Socio-Emotional Impacts of Playing Massively Multiplayer Online Role-Playing Games (MMORPGs) on Older Adults

by

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Abstract

The proportion of people aged 60 and over is growing faster than any other age group. Due to shift from career or family focus, loss of long-term companions and increasing likelihood of chronic and debilitating illness, older adults face some key social and psychological challenges such as loneliness, depression and lack of social support. Gerontology researchers have demonstrated that social interaction is an important component of successful aging. Massively Multiplayer Online Role-Playing Games (MMORPGs) can offer older adults many opportunities to maintain current and develop meaningful and supportive relationships. Drawing on the challenges facing older adults and prior theoretical and empirical studies, this research explored the social and emotional impacts of playing MMORPGs on older adults aged 55 and over, primarily analyzing the relationships between older adults' social interactions in MMORPGs and six social and emotional factors (i.e., bridging and bonding social capital, loneliness, depression, social support and belongingness). To address this question, four research hypotheses were generated.

An online survey was developed and published to eight World of Warcraft (WoW, a popular MMORPG) player forums to gather information about older gamers' demographic characteristics, play patterns, social interactions in WoW, measurements of six social-emotional dimensions, and challenges facing older adults while playing WoW. Data were collected over a three and half months period (from May 15th to September 1st, 2014) from a sample including 222 WoW players aged 55 and older. To answer the research questions and test the four hypotheses, hierarchical multiple regression analysis was applied, and Cohen's f^2 was computed to compare effect sizes. Similar to their younger counterparts, older adults' social interactions in MMORPGs can take place on several different levels, and can be casual or intimate, and even romantic. Social interaction in MMORPGs is an important source for older adults' social learning. The regression analyses revealed that enjoyment of relationships and quality of guild play has deep impacts on older adults' social and emotional wellbeing.

Keywords: Massively Multiplayer Online Role-Playing Games; Socio-Emotional Impacts; Older Adults; Motivation

Dedication

I would like to dedicate this paper to my mother, father, and my husband. I also would like to dedicate it to Dr. David Kaufman, Dr. Kevin O'Neill and Dr. Shawn Bullock. Thank you for all of your support.

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MMORPGs	Massively Multiplayer Online Role-Playing Games
WoW	World of Warcraft

Chapter 1. Introduction

The researcher begins by defining some core concepts (i.e., older adults, key social and emotional problems among older adults, social engagement, social capital, MMORPGs and situated learning) and looking more closely at the theories and mechanisms that are thought to underpin the social and emotional impacts of playing MMORPGs on older adults. These in turn suggest research questions that will be discussed in the following chapters.

1.1. Definition of Older Adults

The boundary between middle age and old age cannot be defined exactly because it does not have the same meaning in all societies. From the perspective of life cycle, people may be considered old when they become grandparents. Historically, most countries have accepted the chronological age of 65 years as a definition of “elderly” or older people. Legally, in the United States, full retirement age for Social Security benefits for people retiring in 2013 is 65 (NASI, 2013). In Canada, the normal age for retirement is 65. In Canadian Census Documents, the aging population is commonly considered as the category of “65 and over” (Statistics Canada, 2011). However, in UK National Statistics, aging in the UK Dataset covers people aged 50 and over (UK National Statistics, 2014). In the terminology of the European Union, “older workers” are identified as those aged 50 years. In the social welfare code, the Department of social protection in Ireland introduced 55 as the age cut-off point between unemployment benefits and “pre-retirement”, and 60 is the age at which many occupational pensions are available (Walsh & Harvey, 2011). In this research, “55” is set as the lower age limit for several reasons, which will be discussed in Chapter 3. The term “older adults” is used as “older people” because it is commonly used in the social sciences (APA, 2010).

1.2. Key Social-Emotional Problems among Older Adults

Loneliness. It is the principal challenge that older adults face (Walsh & Harvey, 2011), although others say cognitive decline. The move away from the extended family toward a more nuclear family (as children have left home), the loss of a partner, decline of health status, difficulties with mild cognitive impairment, retirement from workforce are implicated in the loss of social contacts, which in turn are expected to increase the risk of loneliness (Heylen, 2010). Loneliness, a lack of social support, and having a deficit of reliable or frequent contacts with friends or relatives are closely inter-related (Gray, 2009). Research has shown many negative health effects of loneliness and social-isolation, including poor mental and physical health, memory deficits, sleep, disturbances and so on (Masi, Chen, Hawkley, & Cacioppo, 2011).

Depression. Although depression is not a normal part of aging, it is a very serious problem in later life (CDC, 2012). It affects more than 6.5 million of the 35 million Americans aged 65 and older, of which most are women (NAMI, 2013). The rise of depression in later life mostly reflects life-cycle gains and losses in marriage, employment, and economic well-being, such as retirement, death of a loved one, side effect of some medications, social isolation (Mirowsky & Ross, 1992). In this research, depression refers to mild or non-clinical depression, which is normal reaction to painful life events or physical, mental and emotional stress, not clinical depression, which is a problem with the brain, a neurobiological disease with debilitating physical, emotional and mental symptoms.

Lack of social support. It is one of the social conditions that have a significant influence on psychological well-being and physical health, with the cost particularly high among retired and elder population (Tomaka, Thompson, & Palacios, 2006). It is indeed higher among people with individual frailty, and increases with age (Melchiorre et al., 2013). Support from others can be important in reducing stress and protecting from psychological problems such as depression and anxiety (NCPC, 2011).

1.3. Social Engagement and Successful Aging

Gerontology researchers have demonstrated that cognitive and social factors are key elements to enhance older adults' quality of life. Social engagement (also referred to social interaction, social involvement, social connectedness, or social participation) is one's degree of participation in social activities (Bassuk, Glass, & Berkman, 1999). Social engagement has profound impacts on physical health and psychological well-being. People who have close friends and confidants, friendly neighbours, and supportive coworkers are less likely to experience sadness, loneliness, low self-esteem, and problems with eating and sleeping, whereas people who are socially disconnected are between two and five times more likely to die from all causes (Putnam, 2000). As one gets older, the social circle they developed through a lifetime will change and sometimes diminish (Eure, 2014). People who continue to maintain close friendships and find other ways to interact socially have reduced risk of mental health issues such as depression and live longer than those who become isolated (Singh & Misra, 2009).

It is well established that social engagement is seen as an important component of successful aging (Ristau, 2011). It provides opportunities for older adults to deal with stress, receive social support and connect with friends. Eisenberger, Taylor, Gable, Hilmert and Lieberman's (2007) study yielded supportive evidence that individuals with regular social interaction during 10 days showed diminished neuroendocrine stress responses and distress of social separation. Based on an analysis of responses to an open-ended question about meaningful experiences associated with being involved in the Red Hat Society (a women's leisure-based social group), Hutchinson and colleagues (2008) found that participating in the organization's activities is a significant factor that helps older adults cope with chronic and acute stressors (e.g., a spouse's death, health challenges and care-giving), challenging life transitions (e.g., residential transitions, divorce and retirement) and daily hassles (e.g., children leaving home) by providing them a context for social support, self-regulation of stress and negative emotions, coping with stressors day-to-day, and re-appraising lives.

1.4. Social Capital and Older adults

1.4.1. Social Capital Overview

Social capital has become a key concept in analyzing personal interactions and relationships in social science research since the early 1990s (Woolcock & Narayan, 2000, cited in Huvila, Holmberg, EK, & Widen-Wuff, 2010). It was popularized by some sociologists (Coleman, 1988) and Putnam's (2000) work *Bowling Alone: The Collapse and Revival of American Community* (Lee & Lee, 2010; Trepte, Reinecke, & Juechems, 2012). Different from financial capital (emphasizing goods and money) and human capital (individual knowledge and skills), social capital focuses on personal relationships and positive outcomes and resources that come with them (Williams, 2006a).

There are many definitions of social capital. The most accessible one used in social science is defined by Putnam as the "features of social life such as networks, norms, and social trust that facilitate coordination and co-operation for mutual benefit" (Putnam, 1995, p.67). There are two forms of social capital: bridging and bonding. In Putnam's (2000) words:

> Bridging social capital refers to social networks that bring together people of different sorts, and bonding social capital brings together people of a similar sort. This is an important distinction because the externalities of groups that are bridging are likely to be positive, while networks that are bonding(limited within particular social niches) are at greater risk of producing externalities that are negative.

Bridging social capital refers to weak social ties in which individuals with different backgrounds make connections between social networks. As a result, bridging may broaden social horizons or world views, or open up opportunities for information or new resources, and are not restricted to one's social identity such as age, ethnicity and profession (Trepte et al., 2012). It functions to get together of disparate members of the community and is marked by tentative relationships. Conversely, bonding social capital is marked by close-knit networks among people sharing similar backgrounds and beliefs and having stronger personal connections. It provides continued reciprocity among individuals who exchange strong emotional and substantive support. What bridging social capital lacks is depth, while what bonding social capital lacks is breadth.

Steinkuehler and Williams (2006) indicated that there is an implicit bias toward bonding social capital over bridging social capital. Actually, they are two different types of social capital and overemphasizing one over another is harmful. Without bridging social capital, individuals will be sheltered from newness and alternative viewpoints and opportunities; without bonding social capital, individuals are widely connected but unsupported (Steinkuehler & Williams, 2006).

In Putman's (2000) opinion, social capital is a mutual resource in society rather than individual property. While Putman claimed that social capital as a collective good is created through active participation of citizens in organizations and groups, others (Bourdieu, 1986; Coleman, 1988) maintained that social capital is inherent in an individual's social networks and comprises social resources accessible through membership in those social networks. Thus, social capital can be conceptualized as an individual resource residing in relationships between individuals or as a collective resource produced through interactions in larger social structures or societies (such as civic engagement). The discrepancy between the two facets of social capital – the individual and the collective – has resulted in the persistent conceptual confusion (Rostila, 2011). However, no matter whether social capital resides in the individual or collective level and no matter whether it should be seen as private good or public good, the bottom line is that it has benefits for individuals.

For the purpose of this research, social capital is seen as social resources, which are available to individuals and groups through their social connections to the communities and can be used to obtain information and assistance of various kinds. It is applied to those features of a community which promote cohesion and a sense of belonging, and which enable its members to cooperate for mutual benefit (Cooper, Arber, Fee, & Ginn, 1999). Social capital is different from social interaction, as social interaction focuses on the ways that people respond to the others, but social capital focuses on "the relationships within and between them (networks) and the norms which govern these relationships" (Schuller, n.d., p.5). A striking difference between social support and social capital is that the former refers to the social resources that derive from social interaction at the individual level, and the latter reflects the social resources available at the community level but has benefits for individuals.

1.4.2. Social Capital and Internet Use

The Internet has changed the way in which people communicate with others. The development of social web and virtual worlds has transformed traditional communities into online communities which are not formed around neighbourhoods, but around social networks comprising family, friends, and people with similar interest (Wellman & Gulia, 1999). Online communities (e.g., virtual learning communities and social networking sites) provide seamless forms of informal socializing, and thus suggest new ways of conceptualizing the relationship between “place” and communities (Shen, 2014). As a result of this, a great amount of attention has been paid to the relationship between the production of social capital and online community usage. Zhong (2011) made a distinction between online social capital and offline social capital: online social capital is created through computer-mediated communication, whereas offline social capital is based on face-to-face communication. According to him, online bridging social capital is marked by online weak social ties, whereas online bonding social capital inheres in online strong ties formed by individuals who meet and keep close contact on the Internet.

There are debates about whether online communities foster and nurture social capital. Computer-mediated communication accelerates the ways in which people connect with others, particularly for those who are homogeneous with respect to interests and values. Anonymity and the absence of social clues inhibit social control, which makes online activities less hierarchical, but more participatory. Nevertheless, some researchers indicated that face-to-face communication provides a depth and speed of feedback that is impossible in computer-mediated communication. Lee and Lee (2010) indicated that the underlying assumption on both sides is that all Internet activities (e.g., visiting chat rooms and playing in 3D virtual worlds) are relatively equivalent. However, individuals have a position in these social structures, which can either benefit or harm them. Therefore, it would be more empirically rigorous to investigate how and the extent to which individuals’ social capital is impacted by specific forms of Internet activity (Lee & Lee, 2010).

1.4.3. Social Capital and Successful Aging

Social connection to one's social network can result in positive affective bonds, which in turn yields positive outcomes such as emotional support or the ability to mobilize others (Williams, 2006b). Cannuscio, Block and Kawachi (2003) described two ways in which social capital is relevant to successful aging. On the one hand, older adults are much dependent on social capital within their communities due to the decrease of their social ties as they age. On the other hand, the levels of social capital within U.S. communities appear to decline as the population continues to age.

Examining the nature and the impact of social capital on health has become popular in recent years. Several empirical studies have found that social capital is associated with health outcomes such as mental health (Scheffler, Brown, & Rice, 2007), obesity and diabetes (Holtgrave & Crosby, 2006), and cancer (Beaudoin & Tao, 2007). Rostila (2011) argued that social resources can reduce both physical and psychological health problems by serving as a physiological triggering mechanism, strengthening people's immune system to fight disease and buffer stress.

Recent studies have suggested that social capital plays an important role in later life (Forsman, 2012; Forsman, Nyqvist & Wahlbeck, 2011). Muckenhuber, Stronegger and Freidl's study (2012) showed that social capital affects the health of older adults more strongly than younger individuals. Forsman (2012) examined the associations between psychological health and social capital among older adults. Based on both quantitative and qualitative data, the findings consolidated the effectiveness and subjective importance of social activities for the maintenance of mental health and well-being among older adults. The social activities are important health resources for older adults due to "the accompanied sense of belonging to a social group, as well as feelings of purpose with regard to everyday life and hope for the future" (p.4).

1.5. MMORPGs and Older Adults

1.5.1. Definition of MMORPGs

Older adults use many leisure activities offered by Information and Communications Technologies (ICTs), one of which is digital games (e.g. video, computer, and online games). Although it is impossible to create an absolute definition of what a game is, for the purpose of this study, the researcher defines game in the context of entertainment in order to look in more detail at the types of activities that are included. Game is a competitive and fun activity in which participants follow prescribed rules and use strategies and skills to reach challenging goals and finally win. The common elements of games include rules, goals, outcomes and feedback, competition or challenge, interaction, representation or story (Prensky, 2001), and of course, fun.

A digital game is an electronic game that involves human interaction with a user interface to generate visual feedback on an electronic device, either online or offline. The electronic devices used to play digital games include desktop computers, laptops, game consoles, handheld devices, mobile phones and so on. Based on the game-play challenges, digital game genres consist of action, adventure, role-playing, stimulation and strategy. Each type of game requires different skills. For example, action games demand quick respond speed and spatial abilities; role-playing games rely on social and interpersonal skills; strategy games require problem solving and planning abilities.

In general, some of the social and psychological problems faced by older adults such as loneliness, depression and lack of social support, could be improved by increasing their social interactions. One genre of game that provides many opportunities for social interactions is Massively Multiplayer Online Role-Playing Games (MMORPGs). Massively refers to the fact that millions of players play online games; multiplayer identifies the fact that a very large number of players play simultaneously in the same online world, interacting with each other; Online indicates that the players need to be connected to the Internet while they play; Role-Playing, in general, refers to players who play the role of a unique character and interact with other players by using an “avatar”, which is a humanoid graphical representation of the player in the game world.

Non-digital games (such as table-top board games, card games, and games that are outside and involve physical activity) allow face-to-face social interactions, providing the thrills of competition and co-operation and adding meaning and enjoyment to game playing. However, non-digital games require all players to be at the same physical place. Sometimes, it is hard to schedule the time to sit with a group of people. In many games, players play against each other competitively. This requires players to master good playing skills and the outcomes (either win or lose) may have negative real-life consequences.

However, MMORPGs allow a group of players to play together no matter where they are physically located. Players can collaborate to solve quests that cannot be completed by one player alone. It is advantageous to older adults who can't find people to play with in real life, as there is better chance to find someone online. For older adults who have physical limitations (e.g., due to physical impairment, distance or bad weather), they can still enjoy fun with friends by playing the game at home. For older adults who don't have good playing skills, the levelling up mechanism allows them to gradually master skills without pressure. If they fail a quest, they can replay it again. This enhances older adults' confidence and encourages them to experiment with different playing strategies without real-life consequence.

1.5.2. History of MMORPGs

MMORPG is a genre of role-playing video games where large numbers of users can interact with each other within an online environment through battles, commerce, or recreational activities (Son et al., 2012). The origin and influence on MMORPGs stems from paper-and-pencil Dungeons and Dragons, text-based Multi-User Dungeons (MUDs) and earlier computer role-playing games (Steinkuehler & Williams, 2006). Dungeons and Dragons is a fantasy, role-playing game first released in 1974 (Bebergal, 2014). Its publication is widely regarded as the beginning of modern role-playing games and the role-playing game industry. MUDs, as the first online RPG, were developed by Roy Trubshaw and Rchard Bartle between 1978 and 1980 at Essex University in the UK (Bartle, 1999).

As the graphical and processing capabilities of personal computer increased, and as accessibility to the Internet became widely available, the 90's saw a rapid rise in the number and advancement of graphical online RPGs (Role-Playing Games). The term MMORPG was coined in 1997 by Richard Garriott, the Creator of Ultima Online (Indvik, 2012). Ultima Online is a graphical MMORPG with 3D isometric/third-person graphics. EverQuest released by Sony in 1999, brought MMORPGs into the Western mainstream. It created a massive 3D world with contemporary graphics, and supported a massive community accommodating 10,000 and 15,000 people per server. It was the most commercially successful MMORPG in the United States for five years. The most recent generation of MMORPGs, based on arbitrary standards of graphics, game-play, and popularity, is said to have launched in 2004 with Sony Online Entertainment's EverQuest II and Blizzard Entertainment's World of Warcraft. Given the growing demographics of MMORPGs, there has been a growing body of research involving this genre of game.

1.5.3. Details of MMORPGs

MMORPGs vary in terms of content and challenges and are set in a variety of worlds from medieval fantasy to post-apocalyptic landscapes and science fiction universes (Barnett & Coulson, 2010). To enter a game world, players first create a character from a set of classes and races as digital representations of themselves. When creating their character, users play the role of a character living in the game's fantasy world. Each character has a specific set of skills and abilities that define that character's role. For example, in World of Warcraft mages are powerful spell casters who use magic to inflict damage on their enemies from afar but are very vulnerable to attacks. These traits define the role of the mage: hang back, do a ton of damage, and hope to kill the monsters before they reach the player. Players also have the option of sex and adding various adornments to enhance their characters appearance as they progress in the game, such as hair color, clothing, armor, etc. Due to these characteristics, MMORPGs are anonymous environments in which players have many opportunities to experiment with different online identities. Different from other genres of games, MMORPGs do not have storylines. Players may invest hundreds of hours advancing their character and interacting in the virtual environment, and thus players often feel an emotional proximity to their character.

In MMORPGs, players begin the game as low-level member. During game-play, the development of the player's character is the primary goal (Dickey, 2007). Nearly all MMORPGs featured a character progression system in which players earn "experience points" for their actions and use those points to reach progressively higher "levels". Over the course of a character's life, the character will brave thousands of quests while exploring the game environment, learn new and powerful abilities, and find hundreds of powerful weapons and more. In other words, the character progresses and gets stronger as the player gain experience, new skills, and more powerful items and equipment. The progression in the game by regularly rewarding the player has been related to Skinner's behaviour principles of reward for commitment (Barnett & Coulson, 2010). MMORPGs do not have an ending or finishing time. Even after achieving the highest level, players may still remain in the game world to complete more challenges or participate in the social communities that they have been part of.

1.5.4. Who is playing MMORPGs?

Griffiths, Davies and Chappell (2004) found that over 60% of EverQuest players were older than 19, about 5% aged between 40 and 60, and 2% aged 60 and older. Yee (2006b) investigated the demographics, motivations and derived experiences among MMORPG players over a three year period from 2000 to 2003. The mean age of the respondents was 26.57, with a range from 11 to 68. The findings demonstrated that MMOPRG users were not primarily adolescents. In fact, it includes college students, early adult professionals, middle-aged homemakers, as well as retirees. Although the majority of players are male, a notable increase in female gamers appears to be occurring. Griffiths et al. (2004) reported that approximately 85% online players were male. In 2007, Cole and Griffiths (2007) found that male accounted for 71% of online gamers.

What is somewhat surprising is the growth of older players. Williams, Yee and Caplan (2008) reported that 12.4% of EverQuest II players were in their forties, and 4.8% were fifty and older. Among all players, mean hours played per week increases steadily with age, with individuals aged 18-22 playing 24.84 hours per week, those aged 49-52 playing 28.13 and those aged 53 and over playing 30.59 hours per week. Yee (2008) found that MMORPG players, on average, spent 22 hours each week in an

MMORPG; players over the age of forty played just as much as players under the age of twenty, and female players played for the same amount of time as men do. Although inconsistency about the amount of play exists due to the sampling difference, older players did spend a huge amount of time playing MMORPGs.

1.5.5. MMORPG: a Character-Mediated Social Community

Social networking sites have become a revolutionary tool that millions of people around the world utilize to connect with other individuals, disseminate and share information. Many of these online social community members share common interests in hobbies, religion, politics and alternative lifestyles. MMORPGs are one of these social networking sites in which social interaction might occur. However, different from other social networking sites, MMORPGs are character-mediated social communities that collect and mix people pursuing goals in a 3-D virtual space. For older adults, MMORPG is a safe and non-threatening environment in which they can explore and experiment with different aspects of themselves. MMORPG is also a narrative environment, embedded with thousands of short narrative tales in which a non-player character requests the aid or assistance a player's character. Older adults can choose what, how and who they play with. So, they are mostly in control of what happens to them.

Another difference between MMORPG and other social networking sites (such as Facebook, Twitter and YouTube) is that MMORPGs have functional constructs (e.g., unique attributes of each character and challenging quests that can't be addressed by a single player) that encourage players to group with others and complete a same quest for mutual benefits. These functional constructs facilitate some social groups, known as guilds. A guild is an organized group of players that regularly play together, and formed to make collective actions easier and more rewarding, as well as to form a social atmosphere. A MMORPG community is as dynamic and complex as the real world. A typical group requires players to fulfill a number of roles, which are summarized as kill, irritate, and preserve (Barnett & Coulson, 2010). The role of killer is to deal out damage to computer generated opponents and focus on damage output. The job of irritators is to attract and keep the attention of opponents while the kill players deal out the damage. Finally, preservers keep the rest of the group alive. A good group needs an appropriate balance of all three roles and successful team cooperation and coordination in order to

stand a realistic chance of success. Players form contacts and develop relationships of trust and accountability based on their characters' attributions, actions, and the network of affiliations (Dickey, 2007).When a new group is formed, a chat channel is automatically created that only group members can use. This allows players to request help, strategize on group quests and socialize. Additionally, they can also interact with other through person-to-person instant messaging, Voice over IP (an Internet-based auditory chatting system) and site forums.

Based on Blumer's theory, Chen and Duh (2007) define social interaction in MMORPGs as "a dynamic process of meaning-making occurring within a historical context and examinable through the analysis of game language and game joint actions of players" (p.22). Social interaction is a primary driving force for players to continue to play MMORPGs, and contributes a considerable part to the enjoyment of playing (Yee, 2006a). In a MMORPPG, some dedicated groups (such as guilds) have formal recruitments procedures. Each guild has its own rules, and membership in a guild is monitored and regulated. A player who creates a good impression and performs a role well will have good reputation and become a well-respected and experienced member in the game community. Those who do not adhere to the guild's rules and show disregard for other members do not contribute toward the guild's overall well-being and thus are often removed from the guild's community. So, building positive social skills (e.g. behaving in a friendly and helpful way to other players) is a necessity if a player wishes to either participate in communities or successfully complete the harder challenges of the game (Barnett & Coulson, 2010). This is described as "increasing their social capital within the game's society" (Ducheneaut & Moore, 2004, p.2, cited by Barnett & Coulson, 2010). A social group with high level of social capital is more likely to be cohesive and to have well-developed networks of communication and mutual support. Brack et al. (2013) indicate that MMORPG playing can promote social capital.

1.5.6. Guild dynamics

Williams et al. (2006) used a representative sample of World of Warcraft (WoW) players to map out the social dynamics of guilds, the meanings they make, the networks they form and the social capital they derive. They created a typology to categorize guilds by goals, size, and membership. The basic types by goals are social, player-vs.-player

(PvP), raid and role-play. A purely social guild would be one in which the game's goals are social interactions. Many forms of this type of guild are created by people who already know each other in real life. A PvP guild's primary goals are their status and ranking on public boards. They are grouped to fight with other factions. A raid is the most complex team-based task within MMORPGs and requires a certain amount of individual discipline and teamwork. To perform well, each player must act in the best interests of the group, requiring a high degree of familiarity and practice. The purpose of role-playing guilds is to allow members to pretend to be their characters. This works on a meta-level, which means that whether their goal is to PvP, socialize or raid, players are expected to be "in character". Usually, these four types overlap in any one guild, with most considering themselves a hybrid of at least two.

In addition, Williams et al. (2006) created equivalent cut-points of guilds labelled as small (less than 10 members), medium (11-35 members), large (36-150 members), and huge (more than 150 members). Generally, smaller guilds are more focused on social bonds, whereas larger guilds focused more on game goals. However, this is not a hard rule. As guild size increases, guilds are also more likely to engage in more formal management and organizational practices, and thus it becomes impractical for members to know well or care about each member. Specific, small guilds represent the strongest bonding social capital found within WoW. Indeed, most small guilds represent strong real-world bonds that have extended into WoW rather than formed there. Medium sized guilds show the progression from the small, tightly knit groups to the large, sometimes less personal ones. In this range, members still place an emphasis on social bonds and families. But with more members, there is a higher chance of a conflict in styles or ethics. Huge guilds are less sociability, and need more formal organization.

Players join or create guilds for their pragmatic or social needs. The most common reason to join a particular guild is to use their membership as a resource to meet their game goals, such as having access to the game's most challenging content and most rewarding "loot", high-end content (e.g., equipment, weapons, and exciting monsters). Some players want to play with others who share similar personality, real-life demographics, or even sense of humour. Some players see their guild mates as nice, friendly and useful. In some cases, game friends are seen as important as real-life friends. However, there are players who see their guild mates as valueless.

To summarize, playing MMORPG has its own rules, literal boundaries and social norms. The type, size and membership of a guild definitely affect the meanings guild members make, the network they form and the social capital they derive. Steinkuehler and Williams (2006) indicated that bridging social capital is more likely to occur in guilds than in temporary "pick up" groups that band together for short-term goals. Although bonding social capital is much rarer, there are some cases in which deeper and more substantive relationships are formed in long-term guilds.

1.6. A Popular MMORPG: World of Warcraft

At present, World of Warcraft (WoW) is the most played game in North America, and the most subscribed to MMORPG worldwide, with a total of over 10 million customers (Activision Blizzard, 2012). WoW uses a subscription-based business model, which involves paying a monthly fee to play the game. Before beginning game-play, a player must first select a server. There are four types of server that cater to various playing styles (see Figure 1.1): (1) Normal (Player versus Enemies) is a server in which players can only interact with NPCs (Non-Player Characters) controlled by the computer and role-play is optional; (2) PvP (Player versus Player) is a server in which players may attack other players in the enemy side and role-play is optional; (3) Normal-RP (Player versus Enemies - Role Playing) is a server in which role-play is mandatory; (4) PvP-RP (Player versus Player – Role Playing) is the final type of server that combines the PvP server type with the RP rules. Players are only allowed to interact with other players in the same server as them.

Figure1.1. Choose a Realm (2014)

The first step in character creation is selecting a faction. There are two opposing factions (each of which has six races) in WoW (1) the **Alliance**, which is made up of Worgen, Draenei, Dwarf, Gnome, Human and Night Elf.; and (2) the **Horde**, which consists of the Goblin, Blood Elf, Orc, Tauren, Troll and Undead. A character's race determines his visual appearance and also his faction (Alliance or Horde). Faction is important because only characters of the same faction can talk and cooperate with each other. So, faction and race are mostly social choices. Once a character race has been selected, the player must then choose a character class. There are three groups of classes in WoW: (1) the **physical fighting classes**, consisting of Hunter, Rogue and Warrior; (2) the **caster classes**, including Mage, Priest and Warlock; and (3) the **combination classes**, including the Death Knight, Druid, Paladin and Shaman. Each class has different strengths and methods of play, and therefore offers a vastly different game-play experience. For example, the caster classes are proficient in magic use. Class is mostly a game-play choice.

Upon the completion of character creation and customization (see Figure 1.2), players can begin questing in Azeroth, a medieval fantasy 3-D environment. Characters start at level one. Characters level up by gaining experience points. Essentially, the core

game-play of WoW revolves around fighting monsters and completing quests. Every quest is unique and involves different level of challenge. Group quests are more challenging than normal quests and can only be conquered by groups of players working together as a team, but also offer better rewards. For raid quests, players will have to brave the challenges in the game's most perilous places. These quests require a large group (10 or 25 players) to complete. Raids are where players will earn WoW's greatest treasures. If players defeat the most powerful beings in WoW, they can wear these treasures proudly to let others know that they have proved their worth.

Figure1.2. Character Creation Interface (2014)

At its core, what makes WoW such a fun game is that players share this world with thousands of other players at the same time. There are three types of interactive groups in WoW:

(1) **Groups.** Groups are limited to five players, but players can also form a raid group, which can include up to 40 people.

(2) **Guilds.** Groups and raids are temporary and cease to exist once all members leave or log off. Guilds, on the other hand, are more permanent and much larger groups of players united to help each other and play the game together. To show support for their guild and differentiate themselves from others, guilds allow their members to wear a tabard (a shirt with a color and icon selected by the guild

officers) and display the guild name underneath their name for the world to see (see Figure1.3). As guild members grow in number and play together, their guild earns experience points that eventually translate into special perks and other bonuses for their guild as a whole. The more guild members play with each other, the more experience they earn for their guild.

Figure1.3 Guild Tabard and Name (2014)

(3) **Friends.** As players chat, form groups and raids, join guilds, and play together with others, they will meet other players who are genuinely good company and with whom they'd like to play more often. They can add those players to their Friends List, which allows them to keep track of their favourite players, see when they're online, where they are in WoW and when they are logged in.

WoW includes a sophisticated chat system that allows players to talk to other players (see Figure1.4). They can set up private channels if they want to talk to friends only, or they can chat in the local/global chat channels if they want to reach a larger audience, and if they are in a guild they have access to their guild's own chat channel (see Figure1.5). Instead of typing words to chat with others, players can also use WoW's

built-in voice chat system - Voice over IP (VoIP), an Internet-based auditory chatting system (see Figure1.). This is commonly used by guilds.

Figure1.4. Chat Channels (2014)

Figure1.5. Guild Chat (2014)

1.7. Situated Learning in MMORPGs

Situated learning focuses on the social and cultural origin of cognition, which is situated and distributed in the environment (Brown, Collins, & Duguid, 1989). In situated

cognition, learners carry on activity in the world, adapted to the constraints and affordances of the environment (Bereiter, 1997). Situated learning is primarily a social-cultural process. It is a matter of connection one builds with communities--connection that is at first as a legitimately peripheral participant (newcomer) but that gradually as a full participant (old timer) (Lave & Wenger, 1991). Learning, thus, is a way of being in the social-cultural world rather than a way of coming to know about it. Greeno (1998) states that engaged participation including contributions to group functions, developing personal identities and affiliations in communities of practice is part of what students learn. The analysis of full social and cultural context, then, becomes the focus because participation in this context is fundamental in what students learn.

Brown et al. (1989) emphasize that learners need to be exposed to the use of a domain's knowledge in authentic task. They propose a cognitive apprenticeship mode for situated instruction. The traditional assumption of cognitive apprenticeship is that students are able to develop their conceptual understanding through social interaction and collaboration in the culture by observing a master and "stealing" knowledge. This is not to suggest that learning needs to occur in this way, but to claim that learning environments should enable learners' to engage in their communities of practice in order to understand how knowledge is used in authentic context (Greeno, 1998).

Scholars have claimed that video games are good for learning (Shaffer, Squire, Halverson, & Gee, in press; Gee, 2003, 2005a, 2005b). There has been a lot of study on the use and effects of games for teaching a specific curriculum such as languages (Kongmee, Strachan, Pickard, & Montgomery, 2011; Peterson, 2011). Gibson (1979) used the word "affordance" to describe a feature of the world that allows for a certain action to be taken, but only if it is matched by the abilities of an actor who has the wherewithal to carry out such an action. Gee (2005a) pointed that playing WoW is all about such affordances. Different characters in WoW have specific attributes, and thus play the game in different ways. Players must consider the features of the game that can enable the actions they want to take in order to achieve their goals. Gee also claimed that in MMORPGs such as WoW players create new ways to build and share knowledge, and form new forms of learning communities. In WoW, each group member not only needs to be good at their special skills and master how to integrate these skills with the group as a whole (intensive knowledge), but also share common knowledge

about the game and game-play with other group members (extensive knowledge) in order to achieve a successful integration.

Playing MMORPGs is a process of socialization into a community of players and through this situated learning occurs (Ducheneaut & Moore, 2005). Learning how to play a specific role is a central element in fitting into the community, and it can only be learnt through participation and interaction with other players. By observing players' in-game activities Ducheneaut and Moore categorized four types of context in the MMORPGs where situated learning occurs:

- In-game, in-context discussions. Communicating with other players via different chat channels allows for a tight feedback loop between the events happening in the game and the comments of group members. In other words, MMORGs allow information to be exchanged "on demand and just in time, not out of the contexts of actual use" (Gee, 2003).
- Out-game, out-of-context discussions. The discussions in game forums and websites are important occasions for knowledge transfer.
- Observation. Players can learn a great deal of game-play simply by watching what other players do (Prensky, 2001). Observing other players' activities allows the players to engage in legitimate peripheral participation (newcomer).
- In situ-teaching. Learning to do the in-game practices requires practice and teaching from more experienced players.

Ducheneaut and Moore (2005) also identified three types of social interaction that are most important for becoming a competent member of the game community (old timer):

- Self-organization among players. Players can observe and learn how to behave as good community members through activities such as group creation, group maintenance, and group disbanding.
- Instrumental coordination: Players work together as a team to accomplish both the game and the group's objectives.
- Sociability: Downtime socialization such as humor, small talk, players "catching up" with each other is important to social cohesion.

1.8. Research Questions

Previous study on MMORPGs has mainly targeted school students, analysing how the core structure (such as character design and narrative environment) and

important types of social interactions within MMORPGs (such as players' self-regulation and instrumental coordination) can inform the design of an interactive learning environment and promote social learning (Dickey, 2007; Ducheneaut & Moore, 2004). Others have explored whether playing MMORPGs improves students' cognitive performance (Campello de Souza, Lima e Silva, & Roazzi, 2010) and social skills (Wang & Chen, 2012). It's a false assumption that after a certain age we can't learn new skills and try new activities. Older adults are just as capable as younger people of learning new things and adapting to new ideas and changes (Crawford, 2004; Saisan, Smith, Segal, & White, 2014). With the increased percentage of older population and their usage of MMORPGs, it is worthwhile to explore whether playing MMORPGs is one of the effective ways to overcome the challenges they face.

Social capital has become a key concept in analyzing personal interactions and relationships in online communities. Whether the Internet strengthens or weakens individuals' social capital is still under debate because its effect is dependent on the nature of specific online activities and the quality of social interactions. In the context of MMORPGs, the question is whether social interactions within MMORPGs increase social capital. As Zhong (2011) wrote:

> Compared with other online social services such as instant messengers, Facebook and Twitter, MMORPGs are distinctive because they enable dense social interactions, collaboration and interdependent relationships among gamers, which may facilitate the establishment of online social networks and nurture the norms of reciprocity and general trust in the virtual world (p.2353).

Since the last decade, there has been increasing research interested in the social capital in online games. One set of previous research studies classified different social interactions in MMORPGs into bridging or bonding based on the similarities in descriptive characteristics found between the definition of social capital and the social interactions in MMORPGs (Steinkuehler & Williams, 2006; Williams et al., 2006). The other set of studies examined whether social interactions in MMORPGs are positively or negatively related to online or offline bridging and bonding social capital and civic engagement (Trepte et al., 2012; Williams, 2006b; Zhong, 2011). The consistent finding is that social interactions in MMORPGs are positively related to online bridging social

capital. However, there are controversial results regarding how well MMORPG playing is related to online bonding social capital, and to what extent online bridging and bonding social capital is extended to offline bridging and bonding social capital. It is argued that the inconsistencies result from the inappropriate definition and measure of social activities in MMORPGs as predictors of social capital (Trepte et al., 2012; Zhong, 2011). Most of previous researches conceptualized online gaming as the frequency, duration or intensity of game playing, ignoring different patterns of game playing and the quality of social experience in MMORPGs.

Older adults have become a part of MMORPGs customers. The question is how older adults' social interactions in MMORPGs relate to their bridging social capital, which is the loose connection between relative strangers that lead to diverse networks and viewpoints, or bonding social capital, which provides emotional and substantive support. Gerontology researchers have demonstrated that social factors are keys that may sometimes outweigh physical conditions in determining life satisfaction. Can social interactions in MMORPGs also improve the social and psychological challenges (i.e., loneliness, depression, and lack of social support) facing older adults? The purpose of this research is to investigate potential benefits and challenges of playing MMORPGs on older adults. It tries to understand the exact mechanisms of whether and how playing MMORPGs affect older adults' socio-emotional life. The following are the research questions:

1. What are the demographic characteristics of older adults who play MMORPGs?
2. What are the motivations that drive older adults to continue to play MMORPGs?
3. What are older adults' social experiences within MMORPGs (e.g., playing MMORPGs with real-life friends and family, making friends with other players, contacting game friends in real-life situation)?
4. Which challenges do older adults face while playing MMORPGs?
5. Are older adults' social interactions within MMORPGs associated with some socio-emotional factors in terms of bridging and bonding social capital, depression, loneliness, social support and belongingness?

This research has value for researchers, game designers and communities. For researchers, this study contributes to the knowledge of older adults' social experience in

MMORPGs and how it influences their social-emotional life and social learning. The findings of this study may also form a solid foundation for conducting future randomized controlled trials to measure and evaluate the positive effects of MMORPGs playing on older adults. For game developers, findings may clarify how certain game mechanics may attract or alienate certain kinds of players. This will benefit the design and development of digital games specifically targeted at older adults. For communities, findings may clarify whether certain kinds of older players are more susceptible to problematic usage. This will help them organize more appropriate game activities for older adults by reducing the potential negative consequences to the minimum.

1.9. Organization of the Thesis

This chapter provided an overview and introduction to the thesis. Chapter 2 will review literature on the motivation for playing MMORPGs, social effects of playing MMORPGs, social and emotional meanings of playing digital games on older adults, social capital in MMORPGs, previous studies testing the social and emotional effects of MMORPGs, and problematic usage of MMORPGs. Then, the researcher will conceptualize social interactions in MMORPGs and the two types of social capital (i.e., bridging and bonding) in MMORPGs, and describe the similarities and differences among loneliness, depression, social support and belongingness. Based on these conceptualizations, four research hypotheses will be proposed. Chapter 3 will explicate the methods and instruments used in the study. Chapter 4 will present the findings, organized according to the research questions. Finally, Chapter 5 will discuss the findings, draw conclusions, suggest some directions for future research and outline the limitations of this research.

Chapter 2. Literature Review

In this chapter, the researcher, first, will describe the types of motivation for playing MMORPGs, social effects of playing MMORPGs (to understand players' social interactions in MMORPGs), social and emotional meanings of playing digital games on older adults, social capital in MMORPGs, previous studies testing the social and emotional effects of playing MMORPGs and problematic MMORPG usage. The purpose is to summarize the findings of previous studies and identify what problems exist and need to be improved. Based on the literature review, the research will conceptualize social interactions in MMORPGs, and six social and emotional dimensions (i.e., bridging and bonding social capital, loneliness, depression, social support and belongingness). Finally, four research hypotheses will be presented.

2.1. Motivations for Playing MMORPGs

2.1.1. Yee's Three Motivational Components for Playing MMORPGs

Different people bring different motivations and expectations to the game-play experience (Yee, Ducheneaut, & Nelson, 2012). These motivations go a long way in describing not only why people play MMORPGs, but also what the underlying reasons are. In the past decade, many player motivation taxonomies in online games have been proposed, but most of these were not developed using statistical methods and do not provide a means for quantitative assessment. For this reason, based on a factor analytic examination and restructuring of Bartle's four types of player motivation, Yee (2006a) derived three main motivational components, each of which has several subcomponents (see Table 2.1). The Achievement motivation includes advancement, analyzing game mechanics and competition. The Sociality motivation includes helping and chatting with other players, developing meaningful relationship and team work. The Immersion

motivation includes discovery, role-playing, avatar customization and escapism. This conceptual framework provides a solid foundation for future quantitative research in online games by providing a tool to assess player motivations, and thus also a means to understand usage patterns, in-game behaviours, and demographic variables in relation to player motivations.

Table 2.1. Yee's Three Motivational Components for Playing MMORPGs

Motivations		Definition
Achievement	Advancement	The desire to gain power, progress rapidly, and accumulate in-game symbols of wealth or status.
	Mechanics	Having an interest in analyzing the underlying rules and system in order to optimize character performance.
	Competition	The desire to challenge and compete with others.
Sociality	Socializing	Having an interest in helping and chatting with other players.
	Relationship	The desire to form long-term meaningful relationships with others
	Teamwork	Deriving satisfaction from being part of a group effort.
Immersion	Discovery	Finding and knowing things that most other players don't know about.
	Role-playing	Creating a persona with a back-ground story and interacting with other players to create an improvised story.
	Customization	Having an interest in customizing the appearance of their character.
	Escapism	Using the online environment to avoid thinking about real life problems.

Yee's work provided a first significant step toward the building of an empirically based framework for studying motivations to play online games. Billieux et al. (2013) investigated in details the relationships between self-reported motives and actual in-game behaviours of 690 WoW players. By contrasting different models through the use of confirmatory factor analysis techniques, this study is the first attempt to test Yee's model about motivations to play online games. The findings supported that the

motivation framework developed by Yee (2006a) is a valid instrument to investigate motivations to play online games.

2.1.2. Some Expectations about Motivations

Measuring motivations for playing MMORPGs provides a means to better differentiate older gamers beyond demographic characteristics alone. In addition, understanding older gamers' motivations provides the foundation to explore whether different subgroups (such as, female vs. male) are motivated differently, and whether certain motivations are more highly correlated with game preferences or behaviours.

Yee (2002) indicated that the motivational factors encourage both time investment and personal attachment, but they are not equally attractive to all players. Individuals who are competitive, aggressive and rational are more likely to be interested in the achievement and reward cycle of the game, while those who are imaginative and open-minded are more likely to be interested in the immersive quality of MMORPGs. In another study, Yee (2006a) explored how the three main motivational components relate to gender and age. It was found that age was negatively correlated with the *achievement* component. In addition, male players scored significantly higher on all the *achievement* components than female players, while females are more likely to be interested in the *relationship* aspect of the games. Research has shown that the favourite aspect of MMORPGs is their social features (Griffiths et al., 2004). Since social connection plays an important role in later life, it is predicted that older adults are attracted to MMORPGs mainly due to the social interactional aspect of the game.

Yee (2006a) indicated that understanding the motivations behind playing MMORPGs provides us with good predictors of game usage. He conducted a multiple regression analysis using age, gender, motivations and personality traits as independent variables, and revealed that the motivation to socialize and find group affiliation were the best predictors of hours of play per week. So, it is expected that *relationship* players may be more likely to devote an increasingly larger amount of time to play MMORPG compared to other play motivations. As have been discussed that playing MMORPGs is a highly social activity, it is logical to expect that *relationship* players might feel that their

feelings of loneliness, depression and social-support are enhanced through interaction with family, real-life and in-game friends.

2.2. Social Effects of Playing MMORPGs

Since MMORPGs are virtual communities where players interact with each other through their characters, a challenge facing proponents of MMORPGs as a social intervention is whether MMORPGs are socially meaningful in a positive way. In the last decade, there are increasing studies on player behaviours in MMORPGs. It seems that MMORPGs are places populated with a range of social experiences with varying depth, ranging from superficial in-game relationships to sustained and deep relationships extended to real life.

2.2.1. Playing MMORPG increases the frequency of social interactions

The social communities of MMORPGs attract millions of players to the virtual 3D worlds. There are many opportunities to meet and communicate with other players during game-play. Psychological research suggests that people choose to join groups in order to get a sense of belonging, share information, achieve goals, and receive rewards; belonging to a group has a positive effect on well-being in comparison with isolation, which has opposite effects (Baumeister & Leary, 1995, cited by Barnett and Coulson, 2010). Schiano, Nardi, Debeauvais, Ducheneaut, and Yee (2011) found that the majority of WoW players play the game with someone. In Griffiths et al.'s (2004) study, of the 3495 players who responded to the question of grouping with other people, 24% played with game friends they had met while playing the game; 16% played with guild mates; and 14% played with real life friends and family. Whippey (2011) reported that 82% of participants who were involved in guild life often had conversations with their guild mates; 66% often spend time playing with their guild, followed by 26% who played with their guild sometimes. It was found in Williams et al.'s (2006) study that 60% of guild members used Voice IP systems. This shows that guild life is a major part of the social interactions that take place within the game based on the high frequency of contacts between guild mates.

2.2.2. Playing MMORPGs maintains existing relationships with family and real-life friends

Cole and Griffiths (2007) reported that 26.3% of participants played MMORPGs with family and real-life friends. Female gamers were significantly more likely than male gamers to play with both family members and real-life friends. In addition, approximately 81% of participants enjoyed playing the same game with family and real-life friends. In Williams et al.'s (2006) study, roughly 60% of interviewees belonged to a social guild in which the primary goal is social interaction. The social interactions in many of these social guilds, particularly the smaller ones, were extensions of real-world social interactions. In several cases, the real-world collections of friends or families played together as a guild of their own or as a family unit. What's more, Williams et al. indicated that members and leaders in nearly every social guild that lasted more than a month were "aware of the need for a certain level of maturity, responsibility, and player welfare" (p.345). In this situation, social guilds go well past the game's goals in creating and maintaining communities, but, more importantly, fulfill the sense and need of caring. Also, it was found that maintaining existing ties was especially important for geographically dispersed friends and relatives (Williams et al., 2006). Playing a same MMORPG together is a way to socialize and keep in touch with old friends, which gives more to talk about and shared experiences. These sets of data suggest that playing MMORPG appear to enhance real-life relationships, not replace them.

2.2.3. Playing MMORPGs facilitates real-life social activity

People from different ethnic, socioeconomic, and cultural backgrounds come into a virtual world with a common interest: the game. This common interest even makes some players believe that they have more common with their online friends than offline. For those without previous real-life ties, "participation in group activities such as questing and trading and chatting casually with text and voice fosters constant, albeit casual, socialization without requiring previous real-life acquaintance" (Williams, et al., 2006, p.352). Players generally dislike playing with those whom they are not familiar in order to avoid conflicts between players with different expectations for friendliness, sharing, leadership, or roles. This basic familiarity and shared ethic or bond significantly contributes to the satisfaction of players with their guild leader and guild mates. This

creates the sense of belonging and a social entity reflecting some of the guild's prestige on the players individually and collectively. Williams et al. found that the majority of players liked their guild mates and saw them as helpful and friendly.

In Cole and Griffiths's (2007) study, approximately 76.2% of male players and 74.75 of female players had made good friends within the game, and the mean number of "good friends" was seven. In addition, 67% of participants believed that they developed positive relationships with whom they played in the game. What's more, 42.8% of participants had physically met with game friends in real-life situations. Female players were significantly more likely than male players to have met up with game friends in real life. Consistent with Cole and Griffiths's findings, Schiano et al. (2011) found 41%-71% of WoW players met some game friends who eventually became a real-life friend. The fact that game friends finally become real-life friends suggests that MMORPGs may promote social ties that bridge real and virtual life.

2.2.4. Playing MMORPGs improves social support by having someone to talk with

Cole and Griffiths (2007) found that 39.3% of participants discussed sensitive issues with their game friends that they would not discuss with their real-life friends. Females were significantly more likely than males to discuss family problems, loss of loved ones, discrimination, and work problems, suggesting that online relationships provide an outlet to safely discuss serious matters that may be difficult to talk about with family and real-life friends. Similar results were found in other studies. For example, Yee (2006c) reported that 22.9% of male players and 32.0% of female players had told personal issues or secrets to their game friends which they have never told their real-life friends. In Williams et al.'s (2006) study, 70% of the interviewees chatted regularly with their guild mates about topics ranging from game strategy to real-life personal issues. Again, these sets of data show that playing MMORPGs is a social activity. Cole and Griffiths (2007) indicated that one possible reason for this high frequency of interaction is due to the anonymity of online friendships through character-mediated social interactions. Players feel more themselves online because they are not judged by their appearance, gender and age.

2.2.5. Playing MMORPGs engenders meaningful relationships with game friends

Empirical data have indicated that a broad range of players form meaningful social relationships within MMORPGs. In Cole and Griffiths's (2007) study, 45.6% of participants believed their game friends to be comparable to their real-life friends; 36.7% reported game and real-life friends to be equally trustworthy; 4.8% believed their game friends were more trustworthy than their real-life friends. Yee (2006c) reported that 39.4% of male players and 53.3% of female players felt that their MMORPG friends were comparable or better than their real-life friends. In Whippey's (2011) study, 54% of participants felt that their game friends were comparable to their real-life friends. These results show that a significant proportion of players rely in part on their game friends in order to fulfill their need for social interactions.

2.3. Social and Emotional Meanings of Playing Digital Games on Older Adults

Schutter and Abeele (2010) conducted a qualitative study to investigate the meanings of digital games in older adults' lives. They found a list of social meanings of playing digital games in view of connectedness, cultivation and contribution (see Table 2.2). This list of social values shows that older adults do obtain social and emotional support from game-play. In addition, the meanings of digital games with regard to the psycho-social context of older adults are divergent. Game-play is a means for structuring a conversation with sons or with real-life friends. It even facilitates meeting new people, although the majority of older adults prefer quality over quantity. They are more likely to play with someone they know well than meet complete strangers. For some older adults, game-play provides a means to cope with loneliness. Nevertheless, playing digital games was considered as a time-balancing activity. Online play was perceived as a lousy alternative for real-life play or communication. Some older adults even expressed that digital games were something not approved by their peers. Schutter and Abeele indicated that table 2.2 provides a valuable lens to envision the meanings of digital games in the lives of older adults. However, Schutter and Abeele's study didn't specifically focus on MMORPGs. Further empirical study that examines the social and

emotional meanings of MMORPGs among older adults is necessary to prove Schutter and Abeele's model.

Table 2.2. The Social and Emotional Meaning of Digital Games in View of Connectedness, Cultivation and Contribution (Schutter & Abeele, 2010)

	Connectedness	Cultivation	Contribution
Competition with my partner and children.	√	√	
Overcoming challenges with my (grand) children.	√	√	√
While my partner does an activity I do not like.	√	√	
Learn from my children.	√	√	
A way to help and teach my grandchildren.	√		√
Stay in touch with my children.	√		
After work activity with my colleagues.	√		
Part of a passion for traditional games.		√	
A luxury, freedom or a sign of autonomy.		√	
A gateway to different cultures and languages.	√	√	
A way to meet new people.	√	√	
A way to stay in touch with younger people.	√	√	√
Coping with loneliness.	√		
Only fun with the sight playing partners.	√	√	

2.4. Social Capital in MMORPGs

The findings above suggest that playing MMORPGs may often serve to enhance, not diminish real-life social interactions. It has been found that players use the game to extend real-life relationships, meet new people and form relationships of varying strength. For players who know each other beforehand, playing MMORPGs is an important way to maintain and reinforce their relationships, especially for those geographically dispersed; for most others, it is an entrée to build new relationships. The social community of MMORPGs operates much like a real world in which players can turn to for emotional support, considering how much sociability occurs over and above

basic game-play, and how many game friends discussing personal issues and meeting each other in face-to-face situations.

The huge amount of social interactions occurring in MMORPGs leads to the research interest of the nature and extent of social capital generated in MMORPGs. Huvila et al. (2010) indicated that social capital in MMORPGs is created in the process in which players form different social networks to reach their goals (either individual or collective). By mapping out the metrics of guild attributes (e.g., size, server and faction), William et al. (2006) concluded that "a large number of players (i.e., a third to a half) used their guilds as more casual third places that generated bridging social capital but rarely bonding" (p.353). Combining conclusions from media effects research and ethnographic research informed by a socio-cultural perspective on cognition and learning, Steinkuehler and Williams (2006) indicated that playing MMORPGs are suited to the formation of bridging social capital, while bonding social capital is much rarer and in most cases formed within long-term guilds lasting at least several months.

A few empirical studies have explored the relationship between online gaming and social capital. Consistent with the theoretical researches, playing MMORPGs has been shown to lead to bridging social capital. However, there are mixed results in terms of bonding social capital. For example, Zhong (2011) examined the impact of collective MMOPRG play on Chinese gamers' social capital at both individual and collective levels and in both the virtual and the real world. Collective MMORPG play is conceptualized as the frequency of joint guild actions and gamers' assessment of the experience in guilds and groups. Individual-level bridging and bonding social capital in both the virtual world and the real world was measured by Williams' (2006b) Internet Social Capital Scales (ISCSs). Civic engagement was measured by online and offline organization memberships. This study found that frequent in-game social interactions and enjoyable social experience in MMORPGs positively influence gamers' online bridging and bonding social capital, but gaming times was found to negatively influence bridging and bonding social capital. Williams (2006a) conducted an experiment to test the social impact of Asheron's Call 2 (a MMORPG). Social capital was also measured by Williams' (2006b) ISCSs and tested bon both bridging and bonding dimensions and for both online and offline contexts. It was found that bridging social capital was positively affected in all contexts, but boding social capital was negatively affected both online and offline. One

possible problem that results in the different findings on online bonding social capital is the different measures of social interactions in MMORPGs. In Zhong's study, social interactions were measured by the frequency of joint guild actions and gamers' assessment of their experiences in guilds and group (i.e., guild organization, leadership and guild mates). However, in Williams's study, social interactions were measured by the frequency with which participants played alone or with others in strategic fellowship groups.

2.5. Studies Testing the Social-Emotional Impacts of Playing MMORPGs

Many studies have focused on testing the social-emotional impacts of playing MMORPGs. Visser, Antheunis and Schouten (2013) examined the effects of playing WoW on adolescents' loneliness. It was found that there was no difference in the level of loneliness between WoW players and non-WoW players, and there was also no significant effect of time spent playing WoW on loneliness. However, there was an effect of playing WoW on loneliness, mediated by a variety of communication partners in WoW. Kirby, Jones and Copello (2014) explored the association between WoW play and psychological wellbeing through a cross sectional, online questionnaire designed to test the relationship between average hours playing per week and psychological wellbeing. A negative correlation between playing time and psychological wellbeing was revealed. These two studies correlated self-reported measures of playing time with measures of psychological wellbeing, but found conflicting results.

Studies have revealed positive impacts of playing MMORPGs on players' psychological wellbeing. Dupuis and Ramsey (2011) tested a mediated model in which they examined whether higher social involvement in MMOPRGs would be associated with lower levels of depression via engendering a perception of social support. Game involvement was measured by a 13-item scale developed by the researchers. Sample items are "If I had a personal problem that was really bothering me, I would rather tell my online friends than friends I have in real life", and "I have more good friends online than I do in real life." It was found that involvement in MMORPGs was not related to perceived social support, but a lack of perceived social support is associated with higher levels of

depression. Trepte et al.'s (2012) study found that online game players' physical and social proximity as well as their mutual familiarity influenced bridging and bonding social capital, and the two types of social capital were positively associated with offline social support. They further concluded that online gaming may result in strong social ties if gamers engage in online activities that continue beyond the game and extend these with offline activities. Domahidi, Festl and Quandt's (2014) study found that there was a significant impact of social online gaming frequency (measured by general gaming frequency and the average duration of a typical social online gaming session) on the probability of meeting exclusively online friends, and players with a pronounced motive to gain social capital and to play in a team had the highest probability to transform their social relations from online to offline context. These studies went beyond the simple measure of playing time, and analyzed both the online and offline effects of the various social phenomenon formed by MMORPGs playing, using different analysis methods such as linear/logistic regression analysis and mediation analysis. Social interactions in MMORPGs were conceptualized differently as well.

MMORPGs foster informal sociability and cultivate virtual communities. Examining the social and emotional effects of MMORPG use has become a topic of systematic research. One of the main problems in previous studies is the gross measure of playing time as game use or exposure. Another problem is the different conceptualization of social interactions in MMORPGs. Finally, given the fact that each player is able to create unique experiences within the same MMORPGs, it is essential to consider the effects of motivation for playing MMORPGs and activity types (Shen & Williams, 2011).

2.6. Problematic MMORPGs usage

The huge market of online games and the large amount of weekly game-play raises the question whether the design and content of certain games are responsible for the detachment, depression, and even addition experienced by some players. Recent research has demonstrated that online gaming is one of the main reasons for problematic Internet use such as game addition. There is also a growing concern for online gamers especially children and adolescents who spend an excessive amount of

time playing online games and consequently give up important real life activities (Liu & Peng, 2008). MMORPGs are classified as the most addictive by Online Gamers Anonymous, a US website (Bowcott, 2009). The symptoms include failing to quit the game and becoming angry or irritated when unable to play.

Although there are a variety of mechanisms in MMORPGs (e.g., reinforcing repetitive actions through rewards and group/guild obligations) that may encourage obsessive usage, any explanation of problematic usage has to take into account the players themselves because not all gamers are addicted to MMORPGs. Yee (2002) identified two sides of problematic MMORPG usage: one is external personality or situations that push a player; the other is in-game objects or activities with the matching profile that pull a player in. Based on survey data, Yee indicated that these two categories of factors are intertwined. For players who feel undervalued in real life, an MMORPG provides an environment where they feel useful and needed because the character they play in a game has special abilities and fill a viral role in a group.

Due to various pejorative, disputed, and clinically laden connotations (i.e., physical addiction vs. non-physical addiction) of the word “addiction”, some game researchers prefer to use problematic usage over the word “addiction” (Seay, 2006; Caplan, Williams, & Yee, 2009). Problematic MMORPG usage is about how game-play negatively impacts players’ real-life obligations and responsibilities. Liu and Peng (2008) identified three types of problematic MMORPGs usage: (1) physical problems (i.e., fatigue, physical pain, and reducing sleep time.); (2) personal life problems (i.e., conflicts with friends or family and low social engagement; and (3) professional/academic problems (i.e., missing work, deteriorated performance).

Cole and Griffiths’s (2007) study found that one in five MMORPGs players believed that playing MMORPGs had a negative effect on their relationships with people with whom they did not play. So, the possible negative effects of the games must not be ignored. Although examining whether older adults are addicted to MMORPGs is not the purpose of this study, identifying potential problematic MMORPGs usage will definitely raise MMORPGs researchers’ attention and propose effective strategies to reduce the potential negative consequences to the minimum.

2.7. Hypotheses

2.7.1. Conceptualization of Social Interactions in MMORPGs

Among all of the possible MMORPG activities, this research is interested in players' social interactions, which would be critical in determining whether playing MMORPGs is an effective way to increase older adults' informal sociability and foster social capital. Before drawing any conclusions about the impacts of MMORPGs as a whole, it should be determined which underlying variables are involved in older adults' social interactions in MMORPGs (Williams et al., 2006). As discussed above, many previous studies used amount of game playing as the gross measure of social interactions in MMORPGs. Frequent participation in game playing increases the chance of social interactions. However, the amount of game play doesn't depict the whole picture of social interactions in MMORPGs. Actually, a large amount of players have chatted with others in MMORPGs, but they played the game solo. Ducheneaut et al.'s (2006b) study found that many players do not group in the early stages of their characters' development, and usually the rate of grouping increases at level range of 51-59 (the maximum level was 60 at that time). So, only considering the amount of game play may oversimplify older adults' social interactions in MMORPGs.

At present, there are few shared theories and common practices of describing the human social experiences in virtual worlds as research about virtual worlds is still at its infant stage (Williams, 2010). To support research progress in virtual worlds, Williams developed a research framework to map behaviours in virtual worlds. As shown in Table 2.3, this framework consists of four factors. The first factor (group size) refers to the unit of analysis of a study that describes what level of the hierarchy the researcher is examining (In this research, it is at the individual level). The second factor consists of users' demographics, personality, motivation of participating in a virtual world, communication medium used to interact with others and network level, which are the control and independent variables within the traditional computer-mediated communication research. The third factor (contextual and social architectural factors) refers to the code, rules and social architectures of virtual worlds. The last factor refers to the direction of mapping: mapping the real to the virtual, vice versa and some cycle

between the two. This framework can serve as a roadmap for discovering which behaviours map and which do not. The result will inform researchers what situations, contexts, levels of analysis and types of human interactions can successfully be tested within virtual worlds, and which cannot. Although this framework is developed for understanding the extent to which human behaviours occur in the virtual world as the same way in real world, it can be used as "an organizational template for any theory-based program of research on virtual worlds" (p.457).

Table 2.3. A Research Agenda for Virtual Mapping and Other Tests

Group Size	Traditional Controls and Independent Variables	Contextual and Social Architectural Factors	Directionality
Individuals	Psychological profile	World size	Online to offline
Dyads	Motivations	Persistence	Offline to online
Small groups	Demographics	Competitive versus collaborative	Endogenous
Large groups	Communications medium	Role play	
Communities	Network-level variables	Sandbox versus linear	
Societies		Representation	
		Interaction affordances	
		Costs of a behavior	
		Costs of a behavior	
		Local culture	

Adapting the second factor (traditional controls and independent variables) in Williams' framework and combining them with findings in previous researches, this study conceptualizes social interactions in MMORPGs as follows (see Table 2.4):

(1) Communication methods

Communication is the most important aspect of players' interactions in MMORPGs (Shen & Williams, 2011). MMORPGs players communicate with each other through a wide variety of tools ranging from in-game general chat, group chat, private chat, voice chat to out-game social media (e.g., email, phone and forum) and face-to-face meeting. The frequency of using these communication tools is an indicator of the

intensity of interactions. For most players, the purpose of participating in constant conversation through myriad chat channels is not only to overcome the challenges but to develop and maintain relationships of status and solidarity and, in-game community and cultural norms (Steinkuehler & Williams, 2006). Nardi and Harris's (2006) study found that chatting is a key aspect of socializing in WoW, which takes place not only when grouping and fighting, but also when players are soloing or traveling in WoW.

(2) Network level

Network level refers to the position of players in their social network. It is another key variable when understanding the outcomes of MMORPG playing (Williams, 2010). Position within social networks has great predictive power for understanding motivations, group behaviours, information flows, and many other outcomes (Monge & Contractor, 2003). Shen, Monge and Williams (2012) indicated that the measure of network level is essentially the same as centrality. The concept of centrality has been mobilized in a wide range of applications, but it is agreed that a person located at the center of a star or the hub of a wheel has the maximum centrality score and is structurally more central than any other person in any other position in any other network of similar size (Freeman, 1978/79).

There are different indicators of centrality in current MMORPG researches. For example, in Shen and Williams's (2011) study, for each player, the total number of messages sent and received as well as the number of unique partners they received messages from was used to capture the intensity and network size of player communication respectively. In Williams et al.'s (2006) study, centrality refers to the time players spent together in a group with their guild mates, and social players refer to those who played in group with others at least half of the time.

Based on the graph theory, individuals who are in central positions within a network are usually more accessible than other more distant interaction partners (Freeman, 1978/79). In the context of MMORPGs, research has shown that players may play with family, real-life friends, game friends (people who meet in a MMORPG) or other players. So, in this study, centrality refers to the frequency of playing with these persons. The more central older players are in their social networks, the more frequently they play with these persons.

(3) Enjoyment of relationships

Enjoyment of relationships refers to the quality of interactions with family, real-life friends and game friends. The enjoyment of relationships affects how much social support players can exchange by playing together. The depth of relationships in MMORPGs varied widely. Game-play is constituted not only by joint in-game activities but also overwhelmingly by constant conversation about the game and topics well beyond it, ranging from debates about the mechanics of the game and intimate personal problems. Some players trust their game friends and see them as important as real-life friends, while others see their game friends as not particularly important to them (Williams, et al., 2006). So, the indicators of enjoyment of relationship include (a) talking about the game with family and real-life friends; (b) closeness to family and real-life friends, and (c) depth of relationships with game friends (i.e., sharing personal problem with game friends, trusting game friends and game friends as important as real-life friends).

(4) Quality of guild play

In MMORPGs, guild is a place where deep relationship occurs (Steinkuehler & Williams, 2006; Williams et al., 2006). Social interactions in MMORPGs are accompanied with conflicts and selfish motivations. In Williams et al.'s (2006) study of social life of guilds, the most common reason for players to join guilds is to use their membership in guilds as resources until they meet their pragmatic needs, such as levelling up quickly and having access to high-end content(e.g., fantastic equipment, weapons and exciting monsters); and the important reasons for leaving guilds are dissatisfaction with the guild's objectives, elitism, social distance, poor leadership, a lack of players at their level to play with. Williams et al. (2006) found that players in formally structured guilds tend to have more social experiences than others. This positively affects the quality of their time in the game. So, quality of guild play determines whether its impact on social interactions is positive or negative. In this study, quality of guild play refers to the amount of guild play and assessment of guild (including assessment of guild organization, leadership and guild mates).

Table 2.4. The Constructs of Social Interactions in MMORPGs and Indicators

Communication methods	Network level	Enjoyment of relationships	Quality of guild play
Public chat	Family	Talking about the game with family and real-life friends	Amount of guild play
Group chat	Real-life friends	Closeness to family and real-life friends	Assessment of guild
Private chat	Game friends	Depth of relationships with game friends	
Voice chat	Other players		
Social media			
Face-to-face meeting			

2.7.2. Conceptualization of the Social-Emotional Factors

Social capital, loneliness, depression, social support and belongingness are intimately related. Access to and contact with one's social network is central to the development and maintenance of social capital, the perception of social support and the sense of belongingness, and is effective way to protect from or decrease the feelings of loneliness and depression. The size of one's social network, frequency of social contact, the level of such contact would seem logically to increase the level of perceived social resources available from it. However, they reflect distinct social conditions.

Bridging and bonding social capital in MMORPGs. To make it clear, in this research bridging and bonding social capital refers to online social capital. The researcher didn't examine how social interactions in MMORPGs affect older adults' offline social capital such as civic engagement. The purpose of conceptualizing bridging and bonding social capital in MMORPGs is not to draw a line between them. Norris (2002) claimed that the conceptual distinction between bridging and bonding social capital should be seen as "a continuum rather than a dichotomy, since in practice many groups serve both bridging and bonding functions, but networks can be classified as falling closer to one end of this spectrum or the other" (p.3). Social interactions in MMORPGs are dynamic and complex and are a mixture of bridging and bonding

relationships. Steinkuehler and Williams (2006) claimed that “the question for scholars researching virtual communities such as MMORPGs, then, is to what extent such environments shift the existing balance between bridging and bonding” (p.904).

By comparing the similarities in descriptive characteristics between MMORPGs and real-world third-place, Steinkuehler and Williams (2006) concluded: MMORPGs serve best as a new form of “third place” for informal sociability much like the pubs, coffee shops, and other hangouts of old, where people are able to establish and maintain social ties beyond the workplace and home by interacting and collaborating with strangers. The term “third place” is used in the concept of community building, referring to social surroundings separate from the two usual social environments of home (first place) and the workplace (second place). For those without previous real-life ties, playing MMORPGs was an entrée to bridging social capital. Bonding social capital is rare and usually occurs in those who knew each other beforehand, meet face-to-face and use VoIP for communication (William, et al., 2006). William et al. indicated that the relative anonymity in MMORPGs is an obstacle for guild mates to develop in-depth relationship and exchange advice for personal issues and emotional support. Some players recognized the difference between chatting in MMORGPs and meeting face-to-face, and drew a sharp distinction between real-life friendship and relationship in MMORPGs. So, seeing gaming friends as important as real-life friendship is bonding social capital.

In this research, the criteria of pure bridging social capital in MMORPGs should be contacting with a broader range of people from diverse social backgrounds and beliefs. It can be understood as the weak ties that are generated during grouping and guild-play, and embedded in the game friends who know each other but do not necessarily exchange emotional and substantial support. In contrast, the criteria of pure bonding social capital in MMORPGs should be deepening networks among people sharing similar backgrounds and beliefs and providing emotional support. It inheres in family and real-life friends, or strongly-tied game friends who establish friendly relationships and trust through desirable social interactions and personal problem sharing.

Loneliness. Loneliness is a mental status. Social-isolation may lead to loneliness in some individuals, whereas some isolated people may not feel lonely. Conversely, other individuals may experience loneliness even though they have a large social network size. Different from objective physical separation from other people, loneliness refers to the more subjective feeling state of being alone, separated, or apart from others (Tomaka et al., 2006). Ernst and Cacioppo (1999) conceptualized it as an unfavorable balance between actual and desired social contact. So, loneliness is an unpleasant experience that occurs when older adults' social network is deficient in some important way.

Social isolation, loneliness and lack of adequate social support are key factors that negatively relate to psychological health, including happiness and subjective well-being (Tomaka et al., 2006). Heylen (2010) investigated the direct and intermediate effects of both the number and the quality of social relationships on the feeling of loneliness in older adults by analyzing 1414 older adults aged 55 and over. The results showed that more social activities, as well as satisfaction with these activities, are linked to the low risk of loneliness. Moreover, the quantity of social relationships is directly related to loneliness, regardless of the perceived quality of the relationships. In other words, a lack of social contact directly leads to loneliness.

Depression. Depression is defined by *Stedman's Electronic Medical Dictionary* as "a temporary mental state or chronic mental disorder characterized by feelings of sadness, loneliness, despair, low self-esteem, and self-reproach". It ranges from normal feelings of the blues through dysthymia (recurring minor depression with no mania or major depressive episodes) to major depression (Seay, 2006). The core symptoms are depressed mood, loss of interest or pleasure, withdrawal from interpersonal contact and physical symptoms such as eating and sleep disturbances. Depression is not a normal and inevitable part of aging. It has a causal link to many social, physical and psychological problems (Singh & Misra, 2009). One of the protective factors is engagement in valued activities (Fiske, Wetherell, & Gatz, 2009).

Social support. At the individual level, social support refers to "the companionship and the practical, informational and esteem support which derive from a person's social network, including friends, colleagues, acquaintances and family

members" (Cooper et al., 1999, p.18). It reflects the reality or perception that one is part of a social network, and is the natural counterpart to social isolation and loneliness (Tomaka et al., 2006). Perceived social support is referred as the individuals' subjective perception of the availability of interpersonal support from members of their social network (Cohen & Willis, 1985).

Belongingness. Sense of belongingness is defined as "the experience of personal involvement in a system or environment so that persons feel themselves to be an integral part of that system or environment" (Hagerty, Lynch-Sauer, Patusky, Bouwsema, & Collier, 1992, p.173). A system could be a relationship or an organization, and environment could be natural or cultural. Although belongingness can be achieved via other avenues such as a child's security blanket, Baumeister and Leary (1995) emphasized that a sense of belongingness is influenced by interpersonal relationships. They developed and evaluated a belongingness hypothesis that a need to belong is a fundamental human motivation, and human beings have a pervasive drive to form and maintain at least a minimum quantity of lasting, positive, and significant interpersonal relationships.

2.7.3. Research Hypotheses

It is well established that social interaction is seen as an important component of successful aging (Ristau, 2011). Prior epidemiological, cross-sectional and longitudinal research has shown that older adults with high engagement in social interaction report more positive wellbeing. A common idea is that the more opportunities an individual has to interact with other people, the more social support will be available, which, in turn, will have a beneficial effect on general wellbeing. The existence of one's social network as well as substantive interactions generated among social ties can buffer people from negative events (Cohen & Wills, 1985). Although the mechanisms behind the reported associations have not been fully understood, a commonly endorsed possibility is that social interaction challenges older adults to participate in complex interpersonal exchanges, which may produce continued mental stimulation, better cognitive strategies or increase neural growth and synaptic density--the "use it or lose it" hypothesis (Brenowitz, 2012; Gow, Pattie, Whiteman, Whalley, & Deary, 2007). Participation in social activities also provides meaning social roles and a sense of purpose to older

adults, which may direct neurohormonal influences on their brain (James, Wilson, Barness, & Bennett, 2011).

Previous experimental studies have suggested that regular and occasional gamers exhibited significantly higher levels of well-being and lower levels of loneliness compared to non-gamers (Allaire et al, 2013; Jung, li, Janissa, Gladys, & Lee, 2009). However, none of these studies used MMORPGs as training tools. The rise of online games comes at a particular historical moment for social reasons (i.e., the steady decay of real-world civic and social institutions experience) as well as technological ones and prompts a wide array of questions (Williams, 2006c). MMORPGs are a wholly new form of community, social interaction and social phenomenon. Playing MMORPGs links people from all over the world as they engaged in a shared virtual world and collective play experience. It can maintain real-life relationships and facilitate new relationships, and therefore provides more opportunities to obtain social resources. Then, the question is: are there relationships between the social interactions in MMORPGs and some social-emotional benefits for older adults? Based on theories and previous studies, the researcher proposed the following four hypotheses:

Hypothesis 1: Higher level of using different communication methods is positively associated with higher levels of bridging social capital, bonding social capital, social support and belongingness, and lower levels of loneliness and depression (see Figure 2.1).

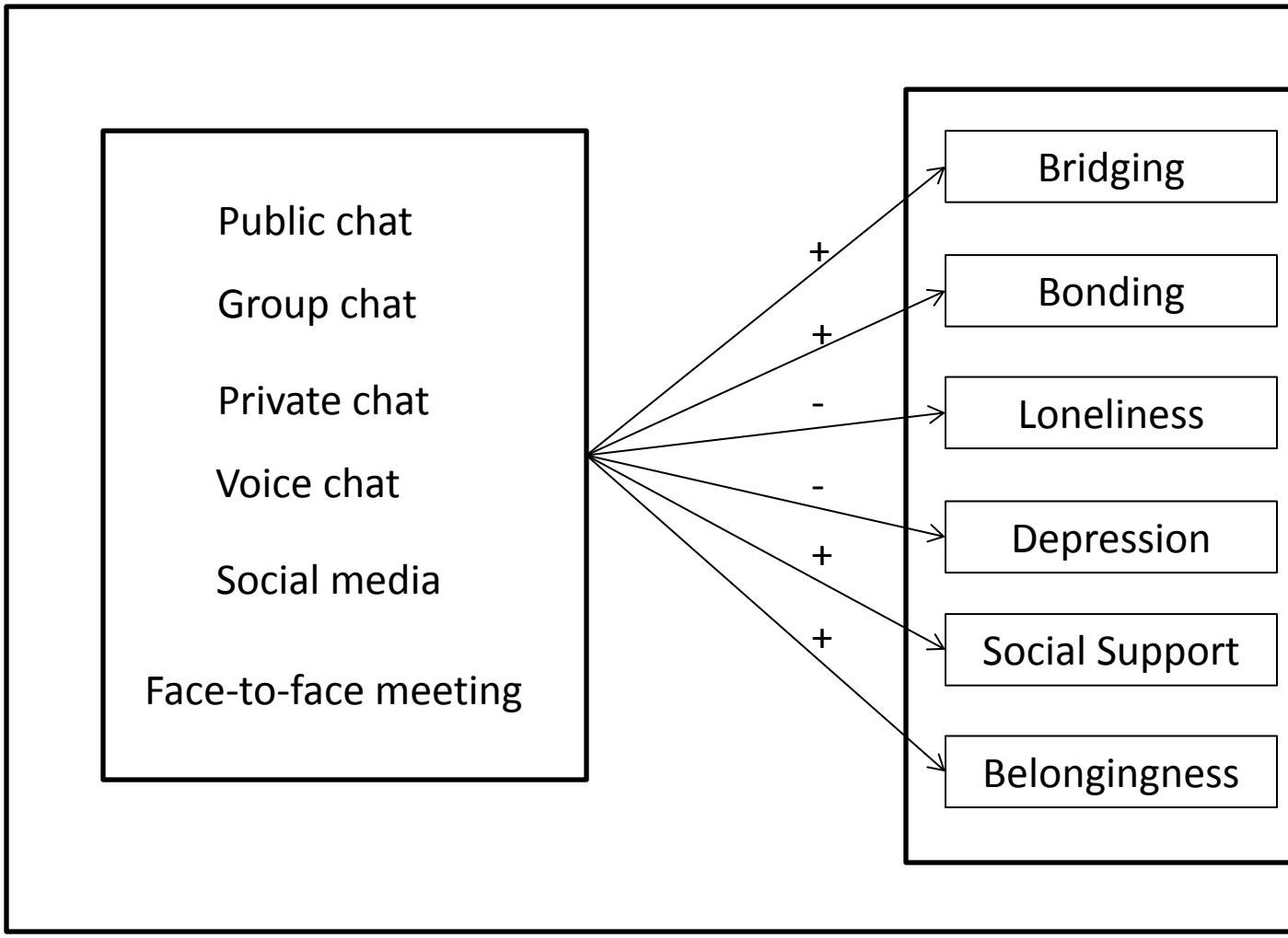

Figure 2.1. Hypothesis Model of Communication Methods

Hypothesis 2: Network level is positively associated with bridging social capital, bonding social capital, social support and belongingness, and negatively associated with loneliness and depression (see Figure 2.2).

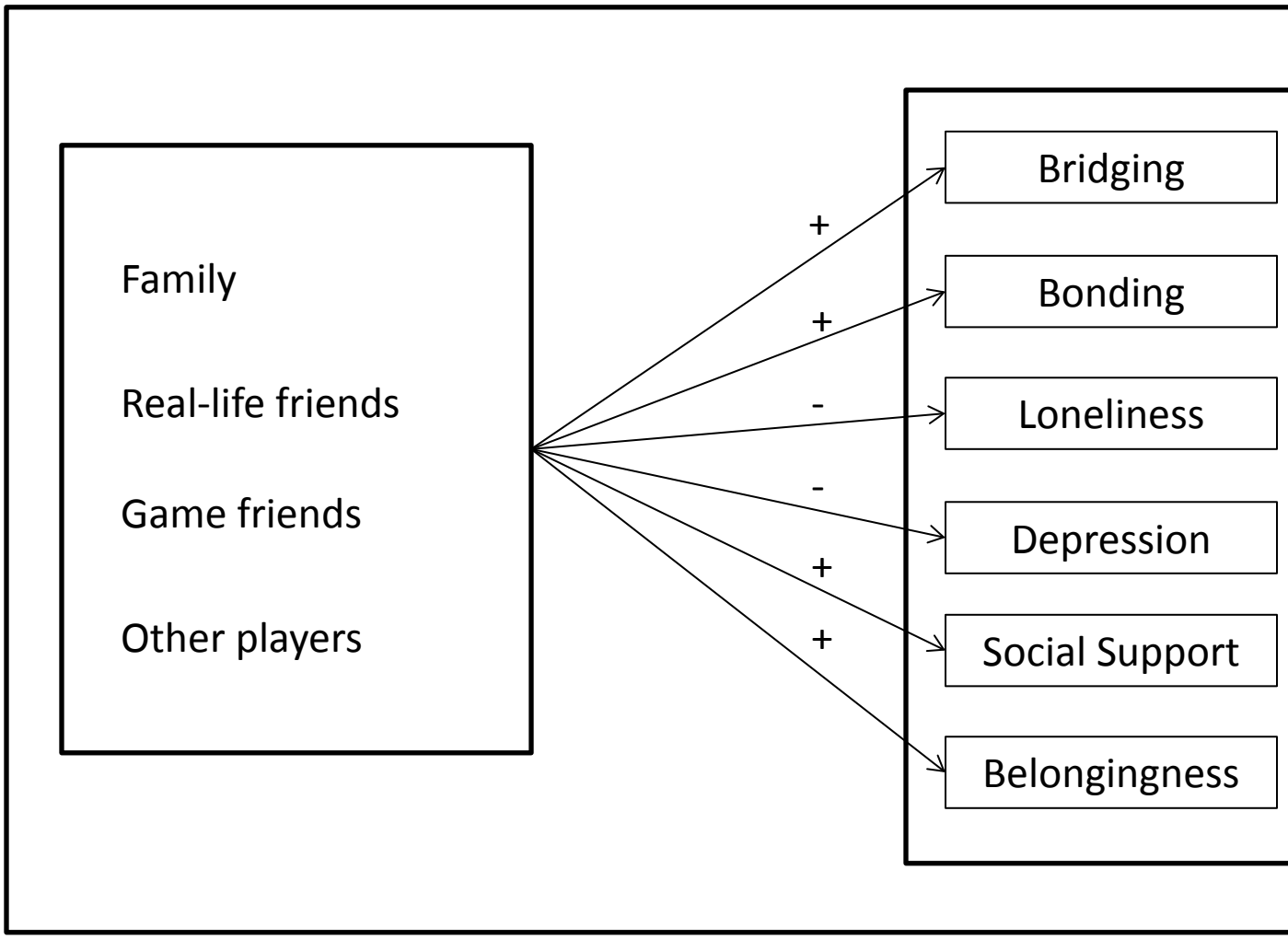

Figure 2.2. Hypothesis Model of Network Level

Hypothesis 3: Higher level of enjoyment of relationships is positively associated with higher levels of bridging social capital, bonding social capital, social support and belongingness, and lower levels of loneliness and depression (see Figure 2.3).

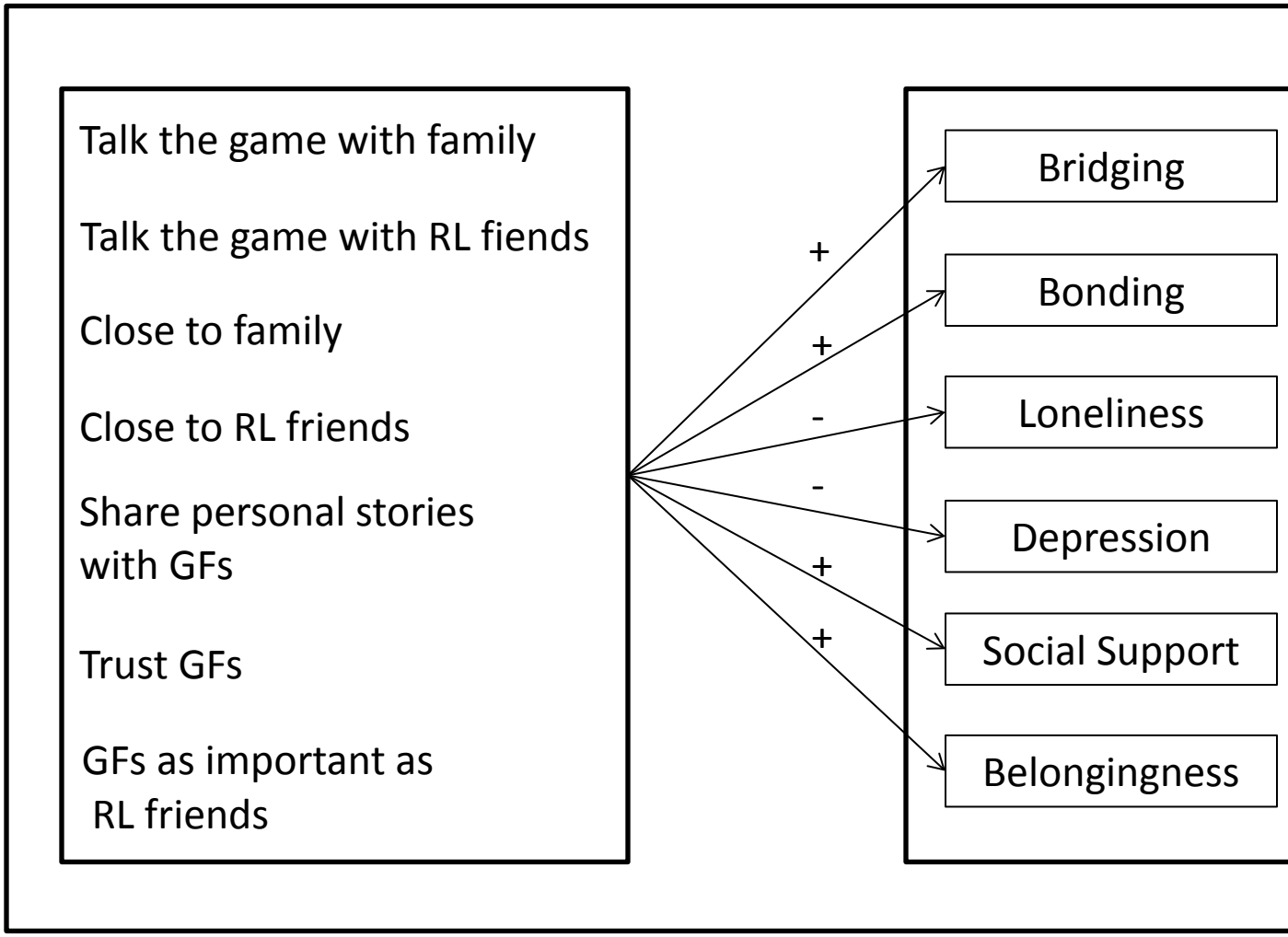

Figure 2.3. Hypothesis Model of Enjoyment of Relationships

Hypothesis 4: Higher level of quality of guild play is positively associated with higher levels of bridging social capital, bonding social capital, social support and belongingness, and lower levels of loneliness and depression (see Figure 2.4).

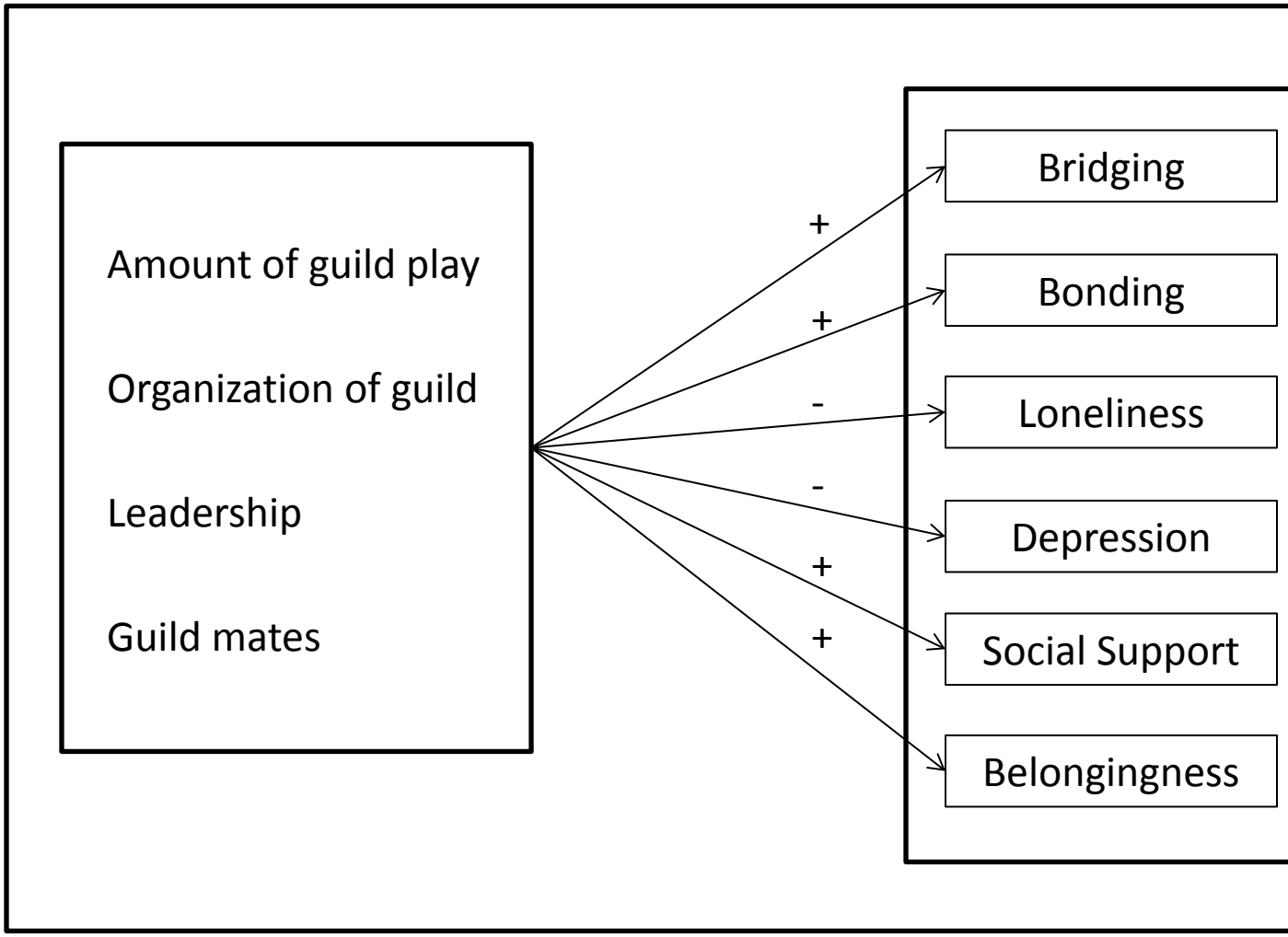

Figure 2.4. Hypothesis Model of Quality of Guild Play

Chapter 3. Methodology

The methodology addresses the research questions using a Web questionnaire (In this study, the term survey and questionnaire are used interchangeably). This chapter describes the intervention tool, survey sample, justification of research method, survey development, data administration and analysis.

3.1. Intervention Tool: World of Warcraft

World of Warcraft (WoW) was selected as the intervention tool in this study for two reasons. On the one hand, games are quite different, and therefore lead to different effects (Williams, 2010). For example, some games encourage conflict through “player versus player” mechanics, whereas others encourage players to work together. WoW belongs to the latter. With different types of games, it is unrealistic to assume that all games have uniform effects (Shen & Williams, 2011). Therefore, examining all MMORPGs rather than just one game (WoW in this case) will hinder the generalizability of the results. On the other hand, WoW is one of the most popular MMORPGs (the current North American MMORPG leader), currently having more than 10 million subscribers (Activision Blizzard, 2012). Williams (2005) indicated that researchers of games should play the games they are studying. There are a number of terms that any game researcher must learn in order to create survey questions. To understand the mechanics of WoW and have a sense of the social context of play, the researcher has played WoW for a period of two months.

3.2. Survey Sample

Participants were older adults who were aged 55 and over, English speakers and WoW players. Obtaining accurate, up-to-date data to answer the question “How many

older adults are playing WoW?" is challenging due to the lack of this kind of data in previous researches and the reality that the number of players increase daily. Schiano et al. (2011) reported that one percent of WoW players in USA were retirees. In the worldwide, the amount of older adults who are aged 55 and over should be bigger than one percent since the retirement age in USA is 65. So, it is estimated that there are at least 10,000 WoW players aged 55 and older.

In this study, "55" is set as the lower age limit for three reasons. First, at this age, retirement from work may have either been reached or is on the horizon, but they are still active and participative. This means that people who are in their late fifties may be heavy users of information technology, and they may also have more time to enjoy entertainment compared to the middle-aged adults. Second, many of them may have experienced more or less real-life losses, such as children leaving home. Then, playing MMORPGs may provide them an approach to gain social support. Finally, as people go into their seventies or eighties, they usually suffer from some physical and cognitive declines, and even impairments, which negatively affect the use of MMORPGs. So, people at this category may not be a large customer base of MMORPGs.

Participants were recruited through a Web questionnaire. Invitation messages including the URL to the Web questionnaire were posted on eight WoW player forums (see Table 3.1). By beginning the survey, they signified that they had read and understood the study purposes, thus satisfying ethics protocols. Totally, 222 older WoW players finished the survey, and were the participants of this research.

Table 3.1. WoW Player Forums for Recruiting Participants

Name of Website	URL	Focus
The Older Gamers	http://www.theoldergamers.com/	A place for older gamers forms guilds in games, and provides a forum space for discussion.
WOW Interface	http://www.wowinterface.com/community.php	A website offers interfaces, skins, add-ons, mods and a community for WoW players.
Reddit	http://www.reddit.com/	User-generated news links. Votes promote stories to the front page.
OWNEDCORE	http://www.ownedcore.com/	A Free World of Warcraft and MMO gaming community for guides, exploits, trading, hacks, model editing, emulation servers, programs, etc.
The Old Timers Guild(OTG)	http://www.oldtimersguild.com/vb/forum.php	OTG is a casual, English-speaking group of mature gamers who have bonded together to seek out two things: fun and gaming.
Wowhead	http://www.wowhead.com/	Wowhead is a search database for WoW, providing information on quests, items, NPCs, etc.
MMO-Champion	http://www.mmo-champion.com/content/	It provides the latest WoW news and a great forum community.
MMORPG.com	http://www.mmorpg.com/	It is the premiere online resource for exclusive information on the MMO gaming genre.

3.3. Justification of Research Method

In the last decade, a range of research methods have been used to generate insights about the social dynamics of MMORPGs communities. Web-based surveys provide benchmark data about the demographics and frequency of some in-game behaviours (Yee, 2006a, 2006b, 2006c). Qualitative studies were carried out to explore

the attitudes, experiences and feelings of MMORPGs players (Hussain & Griffiths, 2009; Schutter & Abeele, 2010). Ethnographic observations were used to map out social interaction within MMORPG and provide a broad framework of the factors affecting social interaction (Chen & Duh, 2007). Some researchers also studied social activities in MMORPGs based on longitudinal behavioural data collected directly from the game's software (Billieux et al., 2013; Ducheneaut & Yee, 2008; Ducheneaut, Yee, Nickell & Moore, 2006b).

Shen and Williams (2011) examined the connections between MMORPGs use and psychological well-being by combining self-reported data of EQII players and their behavioural data collected in the game engine. This study demonstrates the usefulness of behavioural data in examining the impact of MMORPGs. Behavioural data could provide more accurate measure of older adults' social activities in MMORPGs (e.g., frequency of trading and chatting) than self-reported data. However, game engine doesn't record players' demographic information. Thus, it is unable to select older adults' behaviour data from game sever logs. What's more, older adults' enjoyment of relationships and assessment of guild play could not directly measured by behavioural data.

In this research, a Web quantitative questionnaire was used to collect data. The purposes of this research are to understand the demographical distribution of older adults who play MMORPGs, and the frequency of some in-game behaviours, potential socio-emotional benefits and challenges of playing MMORPGs. More importantly, this research was conducted to understand potential associations between older adults' social interactions in MMORPGs and some socio-emotional benefits. Based on previous research findings, four hypotheses were proposed. To test these hypotheses, it is needed to assess whether change in the dependent variable is systematically related to the level of the various predictors (independent variables). A quantitative survey method fits this purpose because it can generate numerical data to describe how often some in-game activities happen. By using the numerical data to conduct statistical analysis, it will be known whether the four research hypotheses are supported or not. This method has been used to understand the demographic characteristics of MMORPGs players and playing experience (Cole & Griffiths, 2007; Schiano et al., 2011; Whippey, 2011), motivation for playing MMORPGs (Yee, 2002; Yee, 2006a; Yee, Ducheneaut, & Nelson,

2012), impacts of MMORPGs (Kirby, Jones, & Copello, 2014; Seay, 2006; Zhong, 2011) and problematic usage of MMORPGs (Seay, 2006).

Since MMORPGs players are geographically dispersed all over the world, using the Internet to distribute surveys is effective to get appropriately large amount of responses from different places and cultures. Bethlehem (2008) mentioned some attractive advantages of Web survey:

- It is a simple means to get access to a large group of potential respondents.
- Questionnaires can be distributed at very low costs.
- Web survey can be launched very quickly.
- Participants are committed to the survey and would like to take times to reflect before responding, which can improve the quality of data.
- The ease of accessibility to the online format at anytime from anywhere is expected to motivate individuals to participate and to complete the survey and thus increase the chances of a high response rate.

Over the past decade the use of Web surveys has increased substantially. They have much in common with other types of surveys (Bethlehem, 2008). However, there are three methodological problems with Web survey. The main concern is the validity of self-reported data. The data may not reflect the “reality” due to problems such as acquiescence and social desirability. The second concern is under-coverage. However, this is not a problem for this research because older adults have to connect to Internet in order to play WoW. Another methodological problem is the self-select sampling strategy. A Web survey is almost always self-selected: respondents visit a website, and complete the questionnaire by filling in a form on-line. Self-selection among MMORPG players through Internet may limit this research in several ways. First, there is a sample bias problem as there is no way to take a random sample of all older players. Second, since the survey link was posted to some WoW forums, this might result in data collection from regular and heavy players, but exclude those who play WoW occasionally.

The researcher acknowledges the limitations of Web survey. However, Web survey is a fast, cheap and attractive means of collecting large amount of data. The more likely people are to participate in the survey, the higher the average response probability will be, and thus the smaller the bias will be (Bethlehem, 2008). In addition, Web survey ensures consistency of the same questions for all respondents and can

ensure anonymity (Creswell, 2005). Williams, Consalvo, Caplan and Yee (2009) even pointed that self-selection sampling is the most effective method of gathering data from the population of MMORPG players.

3.4. Questionnaire Item Development

3.4.1. The Process of Questionnaire Item Development

Since no previously developed questionnaire could be found that targeted older adults who play WoW, the development of a Web questionnaire was undertaken. A few principles were applied to the design of the questionnaire: (1) Capture all of the concepts needed to answer the research questions in the questionnaire and break it into subsections representing five different topics (i.e., playing patterns and motivations, social interactions in WoW, outcome measures, challenges of playing WoW, and demographic information); (2) Order different subsections in a logical sequence and make transitions between different sections as smooth as possible; (3) Start off with easy, non-threatening questions; (4) Make questions clear, simple and brief, and understood consistently for all participants; (5) Ask different types of questions to provide participants with an engaging experience; (6) Use published and well-designed scales to measure the six social and emotional factors; (7) Make the questionnaire look professional and attractive.

Figure 3.1 describes the process of questionnaire item development. The first draft was developed with the research questions as a guideline. Using trial statements generated from the reviewed literature and statements from published and well-established scales, the first draft was developed with considerations for content, comprehension and usability. Then, the committee reviewed the first draft and provided useful feedback on the representativeness, sequence and clarity of survey items. An expert WoW player, who has played WoW for more than ten years, completed the questionnaire as a pilot. He identified some questions that were ambiguous or might create confusion for older adults, and remedied some jargon. Based on the comments of committee and the expert gamer, the survey was simplified to increase clarity.

Since the survey used short versions of six published scales, a pilot test was carried out to test the internal consistency of the selected scales. The details of the pilot test were discussed in the "Pilot Test" section. After the pilot test, the survey link was posted on a MMORPG general discussion sub-forum for gamer test. One week after posting the survey link, 35 participants agreed to take the survey, but only 15 submitted it. More than half of the participants mentioned that the survey is extremely long. To shorten the survey, questions about the technical challenges and reported cognitive benefits of playing WoW were removed because they are not related to the research questions. Scrutiny of the survey database revealed that most participants quitted immediately after they agreed to take the survey. This might be due to the fact that they were uncomfortable to provide their background information. To resolve this problem, the background information section was moved to the end of the survey. After adjusting the survey, an announcement was made that the survey has been shortened. One person replied that the survey was shortened very well. So, this survey was considered to be in its final form (see Appendix A).

Figure 3.1. Questionnaire Item Development

3.4.2. The Final Questionnaire

The final questionnaire consists of five sections. The first section focuses on playing patterns and motivations. Motivations for playing MMORPGs were measured using Online Gaming Motivations Scale (Yee, Ducheneaut, & Nelson, 2012; see Appendix B). The scale items loaded onto 3 factors that correspond to Social, Immersion, and Achievement motivation respectively (see Table 3.2). Each of the 3 factors has 4 items and has Cronbach's α above .70. The response options are identical for all items: a 5 point Likert scale ranging from 1(Not important at all) to 5 (Extremely important). The original sample for which the scale was developed consisted of 2,071 US participants and 645 Hong Kong and Taiwan participants. The results suggest that it has a good factor structure and good internal reliability.

Table3.2. Factor Loadings

Item	Social	Immersion	Achievement
Chatting with other layers.	.73		
Being part of a guild.	.70		
Grouping with other players.	.67		
Keeping in touch with your friends.	.60	.11	
Learning about stories and lore of the world		.78	.12
Feeling immersed in the world		.73	.11
Exploring the world just for the sake of exploring it.		.60	-.14
Creating a background story and history for your character.		.54	-.13
Becoming powerful.			.73
Acquiring rare items.		.13	.68
Optimizing your character as much as possible.		-.12	.67
Competing with other players.			.55
% of variance	23.9%	21.4%	13.9%
Cronbach's α	.77	.75	.74

Note. Any factor loadings less than .10 were excluded (Yee, Ducheneaut , & Nelson, 2012).

The second section asks questions about older adults' social interactions within WoW. It includes the following measurements:

(1) Communication methods

Communication methods was measured by asking how frequently older adults communicate with others via public chat, group chat, private chat, in game voice chat, social media and face-to-face meeting. Participants were asked to indicate on a 5-point scale (1=Never, 5=All the time) the frequency of using these communication tools.

(2) Network level

Network level was measured by asking how frequently older adults play with family, real-life friends, game friends and other players. Respondents were asked to indicate on a 5-point scale (1=Never, 5=All the time) the frequency of playing with these persons.

(3) Enjoyment of relationships

Enjoyment of relationships was measured by two dimensions: the topic discussed with others and strength of relationship with family, real-life friends and game friends. For the measure of discussing topics, respondents were asked to respond to how frequently they discuss game mechanism and general information with game friends on a 5-point scale (1=Never, 5=All the time). For the strength of relationships, respondents were asked to indicate on a 5-point scale (1=Strongly disagree, 5=Strongly agree) to what extent they agree with these statements: (a) Playing with family members makes me feel closer to them; (b) Playing with real-life friends makes me feel closer to them; (c) I trust my game friends; (d) My game friends are as important to me as my real-life friends. They were also asked to indicate on a 5-point scale (1=Never, 5=All the time) how often they engage in these actions: (a) Talk about WoW with my family;(b) Talk about WoW with my real-life friends; (c) Share my personal problems with game friends. These statements were selected from Steinkuehler and Williams (2006) and Williams et al.'s (2006) study in which they were identified as deep relationships.

(4) Quality of guild play

Quality of guild play was measured by time of guild play and satisfaction with guild play. The time spent in guild was measured by asking "On average, how many hours you play in guild per week." Satisfaction with guild play was measured by asking respondents to indicate how satisfied they are with the organization of the guild, guild leadership and guild members with "1" referring to "Very dissatisfied" and "5" referring to "Very satisfied".

(5) Bridging and bonding social capital

In academic research, there are three ways to measure bridging and bonding social capital. The first way measures multiple elements of social capital (e.g., trust, family and friexype uses one scale to measure the different elements of social capital as a whole. For example, in Huvila et al.'s (2010) study, the social capital in Second Life was measured by a set of questions from the questionnaire developed by Bullen and Onyx (1998). Elements measured in Huvila et al.'s study include participation in the community, feelings of trust and safely, family and friends connections and so on. In

these two sets of studies, social capital was measured by proxy indicators, such as the levels of trust and participation in communities. The common criticism for these two types of measure is that what they measure is the components of social capital.

The third type uses Williams' ISCSs (2006b) to measure the outcomes/benefits of people's social network rather than the network itself. Williams pointed that this does not preclude network analysts' use of the measures, but simply suggests that "the networks are the causal agents or moderators of the social capital measured by the scales" (p.594). In this research, ISCSs were used because the researcher views social capital as social resources existing in one's social networks and that can be used to obtain information and assistance of various kinds. This can bridge the individual and collective facets of social capital. In addition, Williams' ISCSs have been successfully used in previous MMORPGs researches to measure social capital in MMORPGs (Trepte et al., 2012; Zhong, 2011). ISCSs measure two types of social capital (i.e., bridging and bonding) for both online and offline contexts. Each scale has 10 items. This study selected 4 of 10 items from the online bridging scale and also 4 of 10 items from the bonding scale (see Appendix C). These items were also used in Zhong's (2011) study. Items were adapted to fit the MMORPG context (e.g., "There is someone in World of Warcraft I can turn to for advice about making very important decisions") and rated on a 5-point scale ranging from 1 (Strongly disagree) to 5 (Strongly agree) with higher scores indicating lower levels of social capital.

The third section consists of four socio-emotional measures:

(1) Loneliness

Loneliness was assessed with the short-form of the UCLA Loneliness scale (ULS-8; Hays & DiMatteo, 1987). It contains the 8 items selected from the revised UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980). The items were (a) I lack companionship, (b) There is no one I can turn to, (c) I am an outgoing person, (d) I feel left out, (e) I feel isolated from others, (f) I can find companionship when I want it, (g) I am unhappy being so withdrawn, and (h) People are around me but not with me. UCLA Loneliness scale is an instrument indexing the frequency of an individual's feelings of loneliness and lack of companionship (see Appendix D). Participants rated each item on

a scale from 1 (Strongly disagree) to 5 (Strongly agree) with higher scores indicating lower levels of loneliness.

(2) Depression

Depression was measured by the 10-item Center for Epidemiological Studies Depression scale (CES-D; Mirowsky & Ross, 1992). The 10 items are statements about how participants might have felt or behaved during the past week. CES-D has been used in some of the most influential studies of the elderly, such as the Established Populations for the Epidemiological Studies of the Elderly (Turvey, Wallace & Herzog, 1999). It is designed to assess the current level of depression, and is one the most commonly used in a normal, as opposed to a pathological, population. It is rated on a 5-point scale ranging from 1 (Strongly disagree) to 5 (Strongly agree) with higher scores indicating lower levels of depression (see Appendix E).

(3) Social support

Social support was tested by 6 items selected from Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988). MSPSS measures how one perceives their social support system, including an individual's sources of social support (e.g., family, friends and significant other). Items are rated on a 5-point Likert-scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). Higher scores indicate higher levels of perceived social support (see Appendix F).

(4) Belongingness

Belongingness was measured by 6 items selected from Social Connectedness Scale (Lee & Robbins, 1995). Lee and Robbins developed a Social Connectedness Scale and a Social Assurance Scale as two measures of belongingness. This study chose Social Connectedness Scale because it focuses on the emotional distance or connectedness between self and other people, both friends and society. The 6 items selected from Social Connectedness Scale (see Appendix G) consist of all three aspects of belongingness: connectedness (3 items), affiliation (2 items), and companionship (1 item). Though this scale was constructed with a split-sample procedure on college students, minor alterations to wording have been made to fit the online gaming domain. Higher scores indicate higher levels of belongingness.

In the fourth section, two types of challenges associated with MMORPGs were measured: physical problems and personal life problems. Items of physical and personal problems were selected from Liu and Peng's (2008) study concerning problematic Internet use and adapted for this study. An example item to measure physical problem is "I experience fatigue after playing online for several hours". "I was late or missed work because of the time I spent playing World of Warcraft" is an example item to measure personal life problems.

The last section asks for information about the demographics. Previous empirical research has shown that amount of playing, motivations and social interactions differ from gender and age. Work situation, history of playing and gaming level is related to time and emotional investment to WoW. Overall, these variables draw a general picture of the gaming activities in older adults and offer the obvious practical value of establishing frames and starting points for data analysis or future research.

3.5. Pilot Test

The purpose of the pilot test was to test the internal consistency of six scales used in the Web questionnaire, including online bridging social capital, online bonding social capital, loneliness, depression, social support and belongingness. A paper survey was developed to ask questions about background, Internet use and measures of the scales. The reason why participants were asked to provide internet use is because it is meaningless if participants were asked to answer questions about online bridging and bonding social capital but they haven't used the Internet. Before the pilot test, three participants, who were older than 55, filled out the paper survey. They indicated that it takes only 5 minutes to complete the survey and the questions are easy to understand. So, this version is the final form for the pilot test. Participants (N=82) were recruited from Bonsor 55+ Centre, Burnaby, Canada. All participants were older than 55 and Internet users. They understood the purpose of the survey and were aware of what they were doing when they were filling out the survey.

Table 3.3 presents the Cronbach's α of each scale. A commonly accepted rule of thumb for describing internal consistency is as follows: .90 or better is outstanding, high

to middle .8s is very good, .80 or the low .8s is good, high to middle .7s is acceptable, .7s is borderline acceptable, high to middle .6s may be okay for research purposes, the low .6s are problematic, and anything below that is not acceptable (Meyers, Gamst, & Guarino, 2013). The alpha reliabilities of scales used in this research are ranged from .86 (good) to .93 (excellent).

Table 3.3. The Cronbach's Alpha of the Short Scales

Scale	N. of Items	Cronbach's Alpha
Online bridging social capital	4	.86
Online bonding social capital	4	.86
Loneliness	8	.88
Depression	10	.86
Social support	6	.93
Belongingness	6	.86

3.6. Survey Administration

The hosting platform of the Web questionnaire is FluidSurvey, a Canadian online survey software host. It was chosen for this study due to the consideration of data security. Web questionnaire resides on the Internet, executes on a Web server, and that respondents access via a standard Web browser. Ensuring that all potential respondents experience the survey in a reasonably standard way is a primary goal of Web questionnaire testing.

3.6.1. Screen Design

Poor or inconsistent screen design will affect how participants experience the questionnaire, with almost certain implications for data quality. The following are the strategies applied to improve the screen performance:

- To make the survey look more professional, the LOGO of SFU was displayed at the top left corner of each screen.
- To make questions easy to read, the general screen layout, colors, fonts and navigation buttons are carefully designed to display the questions and instructions. The general and question specific instructions for answering

questions and moving through the questionnaire, and any instruction or transition text were provided.

- Conditional branching and functionality (i.e., range checks, enforcement of single and multiple responses) were carefully designed to avoid respondents skipping questions or being asked questions that make little sense.
- Variations in how different browsers display screens may cause respondents to interpret questions differently. So, the Web-questionnaire was tested in multiple operation systems (Windows & Mac) and browsers to check question layout.

3.6.2. Usability Testing:

To ensure that the questions and the survey tasks were presented in ways that participants find easy to understand and execute, one respondent completed the Web questionnaire and was interviewed by the researcher. The purposes of this usability testing are as follows:

- All questions and answers are present in the proper order, with no spelling and grammatical errors.
- All navigation buttons work correctly.
- All answer types (e.g., numeric or alphanumeric) are specified correctly, checked for the specified range, and being saved in the correct format.
- The logic executes as specified.

3.6.3. Data Checking:

The goal of data checking is to uncover major errors such as bad skips or out-of-range values or even minor design problems such as undesirable response patterns on individual questions. Three stages of data checking were conducted:

- **Prerelease data checks**. FluidSurvey database was examined both to ensure that data have being saved in the proper format and that the questionnaire logic and range checks are operating correctly.
- **Slow-release data checks**. It refers to evaluating the questionnaire using real data from responses. The first collected 30 responses were examined via frequencies and cross-tabulations to ensure that the questionnaire is functioning properly.
- **Intermediate checks.** This was done throughout the whole data collection period to verify that the large sample data collection process is working properly.

3.7. Data Analysis

One objective of this research is to examine the relationship of some social-emotional benefits with older adults' social interactions in MMORPGs. So, multiple regression was used for this research because it implies prediction. The statistical goal of multiple regression is to produce a model in the form of a linear equation that represents the relationships between a dependent variable and a number of predictors or independent variables, expressed in the following equation:

$Y = b_0 + b_1X_1 + b_2X_2 + \ldots + b_kX_k + e$,
Y is the dependent variable,
$X_1 + X_2 + \ldots + X_k$ are the predictors,
b_0 is the regression constant,
$b_1, b_2 \ldots b_k$ are unstandardized regression weights,
e is a residual.

In multiple regression, there are two basic model building logics used in order to facilitate the creation and testing of research models. One is how the whole equation behaves as a predicting model. Then the equation can be used to make predictions about new cases. Another purpose is to build up a theoretical explanation for how the set of predictors contribute to the dependent variable and understand what's going on with the dependent variable. A multiple correlation coefficient indexes the degree of linear association of one variable with a set of other variables, and the squared multiple correlations (R^2) tells us how much variance of the dependent variable is explained by the model, or the strength of this relationship. However, there is no absolute standard for what is a "good" value of R^2 (Nau, 2014). The magnitude of the effect must be considered with respect to the theoretical and empirical context within which the research was originally framed (Meryers, Gamst, & Guarino, 2013). In general, R^2 values, .01, .06, and .14 might be considered to be small, medium, and large, respectively (Cohen, 1988).

In this research, data analysis was carried out using IBM Statistics SPSS 22.0. First, the frequency of participants' demographic information, play pattern, motivation for game-play, social interactions within WoW, and challenges of game-play were analyzed.

Some analyses (e.g., ANOVA, t-test) were conducted to assess the effect of game-play time and motivation types. Second, a series of data analysis were conducted to test the hypotheses and predict the levels of the socio-emotional benefits among older adults separately. As discussed in previous sections, amount of game-play (weekly hours of game-play in this research) and Social motivation for game-play are important factors that affect the level of social-emotional benefits. Time spent in game necessarily takes away from time spent in other things such as contact with family and real-life friends and institution activities. Also, game-play will likely be more social for some than for others (Bartle, 2004). So, controlling for amount of game-play and Social motivation, a series of two-stage hierarchical regression analyses were performed, using each of the socio-emotional measures as outcome variable, and the factors in each component of social interactions in MMORPGs as independent variables. For hierarchical multiple regression, researchers should look at semi-partial effects of single predictors rather than an overall model R^2 such as the change in R^2 with and without the predictor.

Numerous rules-of-thumb have been suggested for determining the minimum number of subjects required to conduct multiple regression analyses. For example, Stevens (2002) suggested a ratio of 15 subjects for each predictor and Pedhazur and Schmelkin (1991) recommended N > 30K, where k is the number of predictors. Meyers, Gamst and Guarino (2013) pointed that researchers must accept pragmatic compromises to get the research done. They also recommended that the sample size should generally be no less than about 200 or so cases and that researchers use at least 20 but preferable 30 or more cases per predictor. Griffiths et al.'s (2004) study used an online questionnaire to recruit a total of 540 participants who played Everquest, of which only 27 participants were aged between 40 and 60, and 11 aged 60 and older. Schiano et al. (2011) conducted a large online survey and collected data from 2865 WoW players from the US, Europe, Hong Kong and Taiwan. However, only about 29 of the 2865 WoW players were retiree. In this research, the number of participants was 222, which was much bigger than the numbers of older participants in Griffiths et al. and Schiano et al.'s studies. In addition, the maximum number of predictors among the four research models in this research was 9, including the 2 covariates (i.e., amount of game-play and Social motivation) and the 7 variables in enjoyment of relationships component (see Figure 2.3). So, each predictor corresponded to at least 24 cases.

Based on Meyers et al.'s recommendation and previous empirical research, the sample size of this research was acceptable to conduct multiple regression analysis.

In the Web questionnaire, the researcher asked two questions about time spent in WoW: one is "During the past month, how many **days per week** on average have you played WoW"; and the other is "During the past month, when you played WoW, how many **hours per day** on average did you play". To compute the total hours of game-play, the researcher multiplied the scores of the two questions, and then put them in categories. The rule of creating these categories is that the frequency in each category should not be less than 10. The skewness value of the total amount of game-play is .52, indicating the distribution is approximately symmetric (If skewness is between -0.5 and 0.5, the distribution is approximately symmetric). For the measurement of social motivation, social capital, loneliness, depression, social support and belongingness, the researcher averaged the item scores on each scale. The mean of individual item scores is perfectly correlated with the sum of the item scores. Thus, for correlations and regressions it makes no difference whether to use the mean or sum of items (Anglim, 2009). The researcher used mean because the interpretation of a mean is clearer than a sum.

Third, to compare the effect size of each component of social interactions on each outcome measure (e.g., for communication methods, network level, enjoyment of relationships and quality of guild play, which one generated the biggest effect size on bridging social capital?), the researcher calculated Cohen's f^2 of each individual hierarchical regression analyses. Cohen's f^2 is one of several effect size measures to use in the context of an F-test for ANOVA or multiple regression. It is standardized with respect to the total variance, allowing more accurate comparison of effect sizes between variables within the model as a whole (Selya, Rose, Dierker, Hedeker, & Mermelstein, 2012). The f^2 effect size measure for hierarchical multiple regression is defined as:

$$f^2 = \frac{R^2_{AB} - R^2_A}{1 - R^2_{AB}}$$

Where R^2_A is the variance accounted for by a set of one or more independent variables A, and R^2_{AB} is the combined variance accounted for by A and another set of one or more

independent variables B. By convention, f^2 effect sizes of .02, .15 and .35 are termed small, medium, and large, respectively (Cohen, 1988).

Prior to these analyses, histograms and boxplots were generated to assess distributions and identify outliners. Bivariate correlation matrices, variance inflation factor values were examined. There was no multicollinearity among the set of independent variables in each regression analysis. In terms of the high frequency of multiple regression used, all regression analyses were carried out with an alpha level of .01. For other analyses, the alpha level was .05.

Chapter 4. Results

In this chapter, the researcher will present the findings of participants` demographic characteristics, motivation for playing MMORPGs, social interactions within MMORPGs, and challenges facing older gamers. Subsequently, findings from a series of hierarchical multiple regression analyses will be presented.

The following questions will be addressed in this Chapter:

1. What are the demographic characteristics of older adults who play MMORPGs?
2. What are the main motivations that drive older adults to continue to play MMORPGs?
3. What are older adults' social experiences within MMORPGs (e.g., playing MMORPGs with real-life friends and family, making friends with other players, contacting game friends in real-life situation)?
4. Which challenges do older adults face while playing MMORPGs?
5. Are older adults' social interactions within MMORPGs associated with some socio-emotional benefits in terms of bridging and bonding social capital, loneliness, depression, social support and belongingness?

4.1. Question 1: What are the demographic characteristics of older adults who play MMORPGs (i.e., WoW)?

Table 4.1 presents the demographic characteristics of older adults who played WoW. A total of 222 people completed the survey, of which 176 provided their demographic information. Approximate 33% of participants were female, and 67% were male. Yee's (2006b) study found that MMORPG players are roughly 85% male. Thus, compared with young adults, there were more female older MMORPG players. A significant majority of older gamers (62.7%) were aged between 55 and 59, while only 20.9% were between 60 and 64, and 1.2% fell into the 70 - 79 age group. The large proportion of older gamers who were in the 55-59 age group justifies the use of "55" as

age cut point. More notably, 6.2% of participants were among the oldest players (those 80 years of age or older). In terms of relationship, 61% of participants were married and 20.8% were separated or divorced. Roughly one fourth of participants (25.4%) lived alone, while others lived with spouse or common law (42.1%), family (26.2%), or someone else (6.3%). More than half of the participants (53.1%) were full-time employed and 9.5% were part-time employed. For the highest level of education, 39.1% of participants have completed four-year degree, 20.1% completed master's degree and 7.8% had doctoral degree.

Some 40% of participants played WoW seven days per week on average, 12.2% played 6 days per week and an identical 12.2% played 5 days per week. Fully 41% of participants spent 2 or 3 hours per day playing WoW, and 28.4% played 4 to 5 hours per day, while some 22% played more than 6 hours per day. Taken together, 65% of participants played WoW at least 5 days per week and on average 92% spent 3 or 4 hours per day playing WoW. Surprisingly, a substantial majority of participants already were at the high end of the game. The highest level of approximate 84.2% of participants' main character (a main character is the one participant play most often if they play several characters) was 80 and higher.

An independent-sample t-test analysis (t (175) = 1.711, p = .089) indicated that the relationship between gender and playing time was not significant within the participants. Because of the small percent of participants in age groups 65-69, 70-74, 75-79 and 80+, the researcher combined them as 65+. A one-way analysis of variance (ANOVA) revealed that the three age groups (i.e., 55-59, 59-64, and 65+) differed significantly from each other in the time they spent playing WoW (F (2, 174) = 5.600, p = .004). A Bonferroni post hoc test indicated that the age group 65+ (M = 3.31, SD = 1.198) played significantly more than the age group 55-59 (M = 2.59, SD = 1.030, p = .004) and the age group 59-64(M = 2.62, SD = .953, p = .026). The age groups 55-59 and 60-64 did not differ significantly from each other (p = 1.000).

Table 4.1. Frequency Distribution of the Demographic Characteristics of Older Adults Who Play WoW(*N* = 176)

Variable	Frequency(Percent)
Gender	
Female	58(32.8%)
Male	119(67.2%)
Age	
55-59	111(62.7%)
60-64	37(20.7%)
65-69	16(9.0%)
70-74	1(0.6%)
75-79	1(0.6%)
80+	11(6.2%)
Relationship	
Married	109(61.2%)
Separate/Divorced	37(20.8)
Widowed	9(5.1%)
Never married	23(12.5%)
Living situation	
Spouse/Common law	53(42.1%)
Family	33(26.2%)
Others	8(6.3%)
Alone	32(25.4%)
Work situation	
Full-time employed	95(53.1%)
Part-time employed	17(9.5%)
Retired	61(34.1%)
Never employed	6(3.4%)
Educational level	
Less than high school	9(5.0%)
High school or equivalent	33(18.4%)
Four-year degree	70(39.1%)
Master's degree	36(20.1%)
Doctoral degree	14(7.8%)
Other	17(9.5%)

In view of the participants` education, An ANOVA analysis indicated that playing time also differed significantly (F (5, 173) = 2.583, p = .028). A Bonferroni post hoc test revealed that the less than high school group (M =3.78, SD = 1.563) invested significantly more time into playing WoW than did the high school group *(*M = 2.61, SD = .933, p = .050), 4-year degree group (M = 2.60, SD = .954, p = .026) and master`s degree group (M = 2.61, SD = 1.050, p = .048). There was no statistically significant difference among other groups. No significant differences in playing time were found in terms of relationship status (F (3, 174) = .723, p =.539), living situation (F (3, 122) = 1.014, p = .389) and work situation (F (3, 175) = 1.138, p = .335).

4.2. Question 2: What are the main motivations that drive older adults to continue to play MMORPGs (i.e., WoW)?

A motivation scale for online gaming was used to address individual differences in why and, to some degree, how older adults use MMORPGs. The three motivational types included in the scale (i.e., Social, Immersion, and Achievement) are not meant to be mutually exclusive, as a single player can score high (or low) in more than one dimensions at once (Seay, 2006). For a more detailed description of the three motivational types, please refer to Chapter 2.

As can be seen in Table 4.2, older adults generally reported high scores for all of the three types of playing motivation (all of the mean scores are higher than a neutral 3 on the 5-item Likert-type scale), while Immersion motivation were scored the least. There was no significant difference for Social motivation in view of the demographic characteristics. For Immersion motivation, participants with different educational degree were significantly different (F (5, 111) = 3.334, p =.008). For Achievement motivation, participants were significantly different in terms of relationship status (F (3, 112) = 2.765, p =.045). The relationship between Achievement motivation and time of game-play was significant (r = .456, p = .016).

Table 4.2. Mean (SD) for Different Types of Motivation

Motivation Type	Mean (SD)
Social	3.417(.994)
Immersion	3.366(1.013)
Achievement	3.887(.897)

Note. Participants rated each item on a scale from 1 to 5 with 5 the strongest.

4.3. Question 3: What are older adults' social experiences within MMORPG (i.e., WoW)?

Table 4.3 presents the distribution of methods used by older adults to communicate with other players. It seems that group chat and private chat are more popular than public chat when older adults chose a way to communicate with other players. Approximate 32% of participants frequently (28% all the time) used group chat; and 24% frequently (21% all the time) used private chat. This means that older adults were active group players. Some 23.4% of participants used voice chat frequently (23.4%), and another 18.5% used voice chat all the time. Finally, the percent of participants who used social media or met face-to-face with other players decreases substantially. Some 15% of participants used social media to communicate with other players frequently (6.8%) or all the time (8.6%). Just 6.3% of participants meet face-to-face with other players frequently (4.5% all the time).

Table 4.3. Distribution of the Methods Used by Older Adults to Communicate with Other Players

Variable	Never	Rarely	Sometimes	Frequently	All the time
Public chat	15.3%	30.2%	29.3%	17.1%	8.1%
Group chat	7.7%	11.7%	21.2%	31.5%	27.9%
Private chat	12.6%	17.6%	25.2%	23.9%	20.7%
Voice chat	22.5%	14.9%	20.7%	23.4%	18.5%
Social media	42.3%	24.3%	18.0%	6.8%	8.6%
Face-to-face meeting	53.2%	23.4%	12.6%	6.3%	4.5%

In terms of with whom they played, a larger number of older adults have played with their family and real-life friends (see Table 4.4). Roughly 18% of participants played with family sometimes, while 23% played with family frequently (14.4%) or all the time (8.6%). Among those who have played with real-life friends, 23.4% mentioned playing with real-life friends sometimes, 12.6% mentioned frequently and 7.7% mentioned all the time. So, the real-life relationships have been extended to the virtual world through playing WoW together. It also seems that older adults have made some in-game friends. This is based on the fact that 28.8% of participants indicated that they played with game friends frequently (29.3% all the time). The majority of participants also played with other players, people they played with but haven't developed friendship. In comparison to males (M = 2.17, SD = 1.291), females (M = 2.67, SD = 1.526) were more likely to play with family (t (175) = 2.296, p = .023).

Table 4.4. Frequency of Playing with Family, RL Friends, Game Friends and Other Players

Variable	Never	Rarely	Sometimes	Frequently	All the time
Family	46.4%	12.6%	18.0%	14.4%	8.6%
Real-life friends	34.7%	21.6%	23.4%	12.6%	7.7%
Game friends	9.5%	13.1%	19.4%	28.8%	29.3%
Other players	8.6%	15.8%	28.8%	32.0%	14.4%

Table 4.5 describes the frequency of older adults who talk WoW with family, real-life friends and game friends. Although some participants shared their personal problems

with game friends frequently or all the time, these persons only occupy 16.2% of the total participants. The majority of older adults never (29.3%) or rarely (25.2%) shared their personal problems with game friends. It turns out that older adults are more likely to discuss game play and general information within WoW such as weapons, rules and trades. The majority of participants indicated that they have discussed WoW with their family and real-life friends. Specifically, more than half of participants discussed WoW with their families sometimes (26.4%), frequently (16.9%) or all the time (9.0%). Similar trend is also found in those who discussed WoW with their real-life friends. The majority of participants have talked WoW with their real-life friends sometimes (29.4%), frequently (17.9%) or all the time (9.5%). Compared with males, females were more likely to share personal problems (t (175) = 2.420, p = .017) and discuss game-play (t (175) = 2.417, p = .017) with game friends, and talk WoW with family (t (162) = 2.202, p = .029).

Table 4.5. Frequency of Talking WoW with Family, Real-Life Friends and Game friends

Variable	Never	Rarely	Sometimes	Frequently	All the time
Share my personal problems and issues with game friends and listen to theirs.	29.3%	25.2%	29.3%	10.8%	5.4%
Discuss game play and general information with game friends.	6.8%	7.7%	23.9%	38.3%	23.4%
Talk about World of Warcraft with my family	21.4%	26.4%	26.4%	16.9%	9.0%
Talk about World of Warcraft with my real-life friends.	15.4%	27.9%	29.4%	17.9%	9.5%

Table 4.6 presents how much participants actually enjoy the relationships developed through playing WoW. In general, playing WoW is an effective way to extend and consolidate real-world relationships and build deep new relationships. Some 30% of participants agreed (16.7 strongly agreed) that playing with family members makes their feel closer to them, and roughly identical proportion agreed (16.7% strongly agreed) that they've developed close relationships with their real-life friends due to playing with them. In terms of relationship with game friends, approximate 37 % of participants agreed that

they trust their game friends and 11% strongly agreed with this. What's more, 23.9% of participants agreed on the statement "My game friends are as important to me as my real-life friends", and 12.6% strongly agreed on this statement. There was no significant gender difference in these items.

Table 4.6. Distribution of Enjoyment of Relationships

Variable	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Playing with family members makes me feel closer to them.	11.7%	4.5%	37.4%	29.7%	16.7%
Playing with real-life friends makes me feel closer to them.	7.7%	4.5%	41.9%	29.3%	16.7%
I trust my game friends.	5.9%	8.6%	37.8%	36.5%	11.3%
My game friends are as important to me as my real-life friends.	13.5%	25.7%	24.3%	23.9%	12.6%

Some 88% of participants indicated that they were either actively participating in guild activities, or just playing on a guilded character at the time they responded to the survey. The average size of the guild in which older adults play most often is 199 (*SD* = 244.530). Roughly 14% of participants spent weekly 17 to 20 hours in guild, and 25% spent even more than 20 hours engaging in guild activities. To answer the question whether they were satisfied with their guild play, more than 74% participants mentioned they were either satisfied or very satisfied with the organization of guild, leadership, and interaction with guild members. In general, older adults are active guild players and enjoy guild activities that need more commitment than other group activities. In addition, time of guild play was significantly related to Social motivation (r = .188, p = .009). Female spent the same amount of time in guilds as males did.

Table 4.7. Distribution of Satisfaction with Guild Play

Variable	Very dissatisfied	Dissatisfied	Neither	Satisfied	Very satisfied
Organization of guild	2.1%	5.2%	18.2%	47.4%	27.1%
Leadership	2.6%	7.8%	13.5%	40.1%	35.9%
Guild mates	3.1%	3.6%	21.9%	43.8%	27.6%

To answer the question “Which aspects are important to you when you evaluate the players you are grouped with in WoW”, 26.3% of participants selected “Whether they are well-mannered”, 23.9% selected “Whether they are responsible for their own role”, 19.45 selected “Whether we have similar game objectives”, and 17.3% selected “Whether they can be trusted” (see Table4.8). Other 5.7% mentioned sense of humour, similar interests (e.g., movie and music), not being judgmental, listening to instructions, and well-mannered both in game and chatting. Therefore, older adults assessed with whom they grouped based on real-life rules and morals. In another word, to some extent their virtual-world behaviours reflected their real-world needs or they were projecting themselves into the virtual world.

Table 4.8. Evaluating Group Members

Items	Percent of Participants
Whether they can be trusted	17.3%
Whether they are responsible for their own role	23.9%
Whether they are well-mannered	26.3%
Whether we are close to each other	4.2%
Whether we have similar game objectives	19.4%
Whether we have similar backgrounds(e.g., social status and religion)	3.2%

4.4. Question 4: Which challenges do older adults face while playing MMORPGs?

When asked which challenges older adults face while playing MMORPGs, all items were very popular (see Table 4.9). It seems that older adults meet the same challenges as young adults, such as changing exercise habits (20.7%), experiencing fatigue (i.e., eye sight, wrist pain) after playing online for several hours (20.3%), and spending less time contacting family and real-life friends (14.4%). The other (8.2%) challenges include frustration due to not being as good as younger players, dropping other activities, unable to stop playing, and losing spouse. One participant mentioned that other people’s perception of him is usually negative if they know he plays WoW. So, older adults also face unique challenges while playing WoW.

Table 4.9. Challenges of Playing MMORPGs

Challenges	Percent of Participants
I experience fatigue after playing online for several hours.	20.3%
I sleep less so I can have more time to play online.	11.1%
I skip meals so I can have more time to play online.	6.9%
My exercise habits have changed since I started playing online.	20.7%
I spend less time staying in touch with family and real-life friends because I played World of Warcraft.	14.4%
I experienced conflict with my family and real-life friends over how much time I spent playing World of Warcraft.	10.5%
I was late or missed work because of the time I spent playing World of Warcraft.	7.9%

4.5. Question 5: Are older adults' social interactions within MMORPGs associated with some socio-emotional benefits?

To analyze whether there are relationships between social interactions within MMORPGs (i.e., WoW) and some social-emotional benefits, the researcher proposed four hypotheses (see Table 4.10).

Table 4.10. Summary of Research Hypotheses

Hypothesis 1	Higher level of using different communication methods is positively associated with higher levels of bridging social capital, bonding social capital, social support and belongingness, and lower levels of loneliness and depression.
Hypothesis 2	Network level is positively associated with bridging social capital, bonding social capital, social support and belongingness, and negatively associated with loneliness and depression.
Hypothesis 3	Higher level of enjoyment of relationships is positively associated with higher levels of bridging social capital, bonding social capital, social support and belongingness, and lower levels of loneliness and depression.
Hypothesis 4	Higher level of quality of guild play is positively associated with higher levels of bridging social capital, bonding social capital, social support and belongingness, and lower levels of loneliness and depression.

To test these hypotheses and predict the level of the social-emotional benefits among older adults, a series of two-stage hierarchical linear regression analyses were

used. For each component of social interactions in MMORPGs, the amount of game-play and Social motivation were entered to the first block as covariates; in the second block, the factors in each component were simultaneously entered. Using data collected through the research questionnaire, it was found that the alpha reliabilities of the scales measuring the six social-emotional factors were ranged from .80 to .91 (see Appendix H). Table 4.11 presents the mean and standard deviation of the six outcome measures. The means of bridging social capital, loneliness, depression, social support and belongingness were higher than the neutral 3 on each of the 5-item Likert-type Scales.

Table 4.11. Mean (SD) of Outcome Measures

Outcome Measure	N	Mean(SD)
Bridging	222	3.389(.847)
Bonding	222	2.673(1.101)
Loneliness	202	3.479(.916)
Depression	209	3.537(896)
Social support	195	3.580(.977)
Belongingness	190	3.496(.887)

4.5.1. Communication Methods

Table 4.14 presents the analysis results of communication methods. For bridging and bonding social capital, depression and social support, the amount of game-play and Social motivation were significant covariates. When the six variables of communication methods were added to the block, only the second prediction model of bridging, bonding and depression were statistically significant. For bridging social capital, the R^2 change was statistically significant, F_c (6, 213) = 4.861, $p_c < .001$, $R^2_c = .084$, and the six variables of communication methods accounted for 8.4% of the variance of bridging social capital. The squared semi-partial correlations in Table 4.12 indicate that bridging social capital was most predicted by social motivation, second by communicating with other players through social media. For bonding social capital, the R^2 change was also statistically significant, F_c (6, 213) = 4.715, $p_c < .001$, $R^2_c = .087$, and the six variables explained 8.7% of the variance of bonding social capital which was most predicted by the amount of game-play and using social media as communicational tool (see Table

4.13). However, for depression, the R^2 change was not statistically significant, F_c (6, 200) = .1.601, p_c = .148, R^2_c = .043.

Table 4.12. Hierarchical Regression Results for Bridging Social Capital (*N* = 222)

Block	R^2	Model	b	SE-b	Beta	r	sr^2	sc
1	.305	Constant	1.701	.193				
		Amount of play	.018	.026	.039	.069	.002	.125
		Motivation*	.473	.049	.549	.551	.300	.998
2	.389	Constant	1.632	.196				
		Amount of play	-.003	.026	-.006	.069	<.001	.111
		Motivation*	.266	.070	.309	.551	.042	.884
		Public chat	.089	.046	.121	.367	.011	.589
		Group chat*	.138	.055	.199	.522	.018	.838
		Private chat	-.002	.043	-.003	.325	<.001	.522
		Voice chat	.020	.041	.033	.359	.001	.576
		Social media*	.129	.044	.194	.315	.025	.506
		Face-to-face meeting*	-.177	.046	-.158	.011	.018	.018

Note. sr^2 = squared semi-partial correlation; sc = structure coefficient; * p < .01.

Table 4.13. Hierarchical Regression Results for Bonding Social Capital (*N* = 222)

Block	R^2	Model	b	SE-b	Beta	r	sr^2	sc
1	.257	Constant	.490	.259				
		Amount of play*	.135	.035	.222	.247	.049	.487
		Motivation*	.497	.065	.443	.456	.196	.899
2	.344	Constant	.231	.263				
		Amount of play*	.114	.035	.188	.247	.033	.422
		Motivation	.193	.094	.172	.456	.013	.778
		Public chat	.018	.062	.019	.264	.0003	.451
		Group chat	.132	.074	.147	.435	.010	.742
		Private chat	.073	.057	.087	.332	.005	.567
		Voice chat	.046	.055	.059	.343	.002	.585
		Social media*	.203	.059	.235	.411	.037	.701
		Face-to-face meeting	.022	.062	.022	.208	.0004	.355

Note. sr^2 = squared semi-partial correlation; sc = structure coefficient; * $p < .01$.

Table 4.14. Results of Communication Methods

Outcome Measure	Model 1			Model 2			Change		
	F	p	R^2	F	p	R^2	F_c	p_c	R^2_c
Bridging	48.013	<.001	.305	16.919	<.001	.389	4.861	<.001	.084
Bonding	37.835	<.001	.257	13.958	<.001	.344	4.715	<.001	.087
Loneliness	3.353	.037	.033	1.178	.047	.216	.471	.830	.014
Depression	6.047	.003	.055	2.739	.007	.099	1.601	.148	.043
Social support	9.135	<.001	.087	2.322	.021	.091	.134	.992	.004
Belongingness	4.106	.018	.042	1.395	.201	.058	.513	.798	.016

4.5.2. Network Level

It can be seen from Table 4.19 that the amount of game-play and Social motivation was significant covariates for bridging and bonding social capital, depression and social support. When the four variables of network level were added to the block, all of the second prediction modes were statistically significant. The R^2 changes of bridging

and bonding social capital, loneliness and belongingness were statistically different from zero. The four variables of network level accounted for 13.4% of the variance of bridging social capital, F_c (4, 215) = 12.861, $p_c < .001$, $R^2_c = .134$. The Beta coefficients, squared semi-partial correlations and structure coefficients in Table 4.15 indicate that bridging social capital was most predicted by Social motivation, to a lesser extent by playing with game friends. Some 8.2% of the variance of bonding social capital was explained by network level, F_c (4, 215) = 6.658, $p_c < .001$, $R^2_c = .082$, while only 6.2% of the variance of loneliness (F_c (4, 195) = 3.319, $p_c = .012$, $R^2_c = .062$), and 7.9% of the variance of belongingness (F_c (4,183) = 4.129, $p_c = .003$, $R_c^2 = .079$) were explained by the four variables of network level. However, for depression, the R^2 change was not statistically significant, F_c (4, 202) = 1.841, $p_c = .122$, $R^2_c = .033$. The R^2 change was also not statistically significant for social support, F_c (4, 188) = 2.692, $p_c = .032$, $R^2_c = .049$.

Table 4.15. Hierarchical Regression Results for Bridging Social Capital (*N* = 222)

Block	R^2	Model	b	SE-b	Beta	r	sr^2	sc
1	.305	Constant	1.701	.193				
		Amount of play	.018	.026	.039	.069	.002	.125
		Motivation*	.473	.049	.549	.551	.300	.998
2	.439	Constant	1.277	.190				
		Amount of play	.010	.024	.021	.069	.0004	.104
		Motivation*	.268	.062	.311	.551	.049	.832
		Family*	.109	.032	.179	.256	.030	.387
		Real-life friends	-.070	.038	-.107	.181	.009	.273
		Game friends*	.179	.046	.274	.564	.040	.852
		Other players*	.134	.045	.182	.468	.023	.707

Note. sr2 = squared semi-partial correlation; sc = structure coefficient; * p < .01.

Table 4.16. Hierarchical Regression Results for Bonding Social Capital (*N* = 222)

Block	R^2	Model	b	SE-b	Beta	r	sr^2	sc
1	.257	Constant	.490	.259				
		Amount of play*	.135	.035	.222	.247	.049	.487
		Motivation*	.497	.065	.443	.456	.196	.899
2	.339	Constant	.134	.268				
		Amount of play*	.130	.034	.214	.247	.045	.424
		Motivation*	.217	.087	.194	.456	.019	.784
		Family	.089	.046	.112	.203	.011	.349
		Real-life friends	.077	.054	.090	.284	.006	.488
		Game friends*	.256	.065	.300	.485	.048	.833
		Other players	.012	.064	.013	.309	<.001	.531

Note. sr^2 = squared semi-partial correlation; sc = structure coefficient; * p < .01

Table 4.17. Hierarchical Regression Results for Loneliness (*N* = 202)

Block	R^2	Model	b	SE-b	Beta	r	sr^2	sc
1	.033	Constant	.3.463	.267				
		Amount of play	-.083	.036	-.162	-.154	.026	-.850
		Motivation	.091	.068	.094	.081	.009	.448
2	.094	Constant	3.270	.280				
		Amount of play	-.073	.035	-.144	-.154	.020	-.502
		Motivation	.072	.097	.074	.081	.003	.264
		Family*	.163	.047	.245	.261	.055	.850
		Real-life friends	-.004	.058	-.005	.083	<.001	.270
		Game friends	.012	.067	.017	.046	<.001	.150
		Other players	-.055	.064	-.070	-.024	.003	-.078

Note. sr2 = squared semi-partial correlation; sc = structure coefficient; * p < .01.

Table 4.18. Hierarchical Regression Results for Belongingness (*N* = 190)

Block	R^2	Model	b	SE-b	Beta	r	sr^2	sc
1	.042	Constant	3.468	.269				
		Amount of play*	-.094	.036	-.186	-.174	.034	-.849
		Motivation	.106	.070	.109	.089	.012	.434
2	.121	Constant	3.357	.278				
		Amount of play	-.084	.036	-.167	-.174	.027	-.500
		Motivation	.024	.096	.025	.089	.0003	.256
		Family*	.132	.047	.205	.244	.038	.701
		Real-life friends	.070	.057	.099	.172	.007	.494
		Game friends	.083	.067	.118	.084	.007	.241
		Other players	-.124	.063	-.161	-.082	.018	-.236

Note. sr^2 = squared semi-partial correlation; sc = structure coefficient; * p < .01.

Table 4.19. Results of Network Level

Outcome Measure	Model 1			Model 2			Change		
	F	p	R^2	F	p	R^2	F_c	p_c	R^2_c
Bridging	48.016	<.001	.305	28.002	<.001	.439	12.816	<.001	.134
Bonding	37.835	<.001	.257	18.354	<.001	.339	6.658	<.001	.082
Loneliness	3.353	.037	.033	3.383	.003	.094	3.319	.012	.062
Depression	6.047	.003	.055	3.276	.004	.089	1.841	.122	.033
Social support	9.135	<.001	.087	4.947	<.001	.136	2.692	.032	.049
Belongingness	4.106	.018	.042	4.213	.001	.121	4.129	.003	.079

4.5.3. Enjoyment of Relationships

The amount of game-play and Social motivation were significant covariates for bridging and bonding social capital, and social support. When the seven variables of enjoyment of relationships were added to the block, the second prediction modes of bridging and bonding social capital, loneliness, social support and belongingness were statistically significant, and their R^2 changes were also statistically different from zero (see Table 4.25).

For bridging social capital, the seven variables of enjoyment of relationships accounted for 18.7% of its variance, F_c (7, 191) = 9.338, p_c < .001, R^2_c = .18.4. According to the squared semi-partial correlations in Table 4.20, bridging social capital was mostly predicted by Social motivation and feeling close to family. Approximate 24% of the variance of bonding social capital was explained by the seven variables, F_c (7, 191) = 12.722, p_c < .001, R^2_c = .244. To a large extent, bonding social capital was predicted by sharing personal stories with game friends (see Table 4.21). For loneliness, the seven variables of enjoyment of relationships accounted for fully 10% of its variance, F_c (7, 176) = 2.852, p_c = .008, R^2_c = .100. However, none of the predictors in the model was statistically significant (see Table 4.22). This means that none of the predictors was able to account for a statistically significant portion of the variance of loneliness when other predictors acted as covariates. The seven variables explained 14.7% of the variance of social support, F_c (7, 172) = 4.676, p_c < .001, R^2_c = .147. It was mostly predicted by feeling close to real-life friends (see Table 4.23). For belongingness, some 11% of variance was accounted for by the seven variables, F_c (7, 167) = 3.163, p_c = .004, R_c^2 = .113. Similar to loneliness, none of the predictors in the mode was statistically significant (see Table 4.24).

Table 4.20. Hierarchical Regression Results for Bridging Social Capital (*N* =201)

Block	R^2	Model	b	SE-b	Beta	r	sr^2	sc
1	.266	Constant	1.801	.209				
		Amount of play	.023	.028	.049	.083		
		Motivation*	.443	.053	.510	.513		
2	.453	Constant	1.030	.232				
		Amount of play	.009	.026	.019	.083	.0003	.123
		Motivation*	.230	.056	.264	.513	.048	.762
		Talk WoW with family	-.027	.045	-.040	.193	.001	.287
		Talk WoW with RL friends	.024	.049	.035	.299	.001	.443
		Share personal story with GF	.098	.049	.137	.431	.011	.640
		Close to family*	.200	.050	.286	.444	.046	.660
		Close to RL friends	<.001	.056	<.001	.389	<.001	.578
		Trust GFs	.111	.065	.133	.494	.008	.734
		GFs as important as RL friends	.094	.048	.142	.429	.011	.637

Note. sr^2 = squared semi-partial correlation; sc = structure coefficient; GF=Game Friends; RL= Real-Life; * p < .01.

Table 4.21. Hierarchical Regression Results for Bonding Social Capital (*N* =201)

Block	R^2	Model	b	SE-b	Beta	r	sr^2	sc
1	.234	Constant	.539	.285				
		Amount of play*	.138	.038	.226	.253		
		Motivation*	.479	.072	.413	.428		
2	.477	Constant	-.472	.304				
		Amount of play*	.092	.034	.151	.253	.020	.366
		Motivation	.157	.074	.135	.428	.012	.619
		Talk WoW with family	.046	.058	.052	.255	.002	.369
		Talk WoW with RL friends	.052	.064	.057	.351	.002	.508
		Close to family	.057	.065	.061	.263	.002	.381
		Close to RL friends	<.001	.073	<.001	-.002	<.001	.425
		Share personal story with GF*	.192	.063	.206	.537	.025	.777
		Trust GFs*	.277	.085	.247	.552	.029	.799
		GFs as important as RL friends	.144	.063	.162	.523	.014	.757

Note. sr^2 = squared semi-partial correlation; sc = structure coefficient; GF=Game Friends; RL= Real-Life; * p < .01.

Table 4.22. Hierarchical Regression Results for Loneliness (*N* =186)

Block	R^2	Model	b	SE-b	Beta	r	sr^2	sc
1	.019	Constant	3.438	.296				
		Amount of play	-.063	.038	-.120	-.116		
		Motivation	.076	.075	.075	.068		
2	.119	Constant	2.945	.355				
		Amount of play	-.029	.040	-.056	-.116	.003	-.336
		Motivation	.111	.090	.109	.068	..008	.197
		Talk WoW with family	.139	.069	.187	.150	.020	.435
		Talk WoW with RL friends	-.042	.073	-.054	.045	.002	.130
		Close to family	.073	.074	.092	.210	.005	.609
		Close to RL friends	.047	.081	.054	.116	.002	.336
		Share personal story with GF	-.142	.072	-.180	-.125	.019	-.362
		Trust GFs	.126	.097	.134	.023	.008	.067
		GFs as important as RL friends	-.166	.072	-.217	-.130	.026	-.377

Note. sr^2 = squared semi-partial correlation; sc = structure coefficient; GF=Game Friends; RL= Real-Life;
* p < .01.

Table 4.23. Hierarchical Regression Results for Social Support (*N* =182)

Block	R^2	Model	b	SE-b	Beta	r	sr^2	sc
1	.083	Constant	3.047	.310				
		Amount of play*	-.100	.040	-.179	-.164		
		Motivation*	.260	.078	.239	.227		
2	.230	Constant	2.105	.358				
		Amount of play	-.084	.039	-.151	-.164	.020	-.342
		Motivation	.069	.091	.063	.227	.003	.473
		Talk WoW with family	.112	.069	.142	.200	.012	.417
		Talk WoW with RL friends	-.013	.074	-.016	.189	.0001	.394
		Close to family	.063	.075	.074	.321	.003	.669
		Close to RL friends*	.249	.082	.267	.383	.041	.798
		Share personal story with GF	.030	.073	.036	.119	.001	.248
		Trust GFs	.178	.100	.175	.240	.014	.500
		GFs as important as RL friends	-.152	.074	-.187	.036	.019	.075

Note. sr^2 = squared semi-partial correlation; sc = structure coefficient; GF=Game Friends; RL= Real-Life; * $p < .01$.

Table 4.24. Hierarchical Regression Results for Belongingness (*N* =177)

Block	R^2	Model	b	SE-b	Beta	r	sr^2	sc
1	.037	Constant	3.435	.298				
		Amount of play	-.087	.039	-.167	-.162		
		Motivation	.105	.075	.104	.095		
2	.150	Constant	3.043	.353				
		Amount of play	-.072	.039	-.139	-.162	.017	-.419
		Motivation	.080	.090	.080	.095	.004	.245
		Talk WoW with family	.148	.067	.204	.193	.025	.499
		Talk WoW with RL friends	-.014	.073	-.018	.096	.0001	.248
		Close to family	.112	.076	.141	.244	.011	.630
		Close to RL friends	.060	.083	.069	.165	.003	.426
		Share personal story with GF	-.037	.071	-.048	-.059	.001	-.152
		Trust GFs	.033	.100	.035	.014	.001	.036
		GFs as important as RL friends	-.178	.073	-.237	-.138	.030	-.357

Note. sr^2 = squared semi-partial correlation; sc = structure coefficient; GF=Game Friends; RL= Real-Life; * p < .01.

Table 4.25. Results of Enjoyment of Relationships

Outcome Measure	Model 1			Model 2			Change		
	F	p	R^2	F	p	R^2	F_c	p_c	R^2_c
Bridging	35.849	<.001	.266	17.578	<.001	.453	9.338	<.001	.187
Bonding	30.214	<.001	.234	19.391	<.001	.477	12.722	<.001	.244
Loneliness	1.775	.172	.019	2.641	.007	.119	2.852	.008	.100
Depression	3.175	.044	.033	2.178	.025	.098	1.864	.078	.065
Social support	8.147	<.001	.083	5.708	<.001	.230	4.676	<.001	.147
Belongingness	3.337	.038	.037	3.266	.001	.150	3.163	.004	.113

4.5.4. Quality of Guild Play

The amount of game-play and Social motivation were significant covariates for bridging and bonding social capital, and social support. When the four variables of

quality of guild play were entered to the model, all of the second prediction modes were statistically significant. The R^2 changes of loneliness, depression, social support and belongingness were statistically different from zero(see Table 4.30).

For loneliness, the four variables of quality of guild play explained 13.3% of its variance, $F_c(4, 170) = 6.669$, $p_c < .001$, $R^2_c = .133$. It was mostly predicted by satisfied with guild mates (see Table 4.26). Fully 13% of the variance of depression was explained by quality of guild play, $F_c(4, 177) = 6.942$, $p_c < .001$, $R^2_c = .130$. Similar to loneliness, it was mostly predicted by satisfied with guild mates (see Table 4.27). For social support, approximate 16% of its variance was explained by the quality of guild play, $F_c(4, 164) = 8.264$, $p_c < .001$, $R^2_c = .156$, and it was mostly predicted by satisfied with guild leadership (see Table 4.28). Fully 15% of the variance of belongingness was accounted for by the quality of guild play, $F_c(4, 159) = 7.397$, $p_c < .001$, $R^2_c = .150$, but none of the predictors in the model was statistically significant (see Table 4.29).

Table 4.26. Hierarchical Regression Results for Loneliness (*N* = 177)

Block	R^2	Model	b	SE-b	Beta	r	sr^2	sc
1	.023	Constant	3.415	.343				
		Amount of play	-.070	.039	-.136	-.128		
		Motivation	.094	.089	.080	.066		
2	.155	Constant	2.079	.446				
		Amount of play	-.035	.044	-.068	-.128	.003	-.325
		Motivation	.079	.085	.067	.066	.004	.168
		Amount of guild play	-.075	.038	-.173	-.113	.019	-.287
		Organization of guild	.004	.100	.004	.225	<.001	.571
		Leadership	.093	.077	.101	.215	.007	.546
		Guild mates*	.306	.094	.309	.323	.052	.820

Note. sr^2 = squared semi-partial correlation; sc = structure coefficient; * p < .01.

Table 4.27. Hierarchical Regression Results for Depression (*N* = 184)

Block	R^2	Model	b	SE-b	Beta	r	sr^2	sc
1	.039	Constant	3.311	.301				
		Amount of play	-.071	.035	-.150	-.139		
		Motivation	.148	.077	.140	.128		
2	.169	Constant	2.123	.372				
		Amount of play	-.069	.039	-.145	-.139	.014	-.338
		Motivation	.039	.075	.088	.128	.007	.311
		Amount of guild play	-.020	.035	-.050	-.035	.002	-.085
		Organization of guild	.066	.090	.072	.293	.003	.713
		Leadership	.081	.069	.098	.258	.006	.628
		Guild mates*	.228	.085	.256	.008	.033	.849

Note. sr^2 = squared semi-partial correlation; sc = structure coefficient; * $p < .01$.

Table 4.28. Hierarchical Regression Results for Social Support (*N* = 171)

Block	R^2	Model	b	SE-b	Beta	r	sr^2	sc
1	.070	Constant	2.827	.361				
		Amount of play	-.081	.041	-.150	-.120		
		Motivation	.298	.094	.237	.218		
2	.226	Constant	1.173	.455				
		Amount of play	-.052	.045	-.097	-.120	.006	-.253
		Motivation	.301	.089	.239	.218	.054	.459
		Amount of guild play	-.072	.039	-.159	-.064	.016	-.135
		Organization of guild	-.008	.102	-.007	.247	<.001	.520
		Leadership	.247	.082	.261	.344	.043	.724
		Guild members	.223	.103	.208	.309	.022	.651

Note. sr^2 = squared semi-partial correlation; sc = structure coefficient; * $p < .01$.

Table 4.29. Hierarchical Regression Results for Belongingness (*N* = 166)

Block	R^2	Model	b	SE-b	Beta	r	sr^2	sc
1	.047	Constant	3.251	.355				
		Amount of play	-.095	.040	-.181	-.165		
		Motivation	.168	.092	.140	.119		
2	.196	Constant	1.637	.450				
		Amount of play	-.098	.045	-.189	-.165	.024	-.384
		Motivation	.148	.088	.124	.119	.014	.300
		Amount of guild play	-.020	.039	-.045	-.030	.001	-.090
		Organization of guild	.058	.101	.056	.280	.002	.102
		Leadership	.189	.081	.209	.338	.028	.411
		Guild members	.200	.104	.195	.321	.018	.339

Note. sr^2 = squared semi-partial correlation; sc = structure coefficient.

Table 4.30. Results of Quality of Guild Play

Outcome Measure	Model 1			Model 2			Change		
	F	p	R^2	F	p	R^2	F_c	p_c	R^2_c
Bridging	30.159	<.001	.243	11.091	<.001	.266	1.422	.228	.023
Bonding	28.268	<.001	.231	10.938	<.001	.263	1.979	.100	.032
Loneliness	2.012	.137	.023	5.204	<.001	.155	6.669	<.001	.133
Depression	3.649	.028	.039	6.004	<.001	.169	6.942	<.001	.130
Social support	6.289	.002	.070	7.968	<.001	.226	8.264	<.001	.156
Belongingness	3.977	.021	.047	6.465	<.001	.196	7.397	<.001	.150

4.5.5. Cohen's f^2 of All Outcome Measures

Table 4.31 presents Cohen's f^2 of all outcome measures. The biggest effect size on bridging social capital (f^2 = .342*)* was generated by enjoyment of relationships. Based on Cohen's (1988) rule, this is a large effect size. In addition, the biggest effect size on bonding social capital (f^2 = .465*)* was also generated by enjoyment of relationships, and this effect size is large. The biggest effect sizes of loneliness, depression, social support

and belongingness were all associated with quality of guild play. The biggest effect sizes of loneliness (f^2 = .156) and depression (f^2 = .156) were identical, and their magnitude is medium. The magnitudes of the biggest effect size of social support (f^2 = .202) and belongingness are medium to large (f^2 = .185). What's more, communication methods and network level generated bigger effect size on bridging social capital than the effect sizes they generated on bonding social capital, loneliness, depression, social support and belongingness.

Table 4.31. Cohen's f^2 of Outcome Measures

Outcome Measure	Communication Methods	Network Level	Enjoyment of Relationships	Quality of Guild Play
Bridging	.137	.239	.342	.031
Bonding	.133	.124	465	.043
Loneliness	.015	.067	.114	.156
Depression	.049	.037	.060	.156
Social support	.004	.057	.191	.202
Belongingness	.017	.090	.133	.185

4.6. Chapter Summary

In this chapter the researcher reported the results of the frequency distribution of participants` demographic characteristics, motivation for playing MMORPGs, social interactions within MMORPGs, and challenges facing older gamers. Then, the four hypotheses were tested using hierarchical multiple regression analyses, and Cohen`s f^2 were computed for each component of social interactions in MMORPGs.

To summarize, the majority of older WoW players were young older adults who were in their late 50s or early 60s. A substantial majority of them still maintained a certain amount of social contact, and were well-educated. In addition, the majority of them could be defined as heavy gamers (who play video games more than 2.5 hours a day) based on Schutter's (2011) criteria. In addition, oldest older adults played significantly more than younger older adults; and older adults with less than high school degree played significantly more than those with high school degree, four-year degree,

or master degree. The Social motivation, Immersion motivation and Achievement motivation were all very popular among older players. Females spent the same amount of time in MMORPGs as males did. The weekly amount of game-play was not significantly related to Social motivation.

Older adults have used a variety of ways to communicate with other players, and some of them have met with other players face to face. Consistent with previous research results a huge amount of older adults have played WoW with family and real-life friends. Females were more likely to play with family. Some older adults have developed deep friendships with game friends. They shared personal problems with them and treasure them. Females were, generally, more likely to share personal problems with game friends and talk WoW with family. They were attracted to WoW by the *relationship* aspect of the game. Similar to the real-world situations, older adults assess their group players according to real-world rules and morals. While experiencing some challenges that also face young adults, older adults meet specific problems such as feeling less confident due to not being as good as young adults.

Testing the first hypothesis revealed that higher level of using different ways to communicate with other players is positively related to higher levels of bridging and bonding social capital. The hypothesis model of network level predicted that network level is positively related to bridging and bonding social capital, and belongingness, and negatively related to loneliness. The hypothesis model of enjoyment of relationships predicted that higher level of enjoyment of relationships is positively related to higher levels of bridging and bonding social capital, social support and belongingness, and lower level of loneliness. Testing the fourth hypothesis indicated that higher level of quality of guild play is positively related to higher levels of social support and belongingness, and lower levels of loneliness and depression. In addition, it is noted that amount of game-play only contributed a significant part to all of the second models associated with bonding social capital (see Table 4.13, Table 4.16, and Table 4.21). Finally, the values of Cohen's f^2 revealed that the biggest effect sizes on bridging and bonding social capital were generated by enjoyment of relationships, while the biggest effect sizes of loneliness, depression, social support and belongingness were all generated by quality of guild play.

In consistent with Schutter and Abeele (2010)'s study, this research found that the social and emotional meanings of MMORPG playing among older adults are divergent. The majority of older adults gratify the meaningful playing experiences within WoW. Playing WoW is a means to consolidate offline relationships with family and real-life friends. It facilitates deep relationships with in-game friends, although it usually takes years for game friends to become real-life friends. Older adults prefer to group with people who are well-mannered. However, contradicting to Shutter and Abeele's findings, older WoW users didn't consider online play as a lousy alternative for real-life play or communication. Actually, playing WoW provides them a means to cope with loneliness and unhappiness. This difference might be resulted from the different types of games analyzed in each study. This research examined a popular 3D MMORPG with in-game mechanism to facilitate social interactions among gamers, while Schutter and Abeele's study focused on a wide range of digital games.

Chapter 5. Discussion & Conclusion

Previous research in MMORPGs area has focused on young adults. This research takes an original approach by categorizing the components of social interactions in MMORPGs as predictors of six social and emotional benefits of playing MMORPGs on older adults. In the preceding chapters the researcher has discussed the key social-psychological problems (i.e., loneliness, depression and lack of social support) among older adults, and laid out a collection of factors surrounding the effect of playing MMORPGs(i.e., WoW) on the social and emotional wellbeing of older gamers. These issues include motivation for playing MMORPGs, social and emotional impacts of playing MMORPGS, social and emotional meanings of digital games for older adults, the components of social interactions in MMORPGs, and rationales for potential social and emotional benefits. Then, the researcher advanced four hypotheses designed to address whether older adults` social interactions within MMORPGs are related to six social and emotional benefits. Next, the researcher developed a strategy for collecting and analyzing data to evaluate the hypotheses as described. Lastly, the results of the quantitative data were reported. Now the researcher must bring it all together, creating an integrative picture of how the results related to previous findings, what has been learned and what is still left for future research.

5.1. Discussion

5.1.1. Older Adults' Social Interactions in MMORPGs

First of all, WoW users were not primarily adolescents although the exact number of older gamers is not available. This research found 33% of participants were female, while 67% were male. This ratio (female vs. male) is larger than the findings of Griffiths et al.'s (2004) study (approximately 85% online players were male) and Cole and Griffiths's (2007) study (male accounted for 71% of online gamers). On average some

92% of older WoW gamers spent 3 or 4 hours per day in game-play, and the relationship between gender and playing time was not significant within the participants. These are similar to Yee's (2008) findings that MMORPG players, on average, spend 22 hours each week in an MMORPG, and female players played for the same amount of time as men did.

Second, older adults played WoW not only for socialization. MMORPGs appeal to different age cohorts for different reasons due to the inherent complexity and the multitude of activities available in gaming worlds, and the different social circumstances of people at different age stages (Shen, 2014). Yee's (2006a) study found that male players scored significantly higher on all the *achievement* components than female players, while females are more likely to be interested in the *relationship* aspect of the games. Compatible with these findings, this research found that older females were more interested in the *relationship* aspect of MMORPGs. Williams, Consalvo, Caplan and Yee (2009) also found that female EverQuest II players were motivated more by social reasons, while male players were motivated more by achievement-related reasons. Since social contact is an important aspect of older adults' wellbeing, it is predicted that they are attracted to MMORPGs mainly due to the social interactional aspect of the game. This assumption was not met in this research. The Social motivation, Immersion motivation and Achievement motivation were all popular among older adults, and females were attracted to WoW by all of the three types of motivation as males were.

The degree of social interaction was influenced by both individual characteristics and the social architecture of the game itself (Shen, 2014). Players will have to form groups if they want to progress and enjoy the endgame's content, but many players are not observed to be in a group until they are past level 55 (Ducheneaut & Yee, 2008). The more advanced players became in the game, the more frequently they were to interact with other players (Shen, 2014). This research found that roughly 87% of participants have reached level 50 and above, and 84% were at the highest level. Ducheneaut et al.'s (2006a) study found that WoW players spent only about 30-40% of their total time interacting with other players. Although this research didn't directly measure the time of playing with others, it was found that some 88% of participants were guilded, and more than half of participants have played with family, real-life friends,

game friends and other players. The time of guild play was significantly related to Social motivation. Therefore, it could be concluded with confidence that social interactions in WoW were highly frequent among older adults.

Previous studies using different research methods (e.g., quantitative, qualitative, and ethnography) have offered rich description of how social interactions occur in MMORPGs. Cole and Griffiths (2007) reported that 26.3% of MMORPGs users played with family and real-life friends, among which 81% playing the same game with them. Schiano et al. (2011) found 41%-71% of WoW players met some game friends who eventually became a real-life friend. Yee (2006c) reported that 39.4% of male players and 53.3% of female players felt that their MMORPG friends were comparable or better than their real-life friends. Similarly, this research found that older adults' social interactions in MMORPGs can also take place on several different levels, and can be casual or intimate. Many older adults were hard-core players who played with family and real-life friends and were scheduled to group activities, while some were casual players who didn't commit to a rigid schedule for any guild, group, or other players. These casual players used WoW as a channel to make varied and random interactions. Approximate 46% of older WoW gamers have shared personal problems with game friends, and 36.5% agreed that their game friends are as important as real-life friends. Thus, older adults have derived meaningful relationships through WoW playing.

To some degree, MMORPGs are ideal places for learning how to meet people due to the curtain of anonymity. A huge amount of older adults have played with game friends and played in a guild, which suggests that they have learnt how to approach and meet other people in the virtual worlds. Ducheneaut and Moore (2005) indicated that a great deal of learning goes on within a group through group coordination, newcomers' self-observation and more experienced players' direct teaching. Based on the high frequencies of using chatting system and discussing game play and general information with game friends, it is possible that older adults have learnt how to improve their playing skill, and how to coordinate and cooperate with other players through chatting or playing with them. For advanced older players, social skills such as leadership and being sensitivity to others' needs could be learnt as well. Previous study shows that communications among MMORPG gamers are predominantly social-emotional rather than task oriented (Shen & Williams, 2011). Periods of downtime are a perfect platform

for players to experiment and learn about sociable behaviours such as how and when to use humor, and how to approach strangers and progressively build up relationships (Ducheneaut & Moore, 2005). Given the fact that older adults have developed enjoyable relationships within MMORPGs, they could have also learnt how to socialize with people. Building upon previous study, social interactions in MMORPGs could be an important source for older adults' social learning, although this research didn't measure their learning results.

5.1.2. Social and Emotional Impacts of Playing MMOPRGs (i.e., WoW) on Older Adults

According to socioemotional selectivity theory, when time in life is limited, older adults prefer emotionally gratifying social contacts over contacts with novel social partners (Carstensen, 1992). They increasingly emphasize focussing on familiar social partners and emotionally meaningful aspects of relationship. In this research, fully 22% of participants played with family and roughly 20% played with real-life friends frequently or all the time. More than 46% agreed or strongly agreed that playing with family and real-life friends makes them feel close to them. Playing WoW with family has given them something to talk about more than the dreaded question "how was school". It is better creation and more social among family members than staring at the TV and not talking. Therefore, for older adults, playing WoW with family is an effective way to maintain and enhance current offline relationships. In terms of relationships with other players, Ducheneaut et al.'s (2006a) study found that "community" in MMORPGs is not like mythical old villages where everybody knows and interacts with everybody, and the opportunities for small, intense interactions in the context of groups can be rare. This research found that 47.8% of participants trusted their game friends, and 36.5% believed their game friends are as important to them as real-life friends. However, a few participants mentioned that it usually takes years for game friends to become real-life friends. In addition, one participant described that the WoW relationships are like the relationships you'd form with someone in clubs that only a few become real friends. In addition, this research identified one bonding case that game friends helped a player take care of her sister who has terminal cancer. Nevertheless, it is unclear how rare or common this kind of case is. Taken together, the findings of this research are partially

consistent with socioemotional selectivity theory that older adults appreciate emotionally gratifying social contacts.

Steinkuehler and Williams (2006) argued that MMORPGs are particularly conductive for the development of weak connections with diverse populations, or bridging ties, but strong and substantive relationships, or bonding ties, can be rare. Compatible with their argument, this research found that older adults have developed higher level of bridging social capital in WoW, but lower level of bonding social capital. This could be interpreted by the fact that the majority of participants in this research were younger than 65, married, living with someone and employed. So, they already maintain a certain amount of off-line close relationships, and social isolation might not be an issue for them.

What is more difficult to interpret is that this research found higher level of quality of guild play was not related to higher level of bridging and bonding social capital. This contradicts to Zhong's (2011) finding that collective play (measured by time of group/guild play and assessment of group/guild as did in this research) was positively related to bridging and bonding social capital. This finding is also controversial to Steinkuehler and Williams (2006) 's statement that bridging social capital is common in guild and bonding social capital is most likely to exist in guild. Ducheneaut and Yee (2008) investigated the nature and structure of social networks formed among WoW players and indicated that players know at most 1 out of 4 members of their guilds, and play only with 1 out of 10. Therefore, guilds are sparsely knit networks. Actually, small guilds represent the strongest bonding social capital found within WoW; with more members, there is a higher chance of a conflict in styles or ethics (Williams et al., 2006). The average size of the guild in which older adults played most often was 199 (*SD* = 244.530). Approximate 40% of these guilds had more than 150 members. Although the majority of older adults were satisfied with guild play, it was very difficult for them to know every guild member. In addition, it was found by this research that in 16.6% of guilds only a small number (usually about 10) of members were active players even though the guild sizes were huge. Huge guilds are slightly less sociability, and they need more formal organization (Williams et al., 2006).

It was found in this research that the biggest effect sizes on bridging and bonding social capital were associated with enjoyment of relationships. Based on Cohen's (1988) rule, both of the effect sizes were large. This is consistent with the conceptualization of social capital as an individual resource residing in relationships between individuals. Thus, this research found supporting evidence for the hypothesis that higher level of enjoyment of relationships is associated with higher levels of bridging and bonding social capital. It was also found that bridging social capital was mostly predicted by Social motivation and closeness to family, while bonding social capital was mostly predicted by sharing personal stories with game friends. This finding differs from the conceptualization of bridging and bonding social capital in MMORPGs. In this research, pure bonding social capital inheres in family and real-life friends, or strongly-tied game friends. Thus, feeling close to family and sharing personal stories with game friends should be bonding social capital. Norris (2002) suggested seeing the distinction between bridging and bonding social capital as a continuum rather than a dichotomy. This research found that social interactions in MMORPGs are a mixture of bridging and bonding relationships. However, we definitely need more clarification on the conceptualization of bridging and bonding social capital in online communities in order to analyze how these communities shift the balance between bridging and bonding.

The biggest effect sizes of loneliness, depression, social support and belongingness were all generated by quality of guild play. Loneliness and depression were mostly predicted by satisfied with guild mates and social support was by leadership, while belongingness was by the quality of guild play as a whole. This phenomenon could be the result of the membership of guild. Due to the in-game mechanism (for example, guild members need to coordinate with each other in order to win the task), guild members tend to have similar values and play styles. As a result of this collective identity, trust and friendship is more likely to be developed among guild members through repeated collaboration in groups and raids (Shen, 2014). As shown by the quantitative data that more than 70% of older adults were satisfied with their guild organization, leadership and guild mates. Many older adults have been engaged with guild mates and developed deep friendship with some of them. It was found by Shen's (2014) study that guild membership is positively related to players' level of sociability. Guilded players were more likely than unguilded players to participate in social activities

such as chat, trade and collective quests. As discussed in Chapter 2, loneliness, depression and social support is related to the benefits/support/resources existing in interpersonal contact of social networks, while sense of belongingness refers to one's feeling of being an integral part of a system or environment although significant interpersonal relationships is a necessary part of it. Therefore, it could be concluded that higher quality of guild play improves older adults' feelings of loneliness, depression, social support and belongingness. This finding also suggests that playing MMORPGs is about "learning and participating in the shared practices of a game community" (Ducheneaut & Moore, 2005, p.97). The guild membership and high quality of guild play provides older adults opportunities to practice playing skills and interpersonal communication and thus learn social skills such as how to meet people, and how to coordinate and cooperate with others.

Communication methods and network level generated bigger effect size on bridging social capital compared with the effect sizes they generated on bonding social capital, loneliness, depression, social support and belongingness. This finding is predictable and reasonable. Communication methods and network level provides older adults many opportunities to interact with other players and expose them to different viewpoints, but they don't indicate the intention or content of these activities. Communicating and collaborating with other players (no matter using which tool or with whom) does not automatically create a deep social bond among them. It is unclear whether these interactions are social-emotional or task-oriented.

It was found that amount of game-play only contributed a significant part to all of the second models associated with bonding social capital. On the one hand, this is compatible with the finding of Shen's (2014) study that time spent in MMORPGs had a very small impact on players' psychosocial well-being. On the other hand, it indicates that the social and emotional impacts of playing MMORPGs on older adults are very much dependent on the contexts of game-play and enjoyment of the relationships. Time spent in the game engenders deep interpersonal relationships if playing MMORPG is not only about mindlessly killing monsters but also about engagement in meaningful social activities.

5.1.3. “Third Place”, What It Means to Older Adults

Social relationships in MMORPGs suggest new ways of conceptualizing the relationship between “place” and communities (Shen, 2014). Comparing the numerous similarities between MMORPGs and physical third place, Steinkuehler and Williams (2006) claimed that MMORPGs serve best as a new form of “third place” for informal sociability much like the pubs, coffee shops, and other hangouts of old, where people are able to establish and maintain social ties beyond the workplace and home by interacting and collaborating with strangers. Shen (2014) argued that if MMORPGs function as virtual “third places”, they are governed by the rules as much as physical third places such as bars and coffee shops regulated by laws and implicit social norms (cited in Oldenburg, 1997), and the rules and norms in MMORPGs are in part encoded in their technical and social design. For example, WoW encourages players to form group using two classic mechanisms: one is that character classes have specific abilities that complement each other (e.g., priests are the best healers, while warriors are the best melee fighters); another is players have to form either a party or even a raid to have a chance to win the powerful items. This research revealed that the rules and norms were directly or indirectly influenced by older adults’ real-life experiences as well. Older adults assessed who they grouped with based on real-world rules and morals, such as being well-mannered, trusting and responsible, similar game objectives, sense of humour, similar interests, not being judgemental, etc. Therefore, the successful player groups are analogous to the team-based forms of organizations and institutions such as churches and clubs in today’s society.

MMORPGs differ from other online communities, such as forums, Facebook and Twitter, is that they provide “physicality” realized through a rich 3D environment. Some participants mentioned that the huge world of WoW makes it a life time hobby. Playing WoW has improved some older adults’ health such as improvement of sleep pattern, mind, and anxiety. For older adults who are disabled and unable to get out, playing WoW gives them something to do and the various ways of play keep them interested. Although this research found that older adults indeed meet specific physical and personal challenges while playing WoW, problematic usage might not be a main issue for all older players. Since this research didn’t examine the underlying reasons of the negative effects of playing MMORPGs, future research is necessary.

5.2. Future Work

Although it was found that older adults play MMORPGs not just due to social isolation, the question why they play MMORPGs was still not clear. Further qualitative research is clearly needed to understand the cause, contexts or circumstances of older adults' game-play (Is it for socialization, or just to keep the mind sharp and reflexes quick, or both?) and clarify the process by which social contacts and social support are generated. We need to find out more about how older adults develop and sustain relationships with family, real-life friends, game friends and other players, to help us meet the challenges posted by an aging society.

Some participants enjoy being exposed to people with different backgrounds and viewpoints, and some find it easier to talk to game friends than anyone in real life, while others play solo and spend time by themselves in the game but just watch other players chatting. It is similar to the situation when we sit in a coffee shop alone and see people come and go, but we are surrounded by people. In addition, females were more likely to be attracted to WoW by the relationship aspect of the game. So, there is a need for qualitative human behaviour studies to understand older adults' in-game behaviours, and how the in-game behaviours relate to factors such as personality and life experiences.

This research found that higher levels of using different communication tools, network level and enjoyment of relationships are related to higher levels of bridging and bonding social capital. In addition, previous empirical studies revealed the effectiveness and subjective importance of social capital for the maintenance of mental health and well-being among older adults (see discussion in Chapter 1). A more interesting study would be to examine whether social capital within MMORPGs is related to social and emotional factors such as loneliness, depression, social support and belongingness, and whether social capital mediates the relationships between social interactions within MMORPGs and these social-emotional factors.

Although by even the most reckless of estimates, the majority of older adults do not seem to experience problematic usage, further research still needs to be done to gain a deeper understanding of this area. For example, a few participates mentioned

some serious issues such as losing their spouse due to game-play. Studies such as intergenerational play (playing with children and grandchildren) and gender differences also deserve further research to contribute to better understanding this area.

5.3. Limitations

There are several important limitations to this research that deserve discussion. The first one is associated with survey research. All the data collected for this research were self-reports. As such, issues of social desirability and accuracy of response need to be taken into account. The second one is related to the limitation of Web survey. The inclusion criteria are older adults who are aged 55 and over, and have played WoW. Some persons asked in the forum that they were 53 or 54 years old, or have played other MMORPGs (but not WoW), and they were interested in the survey. Although the researcher had a good picture of who should be the participants and mentioned this clearly in the recruitment letters and forum posts, it is still unsure whether those unfitted people completed the survey. The third one is also the limitation of Web survey. As discussed in Chapter 4, the majority of participants are heavy gamers, and most of them have reached the high end of the game. This might result in overestimating the population.

5.4. Conclusion

Drawing on the challenges (i.e., loneliness, depression and lack of social support) facing older adults and prior theoretical and empirical studies, this research explored the social and emotional impacts of playing MMORPGs (i.e., WoW) on older adults aged 55 and over, primarily analyzing the relationships between older adults' social interactions in MMORPGs and some social and emotional factors. The analyses conducted in this research shed a fair amount of light on older adults' social interactions in MMORPGs. It was found that similar to their younger counterparts, older adults' social interactions in MMORPGs can take place on several different levels, and can be casual or intimate, and even romantic. Social interaction in MMORPGs is also an important source for older adults' social learning. It provides older adults opportunities to master

playing skills and learn how to meet and socialize, how to manage a group, and how to cooperate and coordinate with other players. The regression analyses revealed that enjoyment of relationships and quality of guild play has deep impacts on older adults' social and emotional wellbeing. This study also demonstrated that MMORPGs have the potential to function as a "third place" for older adults to socialize and be entertained similar to a real-world club or coffee shop.

Instead of the gross measure of playing time in MMORPGs, this research categorized social interactions into four components: communication methods, network level, enjoyment of relationships and quality of guild play. It contributes to the knowledge of older adults' social experiences in MMORPGs and how it influences their social and emotional life. The findings can form a solid foundation for conducting future randomized controlled trials to measure and evaluate the positive effects of MMORPG playing on older adults. They can also inform the design and development of digital games and community activities aimed at helping older gamers benefit from this technology and reduce the potential negative consequences to the minimum.

As part of the life cycle, everyone may experience declines in social contacts and a number of physical and cognitive functions as we age, leading to some social, psychological and emotional problems. The results of this research are encouraging in that they provide empirical evidence that playing MMORPGs is effective in increasing older adults' social contacts and facilitating meaningful relationships. Older adults are willing to use technology when usefulness and usability outweighs feelings of inadequacy (Heinz et al., 2013). Understanding the opportunities and challenges imposed by MMORPG and the effects that participation in this virtual world has on older adults' day-to-day lives and socio-emotional wellbeing is imperative as society strives to improve the quality of life and long-term independence for older adults.

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Appendix A. The Final Questionnaire

World of Warcraft Player Web Questionnaire

Section 1- Playing Experiences

1. During the **past month**, how many **days per week on average** have you played World of Warcraft?

   □ 0 □1 □2 □3 □4 □5 □6 □7

2. During the **past month**, when you played World of Warcraft, how many **hours per day on average** did you play?

   □ 1 hr or less □2-3 hrs □4-5 hrs □6-8 hrs □More than 8 hrs

3. What is the highest level of your "main" character in World of Warcraft? A main character is the one you play most often if you play several characters.

   □1-10 □11-20 □21-30 □31-40 □41-50 □51-60 □61-70 □71-80 □80+

4. Please use the rating scale below to describe how important each aspect of World of Warcraft is to you.

	Not important at all	Not important	Neutral	Important	Extremely important
Chatting with other players					
Being part of a guild					
Grouping with other players					
Keeping in touch with my friends					
Learning about the lore and legend of Azeroth					
Feeling immersed in the world of Azeroth					
Exploring the world of Azeroth					
Creating a background story and history for my character					
Making my character powerful					
Acquiring rare armour, items and weapons					
Optimizing my character's skills and talents					
Competing with other players					

Section 2- Social Interaction in World of Warcraft

5. Please use the rating scale below to describe how often you use following ways to communicate with other players.

	Never	Rarely	Sometimes	Frequently	All the time
Public chat (e.g., General, Trade, Looking for group channels)					
Group chat (e.g., Group, Guild, Raid channels)					
Private chat (e.g., Custom channel)					
Voice chat (e.g., in-game or Ventrillo)					
Social media (e.g., Email, Facebook, forums, phone)					
Face-to-face meeting					

6. Please use the rating scale below to describe how often you engage in the following actions. (Game friends refers to the people you have met during game play.)

	Never	Rarely	Sometimes	Frequently	All the time
Share my personal problems and issues with game friends and listen to theirs.					
Discuss game play and general information (e.g., food, lore, strategies, weather) with game friends.					
Talk about World of Warcraft with my family					
Talk about World of Warcraft with my real-life friends.					

7. Please use the following rating scale to describe how often you play with the following people.

	Never	Rarely	Sometimes	Frequently	All the time
Family					
Real-life friends					
Game friends					
Other players					

8. Please use the rating scale below to describe your level of agreement with each statement below.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Playing with family members makes me feel closer to them.					
Playing with real-life friends makes me feel closer to them.					
I trust my game friends.					
My game friends are as important to me as my real-life friends.					

9. Which aspects are important to you when you evaluate the players you are grouped with in MMORPGs (Choose all apply)?
    - Whether they can be trusted
    - Whether they are responsible for their own role
    - Whether they are well-mannered
    - Whether we are close to each other
    - Whether we have similar game objectives
    - Whether we have similar backgrounds (e.g., personality, social status and religion)
    - Others (Please specify)

10. Here are some statements about your relationships within World of Warcraft. Please use the rating scale below to describe your level of agreement with each statement.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The people I interact with in World of Warcraft would put their reputation on the line for me.					
There is someone in World of Warcraft I can turn to for advice about making very important decisions.					
The people I interact with in World of Warcraft would share their last dollar with me.					
The people I interact with in World of Warcraft would help me fight an injustice.					
Interacting with people in World of Warcraft makes me want to try new things.					
Interacting with people in World of Warcraft makes me feel like part of a larger community.					
Interacting with people in World of Warcraft makes me interested in what people unlike me are thinking.					
In World of Warcraft, I come in contact with new people all the time.					

11. Do you currently play in a guild?

□Yes □No

If NO, go to Question 16.

12. How many members are in the guild you currently play? _____

13. On average, how many hours a week do you play in the guild?

□Less than 1 □1-4 □5-8 □9-12 □13-16 □17-20 □More than 20

14. Please use the rating scale below to describe how you are satisfied with your social interactions in the guild?

	Very dissatisfied	Dissatisfied	Neither	Satisfied	Very satisfied
Organization of guild					
Leadership					
Guild mates (e.g., nice, friendly, humorous)					

Section 3: Self-Rating

This section asks questions about your feelings and social connections in real life. This will help us understand the impacts of playing World of Warcraft on your social-emotional lives.

15. Below is a list of the ways you might have felt or behaved during **the past week**. Please use the rating scale below to describe your level of agreement with each statement.

During the past week,…	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I felt depressed					
I felt that everything I did was an effort.					
My sleep was restless.					
I felt happy.					
I felt lonely.					
People were unfriendly.					
I enjoyed life.					
I felt sad.					
I felt that people disliked me.					
I could not get “going”.					

16. Here are some statements about your feelings and perceptions. Please use the rating scale below to describe your level of agreement with each statement.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I lack companionship.					
I am an outgoing person.					
There is no one I can turn to.					
I feel left out of social situations					
I feel isolated from others.					
I can find companionship when I want it.					
I am unhappy being so withdrawn.					
People are around me but not with me.					

17. Here are some statements about your perceived social support. Please use the rating scale below to describe how you agree with each statement.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
My family really tries to help me.					
I get the emotional help and support I need from my family					
I have a special person who is a real source of comfort to me.					
I have friends with whom I can share my joys and sorrows.					
There is a special person in my life who cares about my feelings.					
I can talk about my problems with my friends.					

18. Here are some statements about how you feel connected to other people. Please use the rating scale below to describe how you agree with each statement.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I feel connected to the world around me.					
I don't feel connected to anyone.					
Around people I know, I feel that I really belong.					
I don't feel I participate with anyone or any group.					
I feel close to people.					
I have no sense of togetherness with my friends.					

Section 4 –Challenges of Playing World of Warcraft

19. Has playing World of Warcraft caused any of the following **physical problems** for you (Please choose all that apply)?
    - I experience fatigue after playing online for several hours.
    - I sleep less so I can have more time to play online.
    - I skip meals so I can have more time to play online.
    - My exercise habits have changed since I started playing online.
    - I spend less time staying in touch with family and real-life friends because I played World of Warcraft.
    - I experienced conflict with my family and real-life friends over how much time I spent playing World of Warcraft.
    - I was late or missed work because of the time I spent playing World of Warcraft.
    - Other (Specify) _____

Section 5 – Background Information

20. Gender

□Male □Female

21. How old are you?

□55-59 □60-64 □65-69 □70-74 □75-79 □80 and older

22. What's your current relationship status?

□Married □Separated/Divorced □Widowed □Never married

23. Who do you currently live with?

□Spouse/Common law □Family □Others □Alone

24. What is your work situation?

□Full-time employed (paid or voluntary)

□Part-time employed (paid or voluntary)

□Retired

□Never employed

25. What is the highest level of education you have completed?

□Less than high school

□High school or equivalent (such as GED)

□4-Year degree (BA, BS)

□Master's Degree

□Doctoral Degree (e.g., PhD, EdD, MD, JD)

□Other_____

26. Do you have any comments?

Appendix B. Online Gaming Motivation Scale

	Not important at all	Not important	Neutral	Important	Extremely important
Chatting with other players					
Being part of a guild (Guild refers to an organized group of players that regularly play together)					
Grouping with other players					
Keeping in touch with my friends					
Learning about stories and lore of the world					
Feeling immersed in the world					
Exploring the world just for the sake of exploring it					
Creating a background story and history for your character					
Becoming powerful					
Acquiring rare items					
Optimizing your character as much as possible					
Competing with other players					

Appendix C. Internet Social Capital Scales

	Not important at all	Not important	Neutral	Important	Extremely important
Chatting with other players					
Being part of a guild (Guild refers to an organized group of players that regularly play together)					
Grouping with other players					
Keeping in touch with my friends					
Learning about stories and lore of the world					
Feeling immersed in the world					
Exploring the world just for the sake of exploring it					
Creating a background story and history for your character					
Becoming powerful					
Acquiring rare items					
Optimizing your character as much as possible					
Competing with other players					

Appendix D. Revised UCLA Loneliness Scale (R-UCLA)

Instructions: Indicate how often each of the statements below is descriptive of you.

Statement	Never	Rarely	Sometimes	Often
1.I feel in tune with the people around me	1	2	3	4
2.*I lack companionship*	1	2	3	4
3.*There is no one I can turn to*	1	2	3	4
4.*I do not feel alone*	1	2	3	4
5.*I feel part of a group of friends*	1	2	3	4
6.I have a lot in common with the people around me	1	2	3	4
7.I am no longer close to anyone	1	2	3	4
8.My interests and ideas are not shared by those around me	1	2	3	4
9.I am an outgoing person	1	2	3	4
10.There are people I feel close to	1	2	3	4
11.*I feel left out*	1	2	3	4
12.My social relationships are superficial	1	2	3	4
13.No one really knows me well	1	2	3	4
14.*I feel isolated from others*	1	2	3	4
15.*I can find companionship when I want it*	1	2	3	4
16.There are people who really understand me	1	2	3	4
17.I am unhappy being so withdrawn	1	2	3	4
18.People are around me but not with me	1	2	3	4
19.*There are people I can talk to*	1	2	3	4
20.There are people I can turn to	1	2	3	4

Note: Items in italic style are used in the questionnaire.

Appendix E. Center for Epidemiological Studies Depression Scale (CES-D)

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.

	During the Past Week			
	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2) days	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1. I was bothered by things that usually don't bother me.				
2. I did not feel like eating; my appetite was poor.				
3*. I felt that I could not shake off the blues even with help from my family or friends.*				
4. I felt I was just as good as other people.				
5. I had trouble keeping my mind on what I was doing.				
6. *I felt depressed.*				
7. *I felt that everything I did was an effort.*				
8. *I felt hopeful about the future.*				
9. *I thought my life had been a failure.*				
10. I felt fearful.				
11. My sleep was restless.				
12. *I was happy.*				
13. I talked less than usual.				
14. I felt lonely.				
15. People were unfriendly.				
16. *I enjoyed life.*				
17. I had crying spells.				
18. *I felt sad.*				
19. I felt that people dislike me.				
20. I could not get "going."				

Note: Items in italic style are used in the questionnaire.

Appendix F. Multidimensional Scale of Perceived Social Support (MSPSS)

Instructions: We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.

Circle the “1” if you Very Strongly Disagree

Circle the “2” if you Strongly Disagree

Circle the “3” if you Mildly Disagree

Circle the “4” if you Neutral

Circle the “5” if you Mildly Agree

Circle the “6” if you Strongly Agree

Circle the “7” if you Very Strongly Agree

1.There is a special person who is around when I am in need	1 2 3 4 5 6 7	SO
2. There is a special person with whom I can share my joys and sorrows.	1 2 3 4 5 6 7	SO
3. My family really tries to help me.	1 2 3 4 5 6 7	Fam
4. I get the emotional help and support I need from my family.	1 2 3 4 5 6 7	Fan
5. I have a special person who is a real source of comfort to me.	1 2 3 4 5 6 7	SO
6. My friends really try to help me.	1 2 3 4 5 6 7	Fri
7. I can count on my friends when things go wrong.	1 2 3 4 5 6 7	Fri
8. I can talk about my problems with my family.	1 2 3 4 5 6 7	Fam
9. I have friends with whom I can share my joys and sorrows.	1 2 3 4 5 6 7	Fri
10. There is a special person in my life who cares aout my feelings.	1 2 3 4 5 6 7	SO
11. My family is willing to help me make decisions.	1 2 3 4 5 6 7	Fam
12. I can talk about my problems with my friends.	1 2 3 4 5 6 7	Fri

Note: The items tended to divide into factor groups relating to the source of the social support, namely family (Fam), friends (Fri) or significant other (SO).

Appendix G. Social Connectedness Scale

1. *I feel disconnected from the world around me. **
2. *Even around people I know, I don't feel that I really belong. **
3. *I feel so distant from people. **
4. *I have no sense of togetherness with my peers.*
5. I don't feel related to anyone.
6. *I catch myself losing all sense of connectedness with society.*
7. Even among my friends, there is no sense of brother/sisterhood.
8. *I don't feel I participate with anyone or any group.*

Note: Items in italic style are used in the questionnaire.

* In order to balance the scale (positive vs. negative), these three questions were adapted as following:

1. I feel connected to the world around me.

2. Around people I know, I feel that I really belong.

3. I feel close to people.

Appendix H. Cronbach's Alpha for the Short Scales

Scale	N. of Items	Cronbach's Alpha
Online bridging social capital	4	.80
Online bonding social capital	4	.88
Loneliness	8	.88
Depression	10	91
Social support	6	.88
Belongingness	6	.87