play with known others and lastly, competitive play with strangers. These findings describe how the relationships and interactions players have

impact practical social outcomes (social capital) as well as the means of experiencing wellbeing through play (relatedness).

In addition, Study 2 also found that the wellbeing of solitary players was predicted by experiences of autonomy and relatedness, while social players' wellbeing was predicted by playing with strangers (compared with playing known others) and bridging social capital (RQ4a,b). This confirmed that both solitary and social play produced experiences that were associated with wellbeing, while producing unanticipated results (the link between solitary play and relatedness; play with strangers predicting wellbeing), which provided insights to be taken up in future research. In addition, the increased effect sizes of the regressions used in this study, relative to Study 1, showed the value of measures and analyses targeting the social context of play.

Study 3 (Chapter 6) explored the reasons why people might play in different social contexts, using open-ended survey responses and interview techniques (RQ5). In brief, this study showed that solitary players enjoyed relaxing, immersive, escapist and autonomous experiences, and avoiding performance pressure and toxicity in other players. Solitary play was also seen as convenient, as there was no reliance on others' availability or ability. Social players, overall, enjoyed experiences of competence and challenge, as well as relatedness, and saw other people as the means to experience this. People who engaged in mixed play experienced the most fun, enjoyed the variety and showed the least dissatisfaction. The mixture of likes and dislikes suggested design opportunities taken up in section 8.3.3. Implications for wellbeing were also outlined (RQ6), which augmented some of the findings of the previous studies (e.g. that solitary play offers relaxing and immersive experiences ties in with Study 2's finding that solitary play produces greater autonomy, relative to social play). Though the direction of various relationships could not be determined due to the cross-sectional nature of this study, it provided a rich and insightful exploration that both confirmed and contextualised previous findings.

Finally, Study 4 (Chapter 7) demonstrated that cooperative play with an avatar (human) caused greater positive affect, presence, enjoyment, connection and cooperation than cooperative play with an agent (computer) in a laboratory-based repeated-measures experimental study (RQs 7 & 8), though affect and enjoyment were qualified by an interaction with relationship type (stranger or friend). No differences were found for experiences of competence or autonomy. By equalising the level of difficulty across conditions, this study extended previous research in the field by providing evidence that just the perception of playing with a human will positively impact mood and elements of the player experience. The result for presence, contrasting as it does with those of studies 2 and 3, also suggests that differences in the game mechanics of single-player games (captured by survey methodology) versus multiplayer games (used in experimental contrasts) impacts presence, which is a worthy consideration for future research. Additionally, the unanticipated effects of being co-located with a friend on mood and enjoyment, suggest the importance of considering the effects of relationship type in the experimental setting.

8.6 FINAL COMMENTS

As gameplay becomes more commonplace and an accepted part of an individual's entertainment options, knowing how the choices that players make impact their wellbeing becomes crucial. This thesis establishes relationships between the social context of play and both the player experience and wellbeing, and outlines how players might benefit in different contexts. Additionally, this program of research shows that the reasons why people might play in a particular context are shaped by both practical and psychological considerations, and provides suggestions for game design improvements that could enhance player wellbeing and retention. Overall, this thesis challenges the conception of video game play as socially isolating and necessarily detrimental to players' mental health. Rather, the player is shown to be active in negotiating their wellbeing by seeking out of different player experiences via the social context of play.

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Appendices

Appendix A: Wellbeing Table

Table A.1 Wellbeing constructs

	Huppert & So [1]	Keyes [2]	Ryff [3]	Seligman [4]
Emotional Wellbeing	Positive Emotion	Life Satisfaction Positive Affect		Positive Emotion
Psychological Wellbeing	Competence Emotional Engagement Meaning Optimism Positive Resilience Self-Esteem Vitality	Autonomy Environmental Personal Growth Positive Relations Purpose in Life Self-Acceptance	Autonomy Environmental Personal Growth Positive Relations Purpose in Life Self-Acceptance	Accomplishment Engagement Meaning Positive
Social Wellbeing		Social Acceptance Social Actualisation Social Coherence Social Contribution Social Integration		

[1] (Huppert & So, 2013)

[2] (Keyes, 2007)

[3] (Ryff, 1989)

[4] (Seligman, 2011)

Appendix B: Study 1 Items

Demographics/Game Play Experience and Preferences

1. What is your **age**?
2. What is your **gender**?
3. What is your **country of residence**?
4. How did you hear about this survey?
5. How would you rate your **general level of experience** with playing videogames?
6. Approximately how many **years** ago did you **first play** a videogame?
7. Approximately how many **years** ago did you **last play** a videogame?
8. During the time you've played videogames, **on average**, how many **hours** have you played each **week**?
9. What is the **highest number of hours** that you have played videogames **in a single week**?
10. What is the name of the game you **most recently purchased** and that you've played **at least once**?
11. What **genre** best describes this game?
12. On which **platform** do you **most often** play this game?
13. **How** do you **most often** play this game? (online with people you know; online with people you don't know; offline with people you know; on your own)
14. **In total**, how many **hours** have you spent playing this game?

Prompt:

"Think back to the last time you played **[Q10], [Q13]**. Try to remember where you were, what was happening in the game, and how you felt at the time. In the box below please explain (in about 30 words or less) **which part of the game you were playing and what was happening."**

Player Experience of Need Satisfaction Scale (PENS v1.6)- 21 items (Ryan, et al., 2006)

As the PENS is a commercial scale only example items are provided. It is measured on a 7-point scale, from 'Do not agree' to 'Strongly agree'.

"Thinking about playing [Q10], [Q13], reflect on your play experiences and rate your agreement with the following statements: "

- "I experienced a lot of freedom in the game" (autonomy)

- "I feel very capable and effective when playing" (competence)
- "I find the relationships I form in the game fulfilling" (relatedness)
- "When moving through the game world I feel as if I am actually there" (presence).

Flow State Scale-2 (DFS-2) (Jackson, et al., 2008)

As the DFS-2 is a commercial scale only example items are provided. It is measured on a measured on a 5-point scale from 'Strongly Disagree' to 'Strongly Agree'.

“Please answer the following questions in relation to your experience of playing [Q10], ([Q13]). These questions relate to the thoughts and feelings you may have experienced while playing the game. There are no right or wrong answers. Think about how you felt during gameplay, then answer the questions using the rating scale below. For each question, tick which answer best matches your experience.”

- “I did things spontaneously and automatically without having to think."

Mental Health Continuum Short Form (MHC- SF) (Keyes, 2009)

It is measured on a 6-point scale from 'Never' to 'Every Day'

“Please answer the following questions about how you have been feeling during the past month. Tick the button that best represents how often you have experienced or felt the following:”

1. Happy
2. Interested in life
3. Satisfied with life
4. That you had something important to contribute to society
5. That you belonged to a community (like a social group, your school, or your neighbourhood)
6. That people are basically good
7. That the way our society works makes sense to you
8. That you liked most parts of your personality
9. Good at managing the responsibilities of your life
10. That you had warm and trusting relationships with others
11. That you had experiences that challenged you to grow and become a better person
12. Confident to think or express your own ideas and opinions
13. That your life has a sense of direction or meaning to it

- 1-3 Emotional Wellbeing

- 4-8 Social Wellbeing
- 9-14 Psychological Wellbeing

Appendix C: Study 1 Additional Analyses

Table C.1 Mediation model coefficients—Emotional Wellbeing

		Dependent variables						
		M (Relatedness)				Y (Emotional Wellbeing)		
Independent variables		Coeff.	S.E.	*p*		Coeff.	S.E.	*p*
X (Social play)	*a*	.741	.170	.000	*c'*	.176	.388	.650
M (Relatedness)					*b*	.419	.130	.001
Constant	i_1	3.388	.110	.000	i_2	8.826	.503	.000
	R^2 = .061				R^2 = .040			
	$F(1, 292) = 19.048$, $p < .001$				$F(2, 292) = 6.062$, $p < .001$			

Table C.2 Mediation model coefficients—Psychological Wellbeing

		Dependent variables						
		M (Relatedness)				Y (Psychological Wellbeing)		
Independent variables		Coeff.	S.E.	*p*		Coeff.	S.E.	*p*
X (Social play)	*a*	.741	.170	.000	*c'*	1.004	.704	.155
M (Relatedness)					*b*	.532	.235	.024
Constant	i_1	3.388	.110	.000	i_2	17.639	.911	.000
	R^2 = .061				R^2 = .031			
	$F(1, 292) = 19.048$, $p < .001$				$F(2, 291) = 4.663$, $p < .05$			

Table C.3 Mediation model coefficients—Social Wellbeing

		Dependent variables						
		M (Relatedness)				Y (Psychological Wellbeing)		
Independent variables		Coeff.	S.E.	*p*		Coeff.	S.E.	*p*
X (Social play)	*a*	.741	.170	.000	*c'*	.752	.650	.248
M (Relatedness)					*b*	.597	.217	.006
Constant	i_1	3.388	.110	.000	i_2	11.002	.842	.000
	R^2 = .061				R^2 = .031			
	$F(1, 292) = 19.048$, $p < .001$				$F(2, 291) = 4.663$, $p < .05$			

Table C.4 Mediation Model coefficients—Total Wellbeing

		Dependent variables						
		M (Relatedness)			Y (Psychological Wellbeing)			
Independent variables		Coeff.	S.E.	*p*		Coeff.	S.E.	*p*
X (Social play)	*a*	.741	.170	.000	*c'*	1.932	1.557	.216
M (Relatedness)					*b*	1.548	.520	.003
Constant	i_1	3.388	.110	.000	i_2	37.467	2.016	.000
	R^2 = .061				R^2 = .043			
	$F(1, 292) = 19.048$, $p < .001$				$F(2, 291) = 6.513$, $p < .01$			

Table C.5 Pearson's correlations two-tailed for ISCS (adapted) and MHC-SF for social players

	1.	2.	3.	4.	5.	6.
1. Bonding Social Capital						
2. Bridging Social Capital	.334**					
3. Emotional Wellbeing	.122	.220*				
4. Psychological Wellbeing	.175*	.277**	.819**			
5. Social Wellbeing	.05	.296**	.597**	.663**		
6. Total Wellbeing	.132	.303**	.874**	.936**	.860**	-

$p < .05$*, $p < .01$ **

Appendix D: Study 2 Items

1. Are you aged 12 years or over?
2. What is your **age**?
3. What is your **gender**?
4. What is your **country of residence**?
5. How did you hear about this survey?
6. How would you rate your **general level of experience** with playing videogames?
7. Approximately how many **years** ago did you **first play** a videogame?
8. Approximately how many **years** ago did you **last play** a videogame?
9. During the time you've played videogames, **on average**, how many **hours** have you played each **week**?
10. What is the **highest number of hours** that you have played videogames **in a single week**?
11. What is the name of your **current favourite game**?
12. When did you **last** play [Q11]?
13. **In total**, how many **hours** have you spent playing this game?
14. What **genre** best describes this game?
15. On which **platform** do you **most often** play this game?
16. **How** do you **most often** play this game? (online with people you know; online with people you don't know; offline with people you know; offline with people you don't know; on your own) – responses stream to relevant questions after the prompt

Internet Social Capital Scales (Williams, 2006)

Adapted to gameplay. Measured on a 5-point scale from 'Strongly Disagree' to 'Strongly Agree'

1. There are several people I play with in [6] that I trust to help solve my problems.
2. There is someone I play with in [Q11] that I can turn to for advice about making very important decisions.
3. There is no one I play with in [Q11] that I feel comfortable talking to about intimate personal problems.
4. When I feel lonely, there are several people I play with in [Q11] that I can talk to.
5. If I needed an emergency loan of $500, I know someone I play with in [Q11] that I can turn to.
6. The people I interact with [Q11] would put their reputation on the line for me.
7. The people I interact with in [Q11] would be good job references for me.
8. The people I interact with in [Q11] would share their last dollar with me.

9. I do not know people in [Q11] well enough to get them to do anything important.
10. The people I interact with in [Q11] would help me fight an injustice.
11. Interacting with people in [Q11] makes me interested in things that happen outside of my town.
12. Interacting with people in [Q11] makes me want to try new things.
13. Interacting with people in [Q11] makes me interested in what people unlike me are thinking.
14. Talking with people in [Q11] makes me curious about other places in the world.
15. Interacting with people in [Q11] makes me feel like part of a larger community.
16. Interacting with people in [Q11] makes me feel connected to the bigger picture.
17. Interacting with people in [Q11] reminds me that everyone in the world is connected.
18. I am willing to spend time to support general [Q11]-related community activities.
19. Interacting with people in [Q11] gives me new people to talk to.
20. In [Q11], I come in contact with new people all the time.

Prompt:

"Think back to the last time you played **[Q11], [Q16]**. Try to remember where you were, what was happening in the game, and how you felt at the time. In the box below please explain (in about 30 words or less) **which part of the game you were playing and what was happening."**

Player Experience of Need Satisfaction (PENS) – See Appendix B

"The next section explores your general thoughts and feelings. **Please try to answer each question as accurately as possible**."

Mental Health Continuum Short form (MHC-SF) – See Appendix B

Appendix E: Study 3 Items and Interview Questions

Listed at end of Study 2 Survey:

The following pages ask some **final questions**, this time about your **general gameplay experience**.

1. What **genre** of game do you **most often** play? (The comment box is for those who indicate 'other')
2. How do you **most often** play videogames? (online with people you know; online with people you don't know; offline with people you know; offline with people you don't know; on your own)
3. Please tell us what you **like** about playing videogames **[Q2]**
4. Please tell us what you **dislike** about playing videogames **[Q2]**

Social players are streamed to this question:

"When you play **[Q2]**, how do you **most often** prefer to play with them?"

- **competitive multiplayer** (I am competing against the other people playing e.g., deathmatch, competitive race)
- **cooperative multiplayer** (I am cooperating with the other people playing e.g., horde mode, we play on the same football team against game AI, we go on raids together)
- **mixed competitive and cooperative multiplayer** (I am both competing and cooperating with the other people playing e.g., team deathmatch, football against a team of other players controlled by other people)

People who answer [**mixed competitive and cooperative multiplayer]** are streamed to:

"Please indicate how **competitively or cooperatively** you play **generally**."

7-point scale item from 1 (**Mostly competitive**, and only slightly cooperative) to 4 (**An even mix** of competitive and cooperative play) to 7(**Mostly cooperative**, and only slightly competitive)

Interview questions:

Note: Not all questions will be asked of all people, e.g. someone who states up front that they only play single-player games weren't asked any of the multiplayer questions.

Experience:

- How would you rate your general level of experience with playing videogames?
- Approximately how many years ago did you first play a videogame?
- Approximately how many years ago did you last play a videogame?
- In the last month, what's the average number of hours you have played in a week?
- In the last month, what's the highest number of hours you have played videogames in a single day?

Game Play Preferences:

- What is the name of your current favourite game?
- What genre of game do you play the most often?
- What platform do you use the most often?
- Generally what kind of games do you prefer to play (genre/single player/multiplayer/online/offline, etc.)?

Multiplayer:

- Has the kind of game you play (in regards to play with other people) changed much over time? For example, did you move away from single-player games? If so, what do you think has influenced this?
- Do you think how you play games will change in the future and what do you think will be an influence?
- Do you/how do you communicate with other players?
- Is communication important and why?
- What do you like about playing [single-player/multi-player/online/offline]?
- What do you dislike about playing [single-player/multi-player/online/offline]?
- (if they've played a range of modes) Which mode of play would you say is the most [exciting/frustrating/difficult/challenging/boring]?
- What do you get out of playing with other people?

Who they play with:

- Who do you play games with? E.g. Friends, family, strangers, work colleagues, people you met in the game
- What kind of relationship do you have with the people that you only know from the game- how would you describe it? (e.g. close, trusting, warm, congenial, casual)
- How well do you know them/how long have you known them?

- Is there anyone you play with that you'd share personal information with that you wouldn't share with the other people you know?
- How do you think these relationships sit within your larger framework of relationships- what role do they serve?
- Have you socialised with any of these people outside of gameplay, either online or offline? Can you give me some examples?
- What do you like about your interactions with [family/friends/strangers] in gameplay?
- What do you dislike about your interactions with [family/friends/strangers] in gameplay?

Competitive/Cooperative:

- Do you enjoy competitive or cooperative games more? Or a mix of both?
- How competitively or cooperatively would you say you play?
- What would you say you've gained from playing [comp/coop/mix of both]?
- (if they don't play with other people) Would you say there are still comp/coop elements in your gameplay that you're aware or/make use of? E.g. Leaderboards, environment modification, etc.
- What do you like about playing games [competitively/cooperatively]?
- What do you dislike about playing games[competitively/cooperatively]?

Solo Play:

- Has the kind of game you play (in regards to play with other people) changed much over time? For example, did you move away from multiplayer games? If so, what do you think has influenced this?
- Do you think how you play games will change in the future and what do you think will be an influence?
- What do you like about playing single-player games?
- What do you dislike about playing single-player games?

AI versus humans:

- Do you ever play with bots/human-like game AI on your team, or against them?
- What are the differences in terms of gameplay with or against bots/human-like game AI, instead of humans?

- Which is more enjoyable, easier, frustrating, boring?
- What do you like about playing with bots/human-like game AI?
- What do you dislike about playing with bots/human-like game AI?
- Which do you think is preferable: to lose a game with humans or to achieve your goals with bots/human-like game AI?

General:

- Are games a part of your recreational options or would you say you mostly play videogames for recreation?
- Would you say that there is an interaction between your gameplay and your [stress levels/mood/quality of your relationships/confidence/resilience or ability to cope/self-esteem/energy levels/general happiness]- e.g. does it make you more or less stressed or is there no relationship?
- How integrated would you say your gameplay is with the rest of your life? Would you say that it exists in harmony with it, or is there some conflict?
- What makes for a good game?
- Can you tell me about your most exciting gameplay experience?
- What do you get out of playing videogames?
- Do you find gameplay to be meaningful on any level? Please explain.

Appendix F: Study 3 Amount of Play x Social Context

Table F.1 Social context of play x average hours of play

Social Context of Play	N	Mean Hours	SD
Social play	146	22.89	23.32
Solitary play	180	14.02	14.31
Play with known others	87	20.77	18.13
Play with strangers	59	26.02	29.26
Competitive play	18	21.83	20.88
Cooperative play	32	18.28	22.21
Mixed competitive and cooperative play	85	25.76	25.00
Competitive play with known others	9	19.22	22.97
Competitive play with strangers	25	14.16	8.76
Cooperative play with known others	9	24.44	19.60
Cooperative play with strangers	7	33.00	43.78

Appendix G: Study 3 Cohen's Kappas

Table G.1 Cohen's Kappas for survey data

Solitary play/ relationship type: Likes	*K*	Solitary play/ relationship type: Dislikes	*K*	Interaction type: Likes	*K*	Interaction type: Dislikes	*K*
Autonomy	.84	Impact on Life	.88	Challenge/ competence	.75	Lack of teamwork	.75
Challenge/ competence	.92	Lack of autonomy	.74	Fun	.71	Logistical issues	.84
Escapism	.82	Lack of relatedness	.91	Relatedness	.79	Losing/Failure	1.
Fun	.75	Less fun	.82	Teamwork	.76	Mismatch of skill/play style	.86
Immersion	.75	Logistical issues	.88			No dislike	.84
Logistics	.79	Losing/failure	.85			Others toxicity	.94
Meet people	1.	Mismatch of skill/play style	.92				
No performance pressure	.85	No dislike	.93				
No Toxicity	.93	Others' toxicity	.88				
Relatedness	.72						
Relaxation	.79						
Teamwork	.86						

*All Kappa's were significant at the .01 level

Appendix H: Study 3 Coding Scheme

Likes	
Autonomy	Having control over own in-game choices/behaviours/goals and pace. Can include enjoying not being reliant on others and not having emotional attachments that interfere with the way they would like to play. Freedom to play as they wish to. While this may seem to refer to starting a game when they like, code that as 'logistics', while ending a game when they like is 'autonomy' as it is an in-game decision.
Challenge/Competence	Players are challenged to perform at a high level or have experiences of competence e.g. competition, winning, achieving a goal, feeling that the game is matched by their abilities, wishing to extend their abilities.
Escapism	Playing games to escape from/forget stressful thoughts or obligations. Reference point is non-game.
Fun	The word 'fun', obviously, but also other associated wording that implies pleased excitement such as laughter, entertainment, 'good times'. Code it when mentioned explicitly, rather just being used as an adjective.
Immersion	Narrative engagement, emotional involvement with in-game experiences, deep engagement in gameplay. Reference point is in-game.
Logistics	The practical management of the elements of gameplay in order to facilitate gameplay. May include access to internet, no lag, coordinating the schedules of different players, being able to communicate strategy.
Match of skill/play style	Finding that the game or other player matches the player's skill level or style/pace of playing.
Meeting people	Enjoyment of meeting with new people via gameplay and potentially forming friendships. While this might be considered and element of relatedness, when the emphasis is on potentially creating new relationships, code as 'meeting people' and not 'relatedness'.
No other's toxicity	Lack of toxic/deviant behaviour by other players such as abuse, harassment, cheating/hacking. If not sure of the reason why they enjoy not playing with others, don't code, e.g. only given 'no stupid people'.
No performance pressure	No pressure (whether enforced by others or self) to achieve a certain standard of play. No competition.
Relatedness	In-game experiences of connection and commonality. Sharing experiences in a way that creates connection/bonding. Familiarity, not just with a style of gameplay, but also with others on a personal level. Presumes some level of socialising and may extend to a sense of inclusion in a community. Friendliness, which may extend to assisting others or being assisted. However if assistance is offered/given in a team- code as 'teamwork'.
Relaxation/Recuperation	Any reference of gameplay in terms of relaxing, unwinding, switching off, stress relief, chilling out, 'me time', peace or sense that the gameplay provides a way of decompressing. May be mentioned in tandem with escapism, but is a reference to a mental state that gameplay provides. If both mentioned, code both.

Teamwork	Playing the game in which one's efforts are seen as contributing to and/or supported by a team. Interdependence, cooperation and complicity in order to achieve goals. Reliance on others and shared responsibility. Any reference to winning as a team rather than as an individual.
	DISLIKES
Impact on life	Takes time from/distracts from non-game demands, negative self-judgement for playing games, lack of external reward for time put into gameplay, is sedentary/not physical, injury, costs money.
Lack of autonomy	No freedom to play game as they wish (see: Autonomy)
Lack of relatedness	Feelings of alienation from others, disconnection or loneliness. If mentioned in tandem with 'other's toxicity/deviance' code both (see: Relatedness).
Lack of Teamwork	Breakdown of teamwork due to personality clashes, ego assertion (e.g. someone playing for themselves, not the team), lack of trust between members, etc. If teamwork fail is due to deviant/toxic behaviour (this might be a fine line), code as both.
Less fun	References to context being less enjoyable/fun than other contexts of play. Also refers to complaints of play being boring or repetitive.
Logistical issues	Problems managing the elements of gameplay in order to facilitate gameplay, e.g. no internet, lag, equipment issues, difficulty coordinating schedules, communication issues (e.g. speak different languages). Convenience.
Losing/Failure	Gameplay provides feelings of incompetence! Losing, failure, defeat. 'Losing as a team' would be coded here, but if specific mention is made of 'lack of teamwork' being the reason for losing, then code both.
Mismatch of skill/play style	Mismatch of skill/play style/pacing between players. Could also refer to a mismatch of skill to demand between a player and the game. Only code as mismatch if no more specific mention is made - then coding may be 'performance pressure', 'less fun'.
No dislike	Self-explanatory. Include empty cells if the participant answered the corresponding 'Likes' question.
Toxicity	Abuse, harassment, team-killing, cheating, and unsporting behaviour of others.
Performance pressure	Anxiety producing gameplay due to a mismatch between skill and demand (demand is too high). Demand may be delivered by game or other teammates. Related to 'Mismatch of skill/play style' but refers to the mental state produced by it (e.g. code both if mention is made of both).

Appendix I: Study 3 Coding Examples

Table I.1 Coding examples from survey open-ended responses

Age	Gender	Solitary play/ Relationship type	Likes	Codes
22	male	play with strangers	able to connect with people and learn things about different places and cultures. I've cultivated several close friendships with people I've met playing games online.	meet people, relatedness
42	male	solitary play	Relaxing. Play when I want. Stop when I want. Do what I want.	autonomy, logistics, relaxation
24	male	play with known others	its a shared experience where everyone can share their talents for a common goal	teamwork
29	male	play with known others	Banter, trash talk, the challenge of winning against someone I know.	challenge/ competence, relatedness
23	male	play with known others	Good way to bond, have some fun, easier to organize than board games or outdoors stuff	logistics, relatedness, fun
31	male	solitary play	I can play at my own pace and am not beholden to someone else's availability (or my own)	autonomy, logistics
37	male	solitary play	Single player games typically have a more engaging story.	immersion
30	male	play with strangers	Interacting with new people.	meet people
15	male	play with strangers	You eventually recognize them and develop a small relationship	meet people
33	male	play with strangers	I focus mainly on tasks and collecting in-game rewards.	challenge/ competence
28	male	play with known others	cooperation and achievement	challenge/ competence, teamwork
21	female	play with known others	It gives a sense of connectivity in a fantasy world, You can do whatever you like, unlike real-life situations.	autonomy
49	male	solitary play	I like the relaxation that it offers.	relaxation
27	female	play with known others	I love sharing a hobby with my partner	relatedness
Age	**Gender**	**Solitary play/ Relationship type**	**Dislikes**	**Codes**
22	male	play with strangers	I am completely turned off by the MOBA genre, because the playerbase is so acerbic and critical--anyone new to the game is immediately screamed out of the session because they aren't	no relatedness, toxicity

			intimately familiar with the mechanics. I find this to typically be specific to the MOBA genre, but it can be generalized to other types of games to a certain extent; people dislike incompetency, and often won't cut slack for new players who are learning how the game works. I have also felt isolated and alienated from others, and even myself, because of the sheer number of people that play MMOs.	
42	male	solitary play	Game bugs.	logistical issues
24	male	play with known others	when i don't do well	losing
29	male	play with known others	Losing!! Losing face after being previously considered one of the better players in the group.	losing
23	male	play with known others	Have to take turns sitting out if too many people	logistical issues
31	male	solitary play	Sometimes I would like to share the experience I am having with someone else.	no relatedness
37	male	solitary play	Can feel somewhat isolated at times. However, some single player games make good use of community data, such as the Walking Dead or Wolf Among Us games, which display data about the overall player base.	no relatedness
30	male	play with strangers	I should be doing something better with my life.	impact on life
15	male	play with strangers	Some people may be annoying, or don't know how to play the game	mismatch of skill/playstyle
33	male	play with strangers	Online trolls who gain satisfaction from ruining the in-game experiences of other players.	toxicity
28	male	play with known others	finding time to play with people	logistical issues
21	female	play with known others	Communicational errors, playing with two players is sometimes difficult as you are concerntrating on your own character, whilst simultaneously trying communicating to your partner.	logistical issues
49	male	solitary play	Nothing, I'm happy in my achievements without having to crow about them to others.	no dislike
27	female	play with known others	Hard to find the time due	logistical issues

Age	**Gender**	**Interaction type**	**Likes**	**Codes**

24	male	cooperative play	achieving a common goal	teamwork
29	male	competitive play	Using mumble to voice chat while playing, its sociable. Also, when we meet for a group LAN, the face to face socialising.	relatedness
23	male	competitive play	There's a winner. Bragging rights.	challenge/ competence
15	male	mixed play	You get a feeling of satisfaction when both doing things for the team as well as achieving your own goals	challenge/ competence, teamwork
20	male	mixed play	The feeling of beating someone else is the best feeling you can have in a game	challenge/ competence
21	female	cooperative play	Cooperating with my team mate, progressing only because we worked together, otherwise we wouldn't have gotten further. Co-op multiplayer gives a boost of confidence when you are both playing, sense of partnership.	teamwork
27	female	cooperative play	We can help each other out	teamwork
30	male	competitive play	DOTA2 is competitive against the other team, but cooperative with your team. It's a great balance.	challenge/competence , teamwork
33	male	cooperative play	Different dynamics from a purely competitive game. The feeling of satisfaction when a the team reads each other's movements/actions and a plan comes together and works without needing to plan or chat.	teamwork
21	male	competitive play	Its allot of fun working together to achieve one main goal but then its also really fun killing your friends in a game.	teamwork, challenge/competence

Age	**Gender**	**Interaction type**	**Dislikes**	**Codes**
24	male	cooperative play	bad teammates or griefers	mismatch of skill/playstyle, toxicity
29	male	competitive play	Losing! Hahaha	losing
23	male	competitive play	There's a winner, and it's not always me!	losing
15	male	mixed play	Some people in your team may be bad, or intentionally helping the other team	mismatch of skill/playstyle, toxicity
20	male	mixed play	You can be limited by the ability of your own team. It doesn't matter how good you are, if the people with you are bad, then you are severely disadvantaged	mismatch of skill/playstyle
21	female	cooperative play	Sometimes communication gets	logistics, no teamwork

			flushed, its hard playing with two players as both want to do different things, and end up with 2 players at different ends of the screen.	
27	female	cooperative play	When my skills are well below my partners	mismatch of skill/playstyle
30	male	competitive play	Sometimes it can be frustrating if people on the other team are being abusive.	toxicity
33	male	cooperative play	Players who are not interested in the goals but are either not contributing or doing non-construtive things.	mismatch of skill/playstyle
21	male	competitive play	Nothing really.	no dislike

Table I.2 Coding examples from interview responses

Age	Gender		What do you like about…?	Codes
12	female	solitary play	I like it because then I'm kind of alone- I like reading too - and then I'm just alone and then people know that I don't really want to be with other people and then if I don't have anything to do then it's nice to just go and sit down by myself	relaxation
39	male	playing with known others	I just like the social aspect of it really and that it's fun, and you get to kind of riff with your friends and play. It's just the way that adults play, and the education systems seems to do away with that concept offered by a grade 7, and it's a way that we can reclaim it, and those of us, children of '74, we started playing in the late '70s and early '80s. We pretty much never stopped. Yeah. I don't know why.	fun, relatedness
22	male	cooperative play	I do love well-orchestrated teams, that's so fun when just everyone is working together really well.	teamwork
22	male	playing with strangers	Sometimes you'll get a good group of people and you'll communicate well and you'll play really well and you'll have a fun game even if you lose you'll still really enjoy it	fun, relatedness
43	male	competitive play	I think I like how there are really definite markers of how your skill level's improving which is like sport. You cannot beat someone for ages and finally beat them, which is how I used to play chess. I like when practice pays off.	challenge/ competence
Age	**Gender**	**What do you dislike about…?**		**Codes**
25	female	competitive play	There was one time I went to an internet cafe. They had a LAN setup where they were playing first-person-shooter, I think it was Call of Duty or something. It was really hyper competitive and I have never played the game before and it was so hard to shoot somebody and the retribution was swift and it was really intense. That might be fun, but I want to chill out when I play. I don't want it to be like so combative that I freak out. I don't want to be like,	mismatch of skill/playstyle, performance pressure

			'Okay, I got to train myself against other players'.	
24	female	solitary play	It is a bit lonely, to the point that you wish there was people you could talk to. After spending close on a thousand hours in Skyrim, no joke, it's probably about that much now, the world isn't dynamic. Everyone will say the same thing.	no relatedness
22	male	playing with known others	..but its also a lot more harder to organize and get a lot more people for. Yeah, with people I know, because they need to associate with after the end of the one game we are playing. It's typically a lot harder for me to, it's a lot more stressful, because if in a game with three of your mates and the one person on your team that isn't one of your mates, is playing really poorly, it's really easy to give that guy a hard time. And then play the next game with your mates and not worry about it. But when you're playing and your mates are the guys screwing up you can't give them a hard time, because they are the people that you are going to have a drink with the next week or you're playing a game with them later that night. So it's sort of stressful in that you can't sort of chastise them for making stupid mistakes as you would a stranger. Like even if, with my friends especially, they are a bunch of sooks, myself included. And so if you chastise them for doing something dumb, they will take it as super offensive instead of taking it as constructively.	no teamwork, logistical issues
36	male	cooperative play	Dislikes about cooperative play; some games don't seem to value it or if they do include it they include it in a way that's clearly a second thought after the fact that they have gone, 'oh we might as well attach that on' which means it doesn't work very well.	logistical issues
22	male	playing with strangers	Then there are other games where you get, for lack of a better word, dickheads. And they do nothing but bitch and moan. Then they play really poorly because they are in a crappy mood. Then meanwhile they are not playing with the rest of the team. Just a single person can ruin an entire game. And that happens in every online game. There's people bitching and moaning.	no teamwork, toxicity

Appendix J: Study 4 Items

Please enter your participant ID.

1. What is your age?
2. What is your gender?
3. How do you rate your general level of experience with playing videogames? (1 'No experience' to 7 'Very experienced')
4. During the time that you've played videogames, **on average**, how many **hours** have you played each **week**? Please **round up** to the nearest hour
5. How do you rate your experience with playing **first-person shooters**? (as above)
6. During the time that you've played **first-person-shooters, on average**, how many **hours** have you played each **week**? Please **round up** to the nearest hour
7. How would you rate your experience with playing **Left 4 Dead (any version)**? (as above)
8. How many **hours** have you played **Left 4 Dead (any version)** in **total?** Please **round up** to the nearest hour, or **enter '0' if you haven't played it at all**
9. Not counting the researcher/s, **do you know anyone** else in the room? If you know multiple people in the room, please answer this question and the following questions in regards to the person you have the **closest relationship** with. (yes/no)
10. **How** do you know him/her? (socially, from work, from study, family member, partner, other)
11. Have you played first-person shooters with him/her before? (yes/no)

You will now play the game Left 4 Dead for approximately **10 minutes.** The play session will automatically close when 10 minutes has elapsed. Please **refrain from speaking** while playing the game.

Please wait for further instructions and **do not click anything**, until instructed to by the researcher.

<Game session 1>

Please enter your participant ID.

Please rate the extent to which you are experiencing each particular emotion RIGHT NOW.

- Enthusiastic
- Determined
- Inspired
- Alert
- Excited

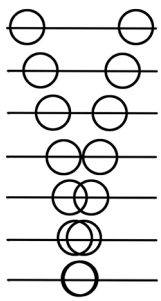
(PANAS positive affect scale: measured on a 5-point scale from 'Very slightly or not at all' to 'Very much' - (Mackinnon, et al., 1999))

Please indicate your level of agreement with the following statements.

- My teammate was helpful
- I helped my teammate
- I cared about the fate of my teammate
- My teammate was supportive
- I supported my teammate

(Cooperation: measured on a 7-point scale from 1 'Do not agree' to 7 'Strongly agree')

Which of the following best represents your level of connection with your teammate? (Schubert & Otten, 2002)



For each of the following statements, please indicate how true it is for you, using the following scale:

- This game was fun to play
- I enjoyed playing this game very much
- I would describe this game as very interesting
- This game did not hold my attention at all
- I thought this game was quite enjoyable
- I thought this was a boring game
- While I was playing this game, I was thinking about how much I enjoyed it

(Intrinsic Motivation Inventory – measured on a 7-point scale from 'Not at all true' to 7 'Very true', (McAuley, et al., 1989))

Please indicate how much you agree with the following statements:

- I found this level very difficult
- I found this level challenging
- I had to put a lot of effort into the game

(Challenge – measured on a 7-point scale from 'Do not agree' to 7 'strongly agree'

Player Experience of Need Satisfaction Scale - using the autonomy, competence, and presence sub-scales

Please wait for further instructions. Do not click anything until instructed to by the researcher.

<**Game session 2>**

The questions after game session 1 were repeated.

The game with the agent had these additional questions:

Please rate your agreement with the following statements:

- It felt like I was playing with a person
- I thought the computer-generated teammate behaved like a human would
- It felt like I was playing with a computer-generated character
- The behaviour of the computer-generated teammate was clearly artificial

At the conclusion of the experiment all participants were asked:

"When you were playing with the bot (computer-generated character), did you believe you were playing with a bot or a human?"

- I believed I was playing with a bot (computer-generated character).
- I believed I was playing with a human.

Appendix K: Study 4 Estimates

Table K.1 Estimates

Measure	Within-subjects factor	Between-subjects factor	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Connection	Avatar	Familiar	4.565	.314	3.928	5.202
		Stranger	4.188	.377	3.424	4.951
	Agent	Familiar	3.348	.309	2.722	3.974
		Stranger	3	.37	2.25	3.75
Cooperation	Avatar	Familiar	5.357	.249	4.852	5.861
		Stranger	5.25	.299	4.645	5.855
	Agent	Familiar	4.504	.278	3.941	5.068
		Stranger	4.05	.333	3.375	4.725
Enjoyment	Avatar	Familiar	5.65	.203	5.239	6.062
		Stranger	5.467	.243	4.974	5.961
	Agent	Familiar	5.553	.247	5.053	6.053
		Stranger	4.796	.296	4.197	5.396
Positive Affect	Avatar	Familiar	18.174	.745	16.664	19.683
		Stranger	19.25	.893	17.44	21.06
	Agent	Familiar	17.913	.875	16.14	19.686
		Stranger	16	.049	13.874	18.126
Challenge	Avatar	Familiar	3.449	.294	2.853	4.046
		Stranger	3.167	.353	2.452	3.882
	Agent	Familiar	3.275	.28	2.708	3.843
		Stranger	3.083	.336	2.403	3.763
Competence	Avatar	Familiar	4.913	.235	4.436	5.39
		Stranger	5.167	.282	4.595	5.739
	Agent	Familiar	5.145	.268	4.601	5.689
		Stranger	4.958	.322	4.307	5.61
Autonomy	Avatar	Familiar	4.203	.272	3.652	4.754
		Stranger	4.312	.326	3.652	4.973
	Agent	Familiar	4.246	.298	3.642	4.851
		Stranger	4.292	.358	3.567	5.017
Presence	Avatar	Familiar	3.643	.261	3.114	4.171
		Stranger	3.667	.313	3.033	4.3
	Agent	Familiar	3.391	.257	2.871	3.912
		Stranger	3.41	.308	2.786	4.034