

**Project Massive:  
The Social and Psychological Impact  
of Online Gaming**

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## Abstract

Millions of people play online games around the world, some for forty hours per week or more. Speculation abounds about both the positive and negative effects such a popular and time intensive activity might have on those who take part in it. In order to investigate how participation in these virtual worlds and the communities surrounding them might affect the player, three general research questions are posed. What factors contribute to players reporting that gaming has gone beyond being an engaging pass-time and begun to cause problems in their real life? Does play lead to social isolation or, instead, to an expansion in the social connectedness a player feels? Does involvement in online gaming lead to depression or can participation reduce depressive affect?

Following a pilot survey involving 1836 respondents, a revised online survey was used to gather information from avid gamers about their gaming habits, attitudes, and feelings. Employing a longitudinal design, three waves of data were collected over a 14 month period from a sample including 2883 online gamers. Prospective analysis was used to establish causal and temporal linkages among the repeatedly measured factors. While the data provide some indication that a player's reasons for playing do influence the development of problematic usage, these effects are overshadowed by the central importance of self-regulation in managing both the timing and amount of play. An individual's level of self-regulatory activity is shown to be very important in allowing them to avoid negative outcomes like problematic use and, more broadly, depression. Further, the results indicate that participation in online gaming can lead to decreased isolation and enhanced social integration for those players who use online gaming as a medium in which to spend time and interact with real life friends and relatives. No causal link between online gaming and depression is observed, even in those individuals who report viewing their use as problematic. With responsible use, online gaming appears to be a healthy recreational activity that provides millions of people with hours of social entertainment and adaptive diversion. However, failure to manage play behavior can lead to feelings of dependency. Strategies and tools for addressing these self-regulatory deficits and supporting self-regulatory activity with respect to gaming behavior are discussed.

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*To Dad*

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*“Before death is eternity, after death is eternity  
There is no death there's only eternity  
And I be riding on the wings of eternity  
like HYAH! HYAH! HYAH! Sha-Clack-Clack”*

*Saul Stacey Williams*

## **Chapter One**

### **An Introduction**

In 2003 it was estimated that 430 million people worldwide, or 7% of the world's population, played video games (Zona, 2004). Over one quarter of these individuals did so online and that number as a percentage of total video gamers continues to grow. In the United States, half of all Americans age six and older play video games (ESA, 2004). In 2003 worldwide gaming revenues reached \$31.37 billion, including hardware and software, having more than doubled since 1996. This compares to \$34.2 billion in revenue for the film industry in 2003 (Kagan, 2004; Zona, 2004). The gaming population continues to expand alongside these impressive financial numbers. The average age of the video game player in 2004 was 29, and 39% of gamers were female (ESA, 2004). As the demographics continue to diversify, revenue continues to mount, and content becomes more and more adult in nature, there is no sense in which gaming can be defined as “kid stuff”.

The average 13 - 24 year old in the United States watches 13.6 hours of television per week compared to 16.7 hours spent using the internet for activities other than email (Harris.Interactive, 2003). The average adult spends 4 hours per day (or 28 hours weekly) watching television (A.C. Nielsen, 2001). Average weekly video game play is estimated at 7.6 hours (ESA, 2004). It is reported that people who play massively multiplayer online games do so for an average of 15 hours per week; however, weekly usage of 30 hours or more is not uncommon (Seay, 2004; Yee, 2004).

One reason for the popularity of online games is that they meld the fun and challenge of video games with the rewarding social aspects of online community. Participation in online communities allows us to stay in touch with old friends, meet new people, learn, and share information (Rheingold, 1993). It also enables self-exploration and discovery as users extend and idealize their existing personalities or try out new ways of relating to one another that can positively affect real life relationships (Turkle, 1995; Bessièrè et al, under review). On the other hand, some fear that virtual communities detract from social activity and involvement in the real world, replacing real social relationships with less robust online substitutes and causing users to turn away from more traditional media (Kraut et al, 1998; Nie & Erbring, 2000).

Clearly, such a large industry with widening appeal and an expanding rate of use must have some effect on its participants. In order to investigate how participation in these virtual worlds and the communities surrounding them might affect the player, three general research questions are posed and investigated in the current study. What factors contribute to players reporting that they feel “addicted” to rather than just deeply involved in gaming? Does play lead to social isolation or, instead, to an expansion in the social connectedness a player feels? Does involvement in online gaming lead to depression or can participation reduce depressive affect?

## **1.1 A Question of “Addiction”**

Reports in the popular media continue to suggest that the design and content of certain games are responsible for the detachment, depression, and even addiction that some players experience. It is assumed that 10% of online game players are addicted to the activity, an extrapolation from the ABCNEWS.com survey finding that 10% of all users of the internet are addicted to it (Young, 1998; Greenfield, 1999; IGDA, 2003). An internet search for “gaming addiction” yields lists of physical and psychological symptoms from dry-eyes and carpal tunnel syndrome to “problems with school or work,” offered as indicative of problem usage behavior (French, 2002; Orzack, 2004). Clinicians around the globe like Kim Hyun Soo, psychiatrist and chairman of the Net Addiction Treatment Center in Busan, South Korea, claim that online game players “don’t have normal social relationships anymore” and play online games in order to cover feelings of anger, depression and low self-esteem (Scheeres, 2001; French, 2002; O’Dwyer, 2002). An article in the Shanghai Star claims that China houses over 40 million online addicts, 80% of whom

are under 25 years of age (Boa, 2004). The alarmist media coverage of this burgeoning “social dilemma” is not unlike that which meets many technological advancements or entertainment phenomena with deep penetration and wide appeal. The telegraph, nickelodeons, motion pictures, the phone, the television, video arcades, Dungeons & Dragons™, the PC, the Internet; all of these have been at one time accused of being the harbinger of insurmountable social ills.

Whether you believe internet and gaming addiction are real threats or recycled hype, it has become impossible to ignore the activity surrounding the issue. Under increasing public and governmental scrutiny, a major gaming industry group in Korea has laid out a multi-part initiative aimed at combating overuse of online games through education, monitoring software and the establishment of treatment and rehabilitation centers. In a country like Korea where online gaming is so wildly popular and mainstream, even a small percentage of problem users could amount to a social crisis. Anecdotal evidence also continues to mount. Support groups and online communities with names like EverQuest Widows and Spouses Against EverQuest are available on the web full of stories about damaged and destroyed relationships. Communications of the ACM published an editorial on the deleterious impact online gaming has on undergraduates, particularly computer science majors, in the United States (Messerly, 2004). In addition, there do exist truly tragic stories, like that of the clinically depressed young man, described by many who knew him as addicted to EverQuest, who killed himself following an extended session of play (Miller, 2002). Clearly there is something here worthy of study; the first challenge is to determine how to approach it.

## 1.2 A Shift in Terminology

In the popular media, addiction to online games has been likened to pathological gambling, eating disorders and drug dependency (O' Dwyer, 2002). In addition, and in spite of the protestations of leading thinkers in interactive entertainment, both marketing departments and the critical media within the games industry also talk about their games' addictive qualities with pride (Adams, 2002). Paradoxically, when talked about in the context of gaming, the definition and usage of the concept of addiction is quite protean. More often than not, statements made about “addictive gameplay” refer to a desirable quality of the experience marked by incremental reinforcement, perseverance in adversity, and desire to continue; to play “just one more”. For most, the experience of an “ad-



dictive” game is much the same as that of a “page turner” novel; you don’t want to put it down, and it is hard to keep track of time while engaged with it. Games ranging in design and complexity from Windows Solitaire to EverQuest II can provide this kind of gameplay. Clearly, this type of an immersive and rewarding entertainment experience is precisely what the consumer wants and what the developer wants to create. Addiction of this kind could easily be recast as *engagement*, the state of being delightfully attracted to and enwrapped in an experience (Charlton, 2002).

In contrast, addiction can also be used to describe the state of powerlessness a person experiences when, despite several attempts to stop or reduce their usage, they are unable to walk away from a game (or substance, or behavior) even in the face of persistent and deleterious effects on their life. Given the various pejorative, disputed, and clinically laden connotations of the word “addiction”, I have chosen to refer to self-described preoccupation with and inability to withdraw from gaming as *problematic use* of online games. I do this not to refer to addiction euphemistically, but to dissociate the phenomenon under study from the state of biochemical dependency most closely associated with the word “addiction.” For the purposes of the present study, problematic use is quite precisely a state of hyper-engagement with a game that is extreme enough to cause an individual to identify and report its interference with numerous aspects of their real life (Charlton, 2002).

*Problematic use* of online games can be further operationalized as consumption of an entertainment product in such amounts or at such times that it causes demonstrable problems in the user’s real life. Under this definition, online gaming would become problematic when it dominates and displaces other behaviors, leads to conflict, or causes anxiety when unavailable. Even those players spending upwards of 40 hours a week gaming, could simply be adaptively engaged in an enjoyable activity that has little or no negative impact on their well being. These engaged players might have euphoric gaming experiences, play for long periods, and think about gaming even when not doing it, but suffer no ill effects as a result. Such players might actively manage their use of entertainment products, ensuring that gaming remains a positive aspect of their lives. Unfortunately, other players may not be as successful at this self-regulation, and allow persistent involvement in online games to interfere with their everyday life. Self-regulation is characterized by an individual’s management of his or her own behavior through self-monitoring, evaluation against perceived standards, and self-administration of behavioral

consequences. This thesis will cover the distinction between engagement and problematic use and the role of self-regulation in greater detail in Chapter 4. Supposing that problematic use does exist, we can consider how it arises and what its outcomes might be.

### 1.3 Developing a Framework for the Study of Problematic Use

The model of the genesis of problematic use presented in the popular media and the writing of interested clinicians is very similar to those found in the substance abuse literature. This substance abuse model suggests that exposure to online gaming leads to dependence, which in turn leads to any number of negative social and psychological outcomes including depression and job-loss. To paraphrase, models like the one shown in Figure 1.1 suggest that if you play games, you get addicted to them, and if you get addicted to them, you get depressed. The communications tradition would characterize this as a “media effects” model, wherein a homogeneous population is exposed to and somewhat uniformly affected by a given medium.

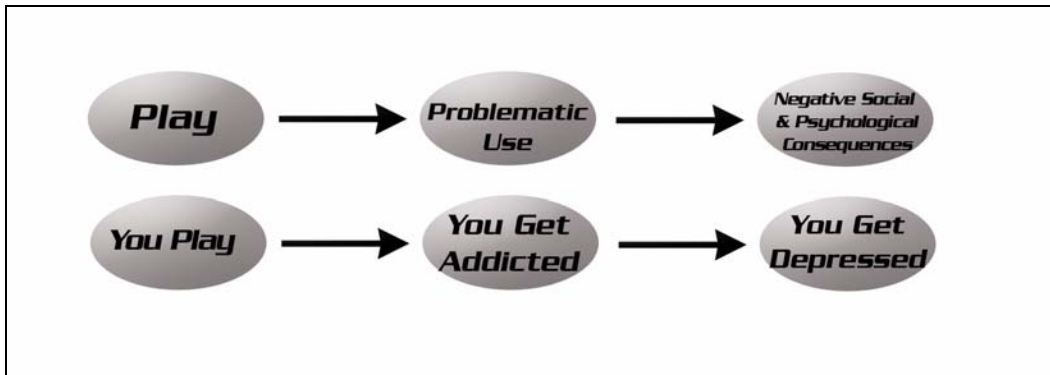


Figure 1.1 : Two examples of exposure or “media effects” models of problematic use.

The adoption of such a model is quite understandable. Exposure models of this type are parsimonious, have a long tradition in many types of clinical practice, and bring with them a ready-made set of therapeutic techniques and treatment objectives. They are quite clearly effective in treating problems once they arise, but less helpful in identification of personal and environmental predictors and thereby quite monotonic in their approach to prevention. To borrow from the most popular substance abuse prevention campaign in memory, such paradigms seem to indicate that the best defense is also the best treatment:

abstinence or avoidance, to “just say no”. The functionally reactive rather than predictive nature of exposure models allows them to omit or ignore several important aspects of the phenomena they describe. Media effects models tend to treat the effected populations monolithically, as a homogenous group of consumers upon which media act. Models of this nature rarely account for the role that individual and environmental characteristics might play in the genesis of a pathology. Given the relatively low frequency of occurrence of “gaming addiction” (4-10% of users) estimated by various sources, it seems safe to assume online games, and participation in the communities that surround them, do not uniformly affect the consumer population. That said, it becomes important to closely examine the personal and environmental factors associated with those individuals who do experience problematic use, relative to those users who do not. The individual’s motivation to play, social environment, and ability to manage their own behavior promise to be important factors in determining the outcome of use of online games. Further, it is clear that problematic use is not the only usage outcome available. Given the explosive commercial success of the interactive entertainment industry it seems that a competing and just as interesting paradigm takes place much more often; that of engaged use. Beyond simple affinity for a given game or genre, investigation of what type of player becomes engaged, how engagement effects time spent playing, and the social and emotional consequences of adaptive use of an engrossing social medium is a necessary compliment to the study of problematic use.

To structure this inquiry, it is helpful to develop a framework that addresses the player’s approach to play, accounts for engaged vs. problematic use, and allows us to unpack the social consequences of use from its psychological consequences. Such a framework is presented in Figure 1.2. We will develop and empirically test this framework in the document at hand.

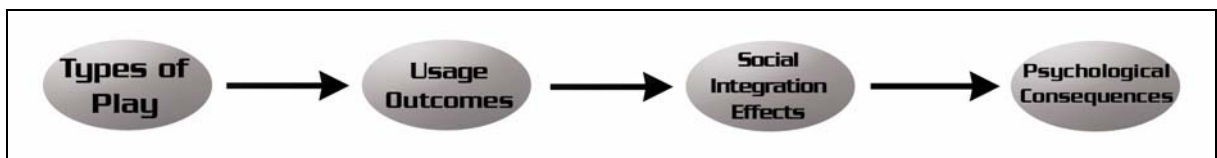


Figure 1.2 : The proposed framework

## **1.4 Thesis Statement**

This work will investigate whether the development of problematic use of online gaming software is more closely associated with pre-existing self-regulatory deficits, player motivation and concurrent social factors than it is determined by the design of the entertainment software itself. Secondly we will investigate the role of social integration in the development of depressive affect in online gamers. Does gaming enhance or ablate social resources and activity? Finally we will investigate the causative links between problematic use and depression, allowing us to see whether problematic use leads to depression or if depression is more often a pre-existing condition that exacerbates the development of problematic use.

Rather than study these factors cross-sectionally, the current study measures the factors of interest repeatedly in order to examine the temporal and causal linkages among them. Using a longitudinal design, we survey gamers in order to examine the social impact of online gaming in terms of commitment to the activity, interaction with real-life and online-friends, and the more personal issues of problematic use and depression. This research places an emphasis on assessing the degree to which over-consumption of interactive entertainment is a causative factor of psychosocial difficulties or a symptom of self-regulatory deficits that are influenced by identifiable aspects of the user's social and emotional life. Rather than presenting the monolithic view that online games are bad or good, we predict that different levels of self-regulatory activity and motivations for play are likely to yield different consequences for the user.

## 1.5 Thesis Organization

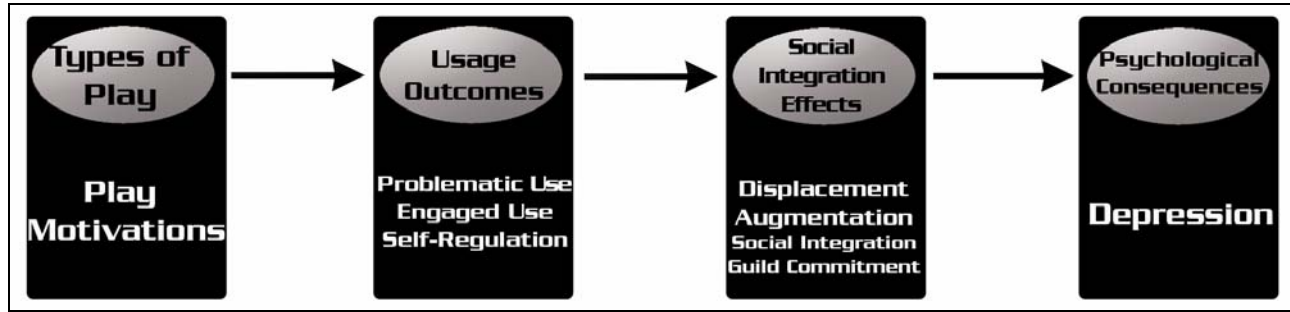


Figure 1.3 : The annotated framework

This thesis is organized to parallel the annotated framework presented in Figure 1.3. Following an exploration of the online gaming domain in Chapter Two, Chapter Three will describe types of play by examining player motivation in terms of player taxonomies and motivational inventories created by Bartle and by Yee. Chapter Four will describe the usage outcomes already introduced (engaged and problematic) and characterize the individual player's ability to regulate their own behavior as an important determinant of their usage outcomes. Chapter Five will discuss the social effects of gaming, describing commitment to social groups within online communities and examining models of how gaming might degrade or enhance a player's social environment. In addition Chapter 5 will also discuss the psychological outcome of depression and its linkage to social integration and problematic use. Chapter Six contains an integrated summary of the rationale for the current study, reiterates the hypotheses framed in chapters four and five and describes the modeling approach used to test them. Chapter Seven describes the survey sample and provides descriptive, cross-sectional analyses. Chapter Eight is devoted to modeling Problematic and Engaged Use. Chapter Nine covers the modeling of social integration and depression. The document closes with Chapter Ten, a summary and discussion of the results and some avenues for future exploration.

*“Reality is a shared hallucination”*

*-Howard Bloom*

## CHAPTER TWO

### The Domain - Multiplayer Online Games

Though still the canonical picture of video game play, the solitary player sitting in front of a PC or television and interacting only with automatically generated visual and auditory stimuli is no longer the rule. In fact, with a few notable exceptions, the single player gaming experience is largely a product of the computer age. Historically, it has usually been at least desirable if not completely necessary to have another person to play with or against. Without attempting to impugn artificial intelligence in any way, it is a relatively safe assertion that games played with and against other humans are especially compelling. Even one of the very first video games, SpaceWar!, was expanded into a networked two player game in 1969 after its appearance on the oscilloscopes of engineering laboratories around the world in the early 60s. Gaming is a largely social enterprise and never has this been more apparent than when one considers online video games.

#### 2.1 Multiplayer Online Games

There is a great breadth of social (and not so social) multiplayer gaming experiences available online, from backgammon to modern combat simulations. One need only peruse the shelves of local retailers, miniclip.com, or Xbox Live Arcade to see that there are gaming experiences from many genres available online in a multiplayer setting. This is not restricted to the PC, as console-based online services like Xbox Live bring the social world of online gaming out of the study and into the living room along with many trap-

pings of the PC experience. Buddy lists, instant messaging, and voice communication are now a part of the formerly simple and comparatively solitary console gaming world. This section will define the classes of multiplayer online games enjoyed by the lion's share of this study's participants: Massively Multiplayer Online games (MMOs), Real Time Strategy Games, and First Person Shooters.

### **2.1.1 MUDs, MMOs & MMORPGs**

Though the true "beginning" is a matter of some debate, a family of online text-based environments called Multi-User Dungeons (MUDs) began to captivate a niche of gamers with academic and commercial access to the internet throughout the 1980s by offering a collaborative social experience in a persistent online world. The experience of playing a MUD is much like that of playing any one of the collection of "Infocom-style" text-based adventure games, except that there are other people playing with you, fighting along side and against you, creating content, and changing the world. MUD1 created by Bartle and Trubshaw was available on the ARPANET in 1980 (Koster, 2002). Due to their accessibility and penetration on college campuses with capable computer systems, MUDs became known pejoratively as Multiple Undergrad Destroyers. Early online communities like Lambda Moo and Habitat grew and flourished around this collaborative communication technology in spite of its no-frills, command line appearance. Text only MUDs still thrive all over the internet in both commercial and public domain manifestations today.

In the mid 1990s, even more players joined in as graphical, internet based multiplayer PC games like Meridian 59 and Ultima Online began to hint at the potential commercial and social impact of what would become the Massively Multiplayer Online (MMO) genre.

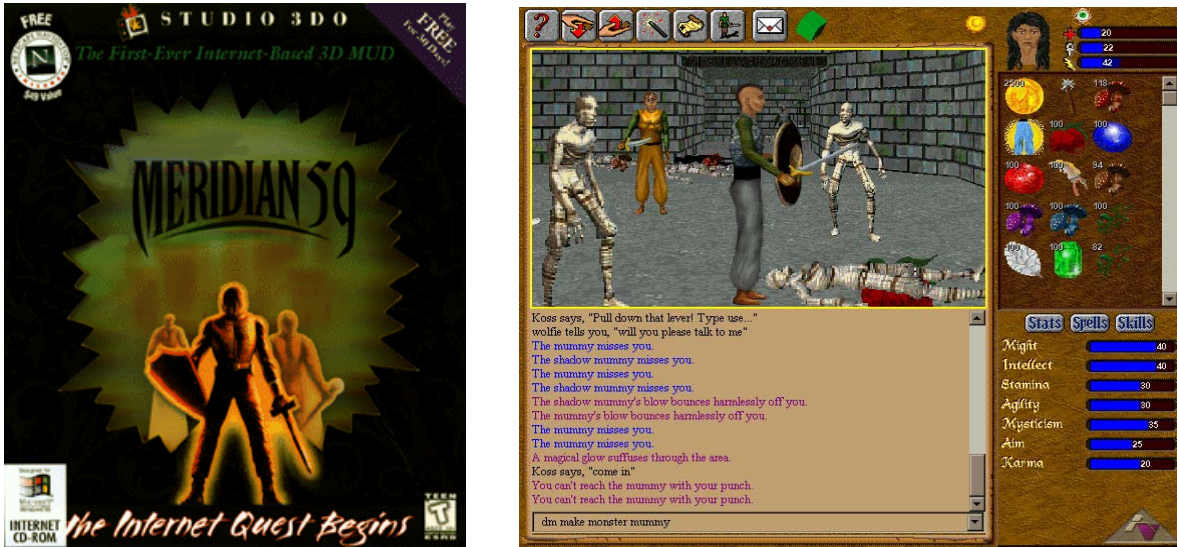


Figure 2.1 : Meridian 59 and Ultima Online were among the first graphical MMORPGS.

Both Ultima Online and Meridian 59 are still available for play on the internet at the time of this writing, a testament to the compelling nature and longevity of well conceived online worlds. Huge commercial successes like Sony's Everquest in 1999 and Blizzard's World of Warcraft in 2004 have followed, cementing the legacy of the genre. With the widespread availability of broadband internet connectivity, and penetration of 3D acceleration hardware, graphically intensive multiplayer online games are now a sizable part of the interactive entertainment industry. Today, comparatively few entertainment products for the PC ship without some form of networked multiplayer component, and the consoles are following suit. For example, Microsoft's online gaming service, Xbox Live is heavily integrated into their latest console product, the Xbox 360. Sony plans to offer a similarly integrated online gaming service with the release of their next console, the PlayStation 3.

Around the world, products like World of Warcraft and EverQuest II command audiences of 200,000 to 5 million subscribers who purchase the client software for 30-60USD and pay a monthly fee of around 15USD to play (Woodcock, 2005). Massively multiplayer games generally require sizable investments by developers in infrastructure and upkeep, but can bear huge dividends when subscriber numbers swell. Blizzard, the developer of World of Warcraft, reported that worldwide subscriptions to their game surpassed 5 million in December of 2005 (Blizzard Entertainment, 2005).





Figure 2.2 : World of Warcraft, a very popular MMORPG

Within MMOs like EverQuest Online Adventures for PS2, Phantasy Star Online for Xbox, and Star Wars Galaxies for the PC, several thousand players can simultaneously join in a persistent gaming experience in a world that exists even when they aren't playing. Participation in these "worlds" allows players to build social relationships with other players, which often develop into organized collaborative groups, called *guilds*. Yee's series of surveys of Everquest players found that social interaction was the primary reason for playing (Yee, 2001). The continuing penetration of broadband internet and voice communication promise to enhance the social and collaborative experiences upon which these games are based.

### 2.1.2 Real Time Strategy

A real time strategy game, or RTS, is a type of strategy game that is played without turns. Instead all moves and countermoves are made in real time, allowing for a faster pace. Though the genre is today characterized by PC titles like Command and Conquer and StarCraft, many trace the roots of the real time strategy genre back to the year 1989 and the title Herzog Zwei for the Sega Genesis/MegaDrive. The game was one of the first to introduce the idea of managing resources to create and deploy semi-autonomous units that would engage in real-time combat. Herzog Zwei offered single player and split screen two-player modes.

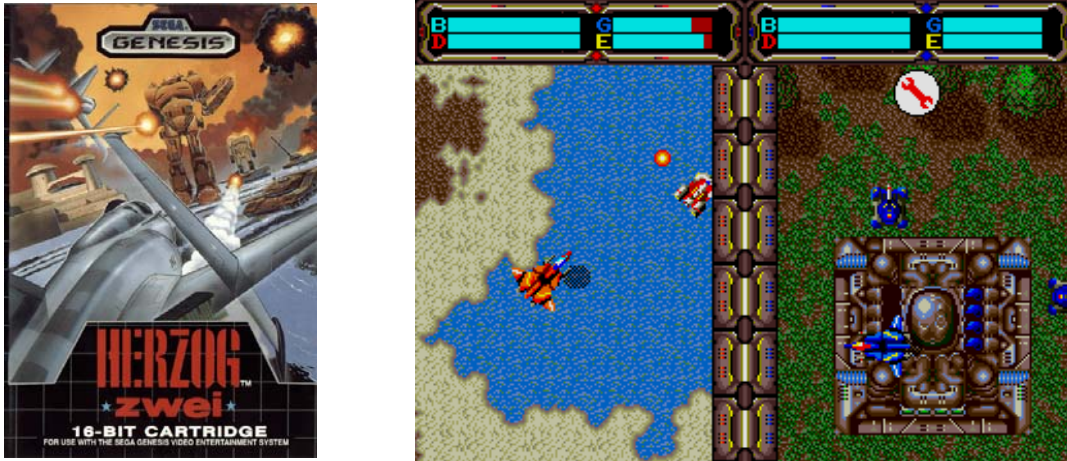


Figure 2.3 : Herzog Zwei, the forefather of modern Real Time Strategy.

Dune II, developed by Westwood Studios and published by Virgin Interactive, was released in 1992 and became the first popular instance of the RTS genre. Based on the Frank Herbert's fantasy universe, Dune II chronicled the struggle between Houses Atreides, Ordos, Harkonnen for control of the planet of Arrakis. In designing the game Brett Sperry introduced tech trees and faction specific units to the genre. Games like Warcraft, Command and Conquer, and StarCraft followed, providing players the ability to compete with one another across direct dial-up connections and later over the Internet.



Figure 2.4 : Starcraft, an exemplar of the conventional Real Time Strategy game.

### 2.1.3 First Person Shooters

First person shooter games, as the name suggests, generally involve taking on the perspective of a person or vehicle with a gun or camera and “shooting” things in the environment. The roots of the first person shooter (FPS) genre extend quite a bit further back in time than those of real-time strategy games. Though somewhat of a controversy, it is generally agreed that the first two implementations of the first person shooter appeared in the early 1970s and were titled Spasim and Maze War. Both of these games eventually supported networked multiplayer competition in realtime. In 1980 Atari released Battlezone in arcades around the US. This vector graphics game involved shooting tanks and UFOs while the player



Figure 2.5 : Battlezone, a coin-op that influenced the development of the FPS Genre.

looked through a simulated “periscope” viewfinder. iD software’s 1992 release of Wolfenstein 3D followed quickly in 1993 by Doom marked the beginning of the modern FPS genre. Though both employed sprite based graphics, the gameplay and level design that came to define the FPS genre were evident in these releases. Several notable titles followed in the next decade including Marathon, Quake, Unreal, and Half-life, leveraging the expanding display and user interface capabilities of personal computers by implementing 3D graphics and mouse-based aiming.

Notable for its longevity and popularity, Counter-Strike is an FPS played around the world and used in professional competition. It started out as a free modification or



“mod” of Valve’s Half-Life and became renowned for its fast-paced, team oriented gameplay. As with other mods, the customizability of Counter-Strike gave rise to a large amount of player created content ranging from player skins to levels. Along with games like the Battlefield series from Digital Illusions, Infinity Ward’s Call of Duty, and Epic’s Unreal Tournament series, Counter-Strike is an important part of the thriving online community of players and fans surrounding PC first-person shooters.

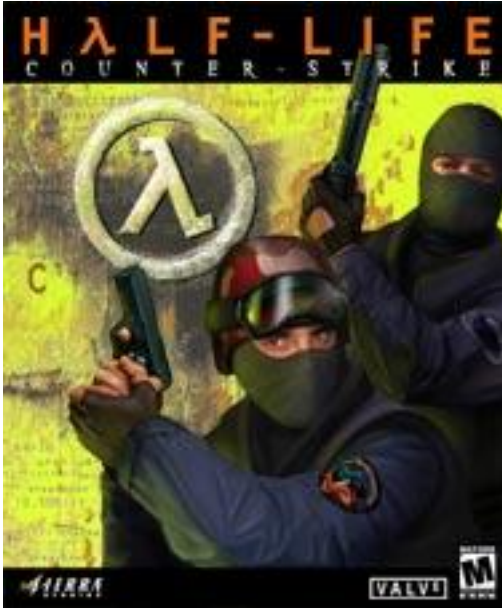


Figure 2.6 : Counter-Strike is a seminal online multiplayer FPS title.

Important FPS releases on console systems include Goldeneye 007 for the Nintendo 64, SOCOM for the Playstation2, and Halo and Halo2 for Xbox. SOCOM, from Zipper Interactive, was among the first console games to support voice communication, a substantial improvement that addressed the need for tactical coordination in multiplayer FPS, but also a huge social enhancement. Halo, from developer Bungie, did not directly support play over the internet when it was released. However, enterprising gamers were able to overcome this limitation with a PC based, companion application named Xbox Connect, which enabled Xbox gamers to locate and join one another’s games over the internet. The launch of the Xbox Live service in 2002 brought voice communication to Xbox gamers as well as social functions like friends lists and messaging that had previously been available only to PC gamers.

## 2.2 The Future of Online Gaming

Market research firm Parks Associates reported that online gaming service revenues will increase from \$1.1 billion in 2005 to \$3.5 billion in 2009 (Graft, 2005). This analysis refers to developer revenue from provision of online service and content, not hardware. We can be sure that while this continuing expansion will include the Massively Multiplayer, Real Time Strategy, and First Person Shooter genres, it will not be limited to them. “Smart Phones” and other mobile devices equipped with global positioning provide an, as yet, largely untapped opportunity for networked multiplayer gaming. Further, genre-bending titles like *Savage* from S2 Games mix gameplay and interface elements in a way that promises to change the way we play even as they presage opportunities for cross platform gaming. Taking a step even further from the desktop or game room, scientist and artists like Steven Benford and Blast Theory have pointed the way to combining conventional gaming technology and Live Action Roleplaying, or LARP, to create groundbreaking user experiences like *Uncle Roy All Around You*. These types of revolutionary “games” promise that technology may someday be a relatively invisible supporter rather than central mediator of collaborative and social interactive entertainment experiences. Today’s proving ground for these designs and ideas is the internet and the multitude of communities that exist there.

As Internet usage continues to grow, so do new ways of relating to other people digitally, through online games, blogs, social network systems like Orkut and Friendster, and assorted wireless applications. Due to their large and dedicated populations, online games are perhaps the most useful current example of large, vibrant, and commercially viable digital communities. As the designers and creators of the digital future, it is imperative that we assess the impact that participation in these online communities has on the individuals who become involved with them. As you will see in the coming pages, Project Massive was conceived and executed as a small step in that direction.

## 2.3 Chapter Summary

In this chapter we discussed multiplayer online gaming, focusing on three of its most prevalent genres, MMORPGs, Real Time Strategy games, and First Person Shooters. We also briefly discussed some current trends affecting the future of online gaming.

*“I have come to the conclusion that my subjective account of my motivation is largely mythical on almost all occasions. I don't know why I do things”.*

*- J. B. S. Haldane*

## CHAPTER THREE

### Player Motivations - Why & How We Play

Given the preceding treatment of the general landscape of multiplayer online gaming we are now able to explore the motivational side of gaming, to ask why the player plays. In doing so we might be able to better grasp why online gaming does not have a uniform effect on those who play. To extend to online gaming the findings of Bessière et al (under review) with respect to internet use, the reasons for an individual's use of gaming might logically influence the outcomes of that use. In this chapter we examine two ways of looking at play motivation, one created by Richard Bartle and one by Nicholas Yee. Both were developed to address player types and play motivation primarily in MUDs and MMORPGs, but their descriptive powers do seem to extend well beyond the confines of that genre.

#### 3.1 Bartle's Types

Clearly, people bring different motivations and expectations to the game play experience. These motivations go a long way in describing not only why one plays, but also how one goes about it. Richard Bartle laid out an initial taxonomy of MUD players that identified four categories based on motivation and behavior (Bartle, 1996). This taxonomy, commonly known as “Bartle's Types” is presented in Table 3.1.

Bartle's Types	
Player Type	Definition
Achievers	Are driven by in-game goals, usually some form of points gathering –whether experience points, levels, or money.
Socializers	Use the virtual construct to converse and role-play with their fellow gamers.
Explorers	Are driven to find out as much as they can about the virtual construct including mapping its geography and understanding the game mechanics.
Killers	Use the game to cause distress on other players, and gain satisfaction from inflicting anxiety and pain on others.

Table 3.1. Bartle's Types as described in "Hearts, Clubs, Diamonds, Spades".

Bartle's Achievers are driven by game centric goals, to be the best, at the top of the rankings, first to the level cap with the best loot and the most gold. Further, Achievers participate in the other types of play like exploring or socializing to the degree that they facilitate these primary goals. For example, an achiever might socialize with other players in order to gather information about efficient play strategies or might explore the game world for the purpose of finding greater treasures and more powerful opponents to do battle with.

Socializers are primarily interested in interacting with other people in the virtual world. The game itself is secondary, providing context in which they can get to know others, relate to them, learn from them, and share with them. Sometimes socializers roleplay, taking on a virtual persona that may be an enhanced ideal of or altogether different from their real life identity. Whether socializers act like their real selves or an alter-ego, they maintain an interest in interpersonal relations and social interaction above all else.

Explorers seek to discover, understand, and even record all that the game has to offer. This pursuit is not limited to digital flora, fauna, and geography either. Bartle's Explorers are also deeply interested in understanding and deconstructing the game's core mechanics, like combat systems, loot tables, spawn maps, and economies. This exploration and experimentation can lead to rewarding discoveries about how the world works that can be highly, if sometimes illicitly, profitable.

Killers are characterized by what Bartle refers to as a desire to impose themselves on the play experience of others. Most often this is done by killing other players for the joy of

“knowing that a real person, somewhere, is very upset by what you've just done, yet can themselves do nothing about it.” Killers are commonly referred to as “griefers” and their actions as “grief play” given their orientation toward annoying and aggravating others.

Bartle’s analysis is based on observational data and his extensive experience as a designer and user of MUDs, and presents a useful and detailed account of why these types exist, how they interact with each other, methods for increasing or decreasing their prevalence in a given environment, and the interactive design implications of doing so.

Though Bartle’s work on the types seems to have originally been directed solely at the MUD user community, the general framework has been applied to games as unMUD-like and outwardly disparate as Sissyfight 2000 and Counter-Strike. It should be noted that Bartle expanded his taxonomy to eight types in later work (Bartle, 2003).

### 3.2 Yee’s Facets

Yee set out to refine Bartle’s types by creating a set of statements about player motivation and activity within MMOs and presenting them in a web-based survey. Using exploratory factor analysis, Yee derived five factors he calls “motivational facets” as opposed to player types (Yee, 2002). Yee’s original facets are presented in Table 3.2.

Yee’s Motivational Facets	
Facet	Definition
Relationship	Measures the desire to develop meaningful relationships with other players in the game. Relationship motivated players derive and provide emotional support from online friends through the game.
Immersion	Measures the desire to become immersed in a make-believe construct. These players role-play and try-out new personas while playing the game.
Grief	Measures the desire to objectify and use other players for one’s own gains. These players kill, taunt, beg, scam and annoy in both overt and subtle ways.
Achievement	Measures the desire to become powerful within the construct of a game. These players concentrate on increasing their wealth and accomplishments in the game through whatever means is most efficient.
Leadership	Measures the desire to become powerful within the construct of a game. These players manifest their influence through assertive and effective management of other players.

Table 3.2. Yee’s Motivational Facets.



There is a great deal of similarity between Yee's and Bartle's types. For example, the Achievement types are roughly equivalent and Bartle's Socializers map to a degree onto Yee's Relationship factor. Bartle's Killers would resonate with the Grief factor, but this factor also includes other forms of annoying and manipulative play like begging and scamming. Yee's Immersion factor refers relatively strictly to the role-playing aspect of play, the motivation to take on and act out a fantasy persona, something that Bartle included in his description of Socializers. Yee's Relationship factor focuses on interpersonal relationships, the offering and receiving of emotional support, etc. The Leadership factor is a novel contribution of this version of Yee's Facets scale, but contains relatively few items and overlaps with Relationship. For a detailed account of the development of the Facets scale including factor loadings, please consult "Facets: 5 Motivation Factors for Why People Play MMORPG's" (Yee, 2002). Again, it is important to note that Yee's framework is evaluative rather than simply descriptive, in that it is derived from factor analysis of a set of likert-type assessment items developed by the author.

As both Bartle and Yee indicate, it is important to realize that there is overlap among the categories in these taxonomies. In fact, Yee's Facets scale can be more gainfully viewed as an inventory rather than a taxonomy, in that much like a personality inventory any given player could, and likely will, score highly in a collection of the motivational attributes presented.

Since the Facets inventory is comprised of brief and well designed assessment items, they lend themselves to use in online survey tools. In collaboration with Yee a modified version of the Facets inventory was used in the current study's web survey. For the purposes of discussion here the modified version of the original Facets inventory will be referred to as Facets  $\alpha$ .

### **3.3 Facets $\alpha$**

By applying exploratory factor analysis to an aggregate data set of Facets response data borrowed from Yee, we established the Facets  $\alpha$  scale. Iterative split-sample analyses were run using varimax and promax rotations to extract five reliable factors comprised of items that loaded together across iterations. Scale reliability numbers for the Facets  $\alpha$  factors derived from the Project Massive survey are presented in Table 3.3. The complete item list with loadings for Facets  $\alpha$  can be found in Appendix 8.

	Wave 1	Wave 2	Wave 3
Achievement	.677 (1483)	.644 (876)	.661 (770)
Escapism	.713 (1480)	.697 (881)	.720 (781)
Roleplaying	.736 (1467)	.476 (903)	.760 (779)
Manipulation	.714 (1480)	.681 (900)	.742 (774)
Relationship	.819 (1484)	.823 (908)	.819 (773)

Table 3.3. Scale reliability results for the Facets  $\alpha$  by survey wave, (n) = # of respondents.

The relatively lower reliability results from Wave 2 for Roleplaying and Manipulation reflect an attempt to use an abbreviated scale during that wave of the survey in response to complaints about survey length. The abbreviated scale was abandoned in favor of the full scale for wave 3. Facets  $\alpha$  is similar to the original Facets instrument in that it maintains the Relationship, and Achievement factors and recasts the Grief and Immersion factors as Manipulation and Roleplaying for the purposes of general clarity. Due to low reliability, weak factor loadings, and a small number of associated items, the Leadership factor was dropped from the scale<sup>1</sup>. Further, an Escapism factor was created from existing items within the original Facets scale that clustered strongly both mathematically and conceptually around the use of gaming as a stress relieving escape.

Since, like personality traits, a given player might have a mix of various motivations influencing their style of play, it is interesting to look at the relationships between the motivation factors. The intercorrelation of all the play motivation factors is displayed in Table 3.4.

	Achievement	Escapism	Roleplaying	Manipulation	Relationship
Achievement	-	.230 (2697)	-.035 (2677)	.333(2686)	.013 (2693)
Escapism	-	-	.210 (2687)	.085 (2697)	.226 (2706)
Roleplaying	-	-	-	-.033 (2691)	.337 (2700)
Manipulation	-	-	-	-	.046 (2709)
Relationship	-	-	-	-	-

Table 3.4. Intercorrelation of the player motivation factors, (n) = # of respondents.

Let us discuss these relationships as we examine each of the Facets  $\alpha$  factors in greater detail.

<sup>1</sup> Yee has also dropped the Leadership factor from newer versions of the Facets scale.

### 3.3.1 Achievement

Achievement players place an emphasis on feeling like and being regarded by others as accomplished players. They are interested in having the best gear in the game in as much as it supports their desire to be powerful and effective in combat and renown among their fellow players. In games with level treadmills, achievement players find it important to optimize their experience gain, seeking out ideal hunting spots and companions that enable them to progress quickly and efficiently through the levels to the maximum level the game allows. Achievement correlates moderately with Escapism ( $r(2695) = .230, p < .001$ ) and Manipulation ( $r(2684) = .333, p < .001$ ), indicating that Achievement players sometimes share these motivations. This makes sense considering Achievement players might view gaming as a way to escape into a world where they are powerful and successful. Further, there is little doubt that some successful players do value the collateral enjoyment of crushing and demoralizing their opponents en-route to achieving game-centered goals.

### 3.3.2 Escapism

Escapism players value gaming as an opportunity to get away from the pressures of the real world. Entering the virtual world allows an Escapism player to forget about day-to-day concerns and take a therapeutic break from reality. Gaming is an attractive release due to the various forms of stress relief it offers, providing the ability to vent frustrations and anxieties built up during the course of normal daily life. In addition to its aforementioned relationship to Achievement, Escapism is also moderately correlated with Relationship play ( $r(2704) = .226, p < .001$ ) and Roleplaying ( $r(2685) = .210, p < .001$ ). It is logical that an Escapism player might be interested in meeting and interacting with people online in an effort to augment or compensate for unsatisfying or stressful real life relationships. That an Escapism player might be interested in taking on and acting out a virtual persona in the course of taking a therapeutic break from the real world is equally understandable.

### 3.3.3 Roleplaying

Roleplaying players enjoy the fact that gaming allows them to become part of a fantasy world. These players place an emphasis on taking part in the narrative flow of the virtual world, shaping it through their participation in the world and interaction with other players. Sometimes they will solidify the historical roots of their character in the game world

through the creation of elaborate back-stories and personal biographies. In addition to its relationship to Escapism, Roleplaying is correlated with Relationship ( $r(2698) = .337$ ,  $p < .001$ ) as well. Given the strong social focus of the Roleplaying motivation, it is little wonder that players scoring high in this dimension might be interested in robust interactions with the other players in the gaming world.

### 3.3.4 Manipulation

Manipulation players are characterized by a desire to annoy and exploit other players. Tactics and techniques for “grief play” vary across games, but manipulation players will do what ever is necessary to “get a rise” out of others, be it abusive language, team killing, corpse humping<sup>2</sup>, corpse or spawn camping<sup>3</sup>, begging, scams and/or ninja looting<sup>4</sup>. Though many of their techniques are profitable in terms of game currency or points, the primary treasure sought by these individuals is the aggravation of their fellow players. Interestingly, players scoring high in Manipulation tend to be younger ( $r(2719) = -.316$ ,  $p < .001$ ), male ( $F(1, 2724) = 118.45$ ,  $p < .001$ ), and more likely to play games other than MMOs ( $F(1, 2724) = 160.10$ ,  $p < .001$ ).

### 3.3.5 Relationship

Relationship players are attracted to the social aspects of gaming. They see gaming as an opportunity to meet and interact with new people. These players move beyond debating game mechanics to seek out meaningful conversations with others in which they discuss personal issues. Relationship players enjoy participating in the lives of other people, offering and receiving support and advice regarding real life concerns. These players not only regard their online associates as good friends, they value them as “real” friends. As discussed above, Relationship play is correlated with Escapism ( $r(2704) = .226$ ,  $p < .001$ ) and Roleplaying ( $r(2698) = .337$ ,  $p < .001$ ).

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<sup>2</sup> Corpse humping – crouching repeatedly or jumping up and down over a downed and helpless opponent

<sup>3</sup> Corpse/spawn camping – remaining nearby a fallen opponent or spawn point in order to take advantage of their weakened state and defeat them again when they revive

<sup>4</sup> Ninja looting – violating common trust and courtesy by removing treasure from a defeated monster without conferring with fellow group members, particularly egregious in cases where the offender cannot actually use the items looted and does so solely to deny them to others.

### **3.4 Motivations at Play – Some Expectations**

We have noted that Achievement players are interested in accomplishments and accolades. In some games, it takes a considerable time commitment and level of dedication to reach the higher levels of the game. We might expect Achievement players to become more engrossed in the games that they play, given that they adopt game centered goals as personal goals. We also might expect that Achievement play would be associated with relatively higher amounts of time spent playing compared to the other play motivations reflecting the investment in being (or at least being seen as) a top player.

As we have discussed, Escapism play is characterized by the desire to take a break from the real world. This type of avoidance behavior can be quite adaptive, as entertaining activities can provide needed distraction and recuperation in the presence of stress. As with many other avoidance behaviors, however, moderation is very important. If resorted to too frequently or taken to an extreme, the use of online gaming to escape real world difficulties might lead to neglect and dereliction of responsibility and social isolation.

On the other hand, since online gaming can be a highly social activity, it is logical to expect that Relationship players might feel that their social lives are enhanced through interaction with online friends and acquaintances. As we discuss and develop the issues of Engaged and Problematic Use in chapter 4 and social integration and depression in chapter 5, we will begin to be able to more fully articulate some hypotheses about how the player motivations discussed in this chapter might relate to these outcomes of interest.

### **3.5 Chapter Summary**

In this chapter we discussed two taxonomies that have been developed to account for player behavior and motivation in online games, Bartle's Types and Yee's Facets. The creation of a modified version of Yee's Facets used in the current study was discussed, followed by a description of each motivation type it contains. General expectations for a collection types were then briefly discussed.

*“All I can do is read a book to stay awake*

*And it rips my life away, but it’s a great escape.”*

*-Shannon Hoon*

## CHAPTER FOUR

# Usage Outcomes – Problematic Use, Engaged Use & Self Regulation

In order to take advantage of the descriptive leverage granted by the player motivation scale and examine the relationship between problematic use, engaged use, and self-regulation, we must first describe each of these constructs individually. In this chapter, the definition and measurement of each of these constructs is discussed. Following this discussion, a model of the relationship between the constructs is presented. We will discuss how problematic use and engaged use reflect two distinct ways the player might feel about their play; is it causing problems in my life or is it simply and adaptively engrossing activity? Finally, two hypotheses are advanced that will help address the following question: How do play motivation and self-regulatory behavior relate to the development of engagement with versus problematic use of an interactive entertainment product?

### 4.1 Pathological Internet Use

The American Psychological Association formally recognized Internet Addiction in the late 1990s and gave it a more clinically precise title, Pathological Internet Use (PIU). PIU has become the focus of much interest in recent years. The most popular definitions and metrics of PIU are adapted directly from clinical definitions of substance abuse/dependency and impulse control disorders found in the Diagnostic and Statistical Manual of Mental Disorders (DSM). It is evident that the DSM criteria share a theoretical basis with Goodman’s criteria for addictive behavior, found in Table 4.1 below, and Brown’s work on pathological gambling (Goodman, 1990; Brown, 1991; Brown, 1993).

These works, in turn, serve as theoretical and empirical referents for much of the current work on internet and computer gaming addictions (Goodman, 1990; Brown, 1991; Brown, 1993; Young, 1998; Greenfield, 1999; Griffiths, 2004; Young and Case, 2004).

Goodman’s Criteria for Addictive Disorders
Recurrent failure to resist impulses to engage in a specified behavior.
Increasing sense of tension immediately prior to initiating the behavior.
Pleasure or relief at the time of engaging in the behavior.
At least five of the following: <ol style="list-style-type: none"> <li>1. Frequent preoccupation with the behavior or with activity that is preparatory to the behavior.</li> <li>2. Frequent engaging in the behavior to a greater extent or over a longer period than intended.</li> <li>3. Repeated efforts to reduce, control, or stop the behavior.</li> <li>4. A great deal to time spent in activities necessary for the behavior, engaging in the behavior, or recovering from its effects.</li> <li>5. Frequent engaging in the behavior when expected to fulfill occupational, academic, domestic or social obligations.</li> <li>6. Important social, occupational, or recreational activities given up or reduced because of the behavior.</li> <li>7. Continuation of the behavior despite knowledge of having a persistent or recurrent social, financial, psychological, or physical problem that is caused or exacerbated by the behavior.</li> <li>8. Tolerance: need to increase the intensity or frequency of the behavior in order to achieve the desired effect, or diminished effect with continued behavior of the same intensity.</li> <li>9. Restlessness or irritability if unable to engage in the behavior.</li> </ol>
Symptoms have persisted for at least 1 month, or occurred repeatedly over a longer period of time.

Table 4.1. Goodman’s Five Criteria for Addictive Disorders.

Brown referred to problem gambling as a type of behavioral addiction and developed six general criteria to diagnose them: Tolerance, the need to engage in the problem behavior for longer periods of time in order to attain the desired effect; Euphoria, the high brought on by engaging in the behavior; Salience, the ongoing dominance of the behavior in thought and action(sometimes divided into Behavioral and Cognitive Salience); Conflict, the behavior causing both psychological and environmental discord; Withdrawal, negative affect associated with periods of inability to engage in the behavior; and Relapse, resumption of the behavior despite efforts to stop. It is easy to see the conceptual commonalities between Goodman and Brown’s sets of criteria. Perusal of the criteria also indicate that, as LaRose observes, deficient self-regulation is both implicit in the definition of addiction and explicit in the criteria commonly used to assess it (LaRose, 2003).

Many tools aimed at the assessment of Pathological Internet Use rely heavily on these diagnostic criteria. Young's initial instrument for the diagnosis of internet addiction used eight, DSM-derived dichotomous items and classified any respondent with five or more affirmatives as dependent. Young reports that 396 (80%) of the 496 respondents in her initial study were classified as "Internet addicts" based on this criterion (Young, 1998). Griffith's early work on addiction to video games also employed a short, DSM-based set of eight true/false items, on which those scoring four or more affirmatives were classified as addicted. Thirty three percent of Griffith's initial sample of 24 undergraduate psychology students met this criterion. In his book *Virtual Addiction*, Greenfield advances the Internet Abuse Test (IAT) and Virtual Addiction Test (VAT), both 12 item, dichotomous instruments with diagnostic cut points of 5 and 6 affirmatives, respectively (Greenfield, 1999). More recently, Salguero and Moran employed a similarly derived, nine-item, dichotomous instrument to measure problem video game play in Spanish adolescents, though no arbitrary diagnostic cut point for addiction was set (Salguero, 2002).

Many of these instruments have evolved to include more items and employ five to seven point, Likert-type response scales, rather than yes/no dichotomies. Still, critics argue that short, DSM-based instruments of this type that operate on arbitrary and often low diagnostic cut points may wildly inflate the reported frequency of the phenomena they purport to measure (Charlton, 2002; Davis, 2002; Charlton, 2004; Danforth, 2004). In addition, almost all of these studies of internet addiction employ a monolithic model of internet use, making no attempt to disaggregate it into its component functions (e.g. communication with family, entertainment, meeting new people, news and information seeking). This shortcoming renders these studies methodologically incapable of detecting the differential effects that various utilitarian and non-utilitarian uses of the internet have on the user (Bessièrè et. al, under review). Further, it seems that many of those who speak loudest about the prevalence of these types of addictions also operate commercial enterprises aimed at profiting from their "treatment" through books, seminars, home courses, and online or in-vivo therapy sessions.

#### **4.1.1 The Bifurcation of Computer Addiction**

In administering a tool that combined DSM based items and the Engagement-Apathy subscale of his own Computer Apathy and Anxiety Scale, Charlton discovered that Brown's six criteria did not universally load on a Computer Addiction factor (Charlton,



2002). In fact, only Behavioral Salience, Conflict, Relapse, and Withdrawal loaded on addiction. The others, Tolerance, Euphoria, and Cognitive Salience, loaded on a Computer Engagement factor. This finding suggested that scales based on Brown's six factors did not measure a unitary phenomenon. Instead some of these criteria, commonly viewed as symptomatic only of clinical dependence, were more strongly associated with a non-pathological construct, that of *engagement*. Engagement can be defined as a state of deep interest in and involvement with a medium. When considered in the context of reading a novel, we can see how the three of Brown's criteria are decidedly less "problematic" than the others.

When an individual picks up a book, they might read only a few pages or chapters in the first sitting. As they become more enwrapped in the story, it might be necessary to read several chapters at a time in order to consume a satisfying portion of the narrative. This is illustrative of the concept of tolerance, requiring more of something to get the desired effect, but it is not necessarily pathological. Similarly, there is nothing inherently "bad" about euphoria, though the term may overstate the enjoyment one derives from reading. Still, the "high" or "rush" or "enjoyment" one gets from engaging in an activity is not necessarily harmful. On the contrary, euphoria, happiness, and satisfaction are concepts of value in all but the most puritanical of cultures. Lastly, there is nothing inherently "problematic" about having one's thoughts occupied by a book one is reading at times when they are not actually reading it. Thought provoking books or movies that "follow you out of the theater" and populate your thoughts and conversations long after they end are desirable parts of life and the consumption of media. To be sure, any of these three factors could become problematic when taken to an extreme, e.g. heavy consumption requirements brought on by tolerance or cognitive salience so extreme as to reach "pre-occupation". The point to be made here is that tolerance, euphoria, and cognitive salience are not inherently pathological in the way that the other four criteria, behavioral salience, conflict, withdrawal, and relapse are. Further, I argue that these three criteria, in moderation, characterize a quite desirable and delightful state of involvement with a given medium, referred to here as engagement.

A complexity of this relationship is the "gray area" created in splitting cognitive and behavioral salience into two criteria. Without question, both can be problematic in their extremes. The pre-occupation of thinking about something all the time or doing something all the time can be equally deleterious to adaptive functioning. However, perform-

ance of one's duties while their thoughts are elsewhere seems decidedly less maladaptive than shirking all other functions to allow one behavior, say the play of video games, to dominate all others. It can be argued that allowing something to dominate one's thoughts is less of a problem than allowing that same thing to dominate one's actions. For this reason a thin line can be drawn between these two, making cognitive salience descriptive of engagement while behavioral salience is descriptive of problematic use.

It is not difficult to argue that few would find any level of the remaining criteria desirable. Unlike the others discussed so far, conflict, withdrawal, and relapse are by their very definition, undesirable and pathological entities. Physical and emotional struggle, separation anxiety, and repeated inability to disengage from a behavior offer few adaptive interpretations. It is the stark contrast of these three factors to tolerance and euphoria that drives the bifurcation of Brown's criteria, a bifurcation mathematically demonstrated by Charlton. This bifurcation in Brown's six factor model suggested by Charlton's results is shown in Figure 4.1.



Figure 4.1 : The Bifurcation of Brown's Diagnostic Criteria for Behavioral Addiction.

Charlton adjusted his criterion for identifying a respondent as addicted to account for the exclusion of Tolerance, Euphoria and Cognitive Salience and in doing so found that only 3.2% of his respondents met the new criterion. That is, only 13 of his 404 participants reported experiencing most of the "harsher" behavioral addiction criteria: Behavioral Salience, Conflict, Withdrawal, and Relapse (Charlton, 2004; Danforth, 2004). This stands

in stark contrast to the much higher incidence of addiction obtained by studies employing Brown's six factor model unitarily, as reported above.

#### **4.1.2 The Engagement / Addiction Scale**

Danforth adapted subscales from Charlton's Engagement/Addiction Scale, or EAS, to create the EAS-II (see Appendix 1), an instrument designed to measure addiction to and engagement with massively multiplayer games (Charlton, 2002; Charlton, 2004; Danforth, 2004). The EAS-II is a 28 item instrument comprised of 15 items from Charlton's Engagement subscale (e.g. "I feel a sense of power when I play EverQuest 2") and 13 from the Addiction subscale (e.g. "When I am not playing EverQuest 2, I feel agitated"). Deploying the EAS-II with 442 players of Microsoft/Turbine's MMOG Asheron's Call, Danforth's results supported the addiction/engagement dynamic pointed out by Charlton (Danforth, 2004). Items and factor loadings for both subscales of the EAS-II as reported by Danforth are displayed in Appendix 1.

Taking a valuable extra step, Danforth used a 7-factor personality model (The Big Five - Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Intelligence, plus Attractiveness and Negative Valence, See Appendix 2) to investigate the predictive value of personality with respect to addiction. Unfortunately, the obtained model, which included Emotional Stability (-), Attractiveness (-), and Negative Valence (+), accounted for only 19% of the variance in Addiction as measured by the EAS-II subscale. Danforth proposes that players scoring highly on Addiction are less emotionally stable, more prone to negative thoughts and predispositions, and perceive themselves as less attractive than those with lower scores on this dimension. A complimentary model for Engagement is not reported.

Taken together, the work of Charlton and Danforth represent an important focusing and refinement of research on internet and video game addiction. By quantifying the distinction between Addiction and Engagement, the EAS and EAS-II represent the empirical instantiation of the colloquial dichotomy of "addiction" and "addictive gameplay". The goal of the current study is to examine the interplay of problematic use, engagement, and their social and psychological correlates over time. As such, this research employs the full EAS-II instrument, changing only the way in the "addiction" factor is referenced. As mentioned earlier, in light of the various pejorative, disputed, and clinically laden connotations of the word "addiction", I have chosen to refer to self-described pre-occupation

with and inability to withdraw from gaming as *Problematic Use* of online games rather than “addiction”. To be clear, Problematic Use is measured by scale items identical to those in the “addiction” subscale of the EAS. I make this change in terminology not to refer to addiction euphemistically, but to dissociate the phenomenon under study from the state of biochemical dependency most closely associated with the word “addiction.”

## 4.2 Self-Regulation

Bandura’s Social Cognitive theory of personality portrays the human individual as a proactive, self-organizing, and self-reflecting agent rather than a reactive organism that is shaped solely by external events and circumstances (Bandura, 1999). Central to this agentic, sociocognitive perspective is the concept of self-regulation, the ability of an individual to manage his own behavior through observation, evaluation, and consequence. Arguments about the design of potentially harmful forms of entertainment focus heavily on the content of these objects, but largely ignore the processes taking place within the consuming individual. Hence, it is important that any study addressing problematic use of online gaming examine the role of an individual’s self-regulatory abilities in managing gaming behavior.

The amount of time a player spends with a game is influenced in a number of ways, some external and some internal to the player him/herself. For example, one might find their play constrained by the schedules of the other people that they play with, the hours in which a young child sleeps (or chooses not to), the computer usage patterns of other members of the household, or work, school, and social responsibilities. The nature of these externally generated constraints is highly variable from individual to individual, temporally dynamic, and difficult for the player to control. Further, amount of play is not the only factor to consider with respect to self-regulation. *When* one chooses to play is also quite important, as even a very short session undertaken at an inappropriate time (perhaps to delay a responsibility or escape / avoid a stressful situation) can be problematic. Clearly, avoidance behaviors can be adaptive, but when undertaken at inappropriate times or with excessive frequency they can be harmful. As such, regulation of the impulse to play is just as important as regulation of the amount of play.

Internal constraints on play are presumably more amenable to management by the individual. Beyond those of a biological nature (e.g. eating and sleeping), internally gener-

ated constraints can come in the form of self control behaviors. These self control behaviors are often divided into three interactive classes: self-monitoring, self-evaluation, and self-consequation (Kanfer, 1970; Bandura, 1999; Kocovski and Endler, 2000; Bandura, 2003). Literature in both psychology and communications point to the importance and effectiveness of self-regulation in the identification, assessment and treatment of both behavioral excesses and deficits (Kirschenbaum, 1987; Kocovski and Endler, 2000; Pajares and Valiante, 2002; Bandura, 2003; LaRose, 2003).

In order to illustrate this self-regulatory framework, let's examine how self-regulation fits into a personal videogame play management paradigm. Self-monitoring, or simple introspective observation of the amount of time one has spent playing, would presumably have an effect on subsequent play in that the individual would recognize that they have been involved in a particular activity for several hours and may want to consider other concerns. The inability to recognize how much time one has spent involved in an activity would be an example of a failure in self-monitoring. Self-evaluation of play would involve an individual comparing their observed time allotment for gaming to those made to other activities or by other individuals. For example, a player might consider that she has not spent 4 hours with her children in the past two days, but just spent 4 hours online. Similarly, she might notice that she has been online twice as often as her in-game friends, suggesting that she may play twice as much as these other people. Alternatively, she might consider that she plays during the day at work, but none of her co-workers or guild mates seem to be online until the evening hours. This kind of self-evaluation through the comparison of one's activities to external standards builds on the self-monitoring process by utilizing information gained from self-monitoring. Self-consequation involves the development of behavioral contingencies that, based on the outcome of the self-evaluative process, lead to the self-administration of reinforcement or punishment. For example, one might deny one's self a trip to the movies given a large amount of time spent playing, or treat play as a reward for the completion of formerly neglected responsibilities.

In combination, these three techniques of self-regulation are effective in allowing an individual to control their own behavior (Bandura, 1999). However, it is important to keep in mind that the same self-regulatory functions can and do operate at various levels of a person's behavioral hierarchy at the same time; in several domains at once. Simply, the same processes of self-monitoring, self-evaluation, and self-consequation operate to

manage the achievement of life goals like happiness in the same way that they operate to manage when and in what amounts one plays online games. The identical self-regulatory processes are employed to monitor one’s progress toward life goals, assess and consequence that progress, and inform decisions made about whether to proceed toward attainment of a goal or disengage from it. Further, this management happens in parallel. As such, self-regulation can be viewed as a general set of processes. This generality and multi-level, simultaneous hierarchical applicability makes it very important to be clear about what is being self-regulated and at what level. For the most part, I refer to self-regulation in the present study as the individual’s behavior-level regulation of their play and interaction in the communities surrounding online games. Similarly, we refer to deficient self-regulation as any difficulty in applying the self-regulatory processes to the management of online play and community participation. Again, it is important to note that regulation of the timing of play is just as important as regulation of amount.

#### 4.2.1 Measuring Self-Regulation

In order to empirically measure self-regulatory behavior Brown et al. developed a 63 item instrument called the Self-Regulation Questionnaire (SRQ). This instrument was designed to measure seven dimensions of self-regulatory behavior. Subsequent analysis of SRQ data by Carey et al. determined that 31 of the items within the SRQ measured a unitary factor that accounted for 43% of the total variance (Carey, Neal et al., 2004). This single-factor solution, the 31 item Short SRQ (SSRQ, see Appendix 7), correlates very highly with the full SRQ ( $r=.96$ ) and places less of a burden on survey respondents. Items included in the SSRQ address all three of the dimensions of self-regulatory behavior discussed above, but measure the construct of self-regulation in a mathematically unitary fashion. Table 4.2 contains selected examples of the items included in the SSRQ. The full instrument is presented in Appendix 7.

Short Self Regulation Questionnaire Items
I usually keep track of my progress toward my goals.
It’s hard for me to notice when I’ve “had enough” (alcohol, food, sweets).
I have personal standards, and try to live up to them.
When I’m trying to change something, I pay a lot of attention to how I’m doing.
I usually only have to make a mistake one time in order to learn from it.

Table 4.2. Example items from the SSRQ.

### 4.3 Hypotheses regarding Problematic Use

Given our previous discussion of player motivation and our more recent characterization of Problematic Use, Engagement and Self-Regulation, we are ready to explore some hypotheses regarding their interrelation.

*Hypothesis I* – Self-Regulatory deficits will predict the development of problematic use.

This hypothesis makes the simple claim that deficits in self-regulation contribute to the development of addiction to online games. By measuring this relationship longitudinally, we will examine the temporal relationship of these factors.

*Hypothesis II* - Certain play motivation factors will distinguish players who are more susceptible to problematic use.

In the same way that social and personality factors predict susceptibility to depression, this hypothesis suggests that player motivation factors will predict susceptibility to problematic use. The main effects model of problematic use shown in Figure 4.2 is proposed. Depression, covered later in this document in detail, is included in the model to test whether pre-existing levels of depression might influence the development of problematic use. This proposition, suggesting that pre-existing depression might positively influence the development of Problematic Use, is the causal inverse of the notion that Problematic Use leads to depression. The signs over each arrow represent the expected direction of the relationship between the predictor at left and the dependent variable, problematic use in this case.

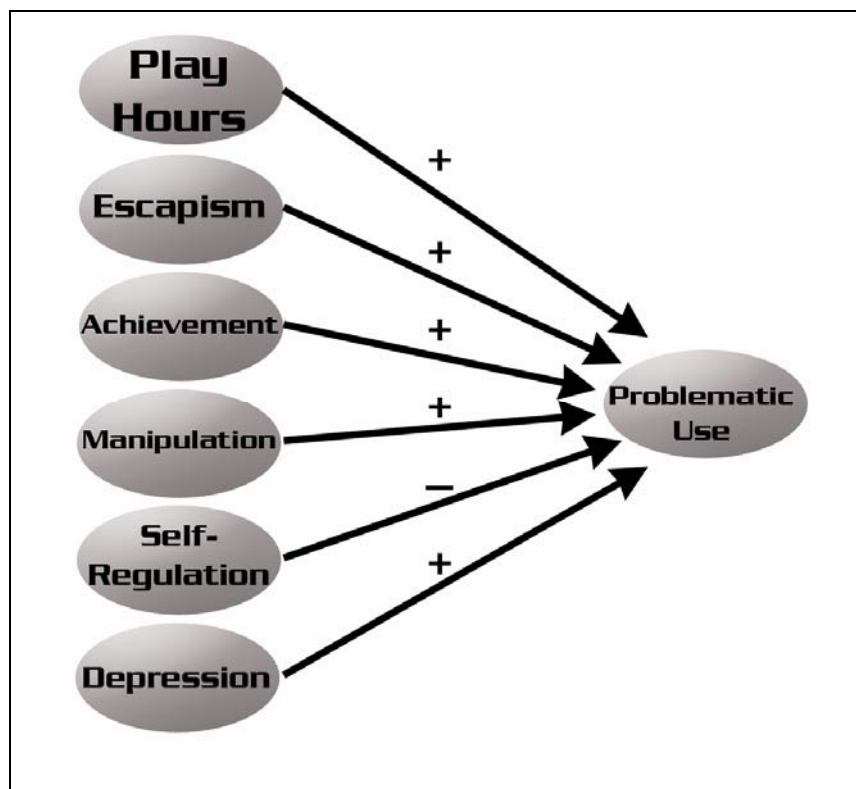


Figure 4.2 : A main effects model of Problematic Use

In combination, these factors can be thought to underlie a problematic play style that makes an individual susceptible to problematic use. In order to address causation we will need to employ longitudinal analyses in order to see assess whether change in the dependent variable over time is systematically related to the level of the various predictors (independent variables). Analyses of this type are presented in Chapter 8.

#### 4.4 Hypotheses regarding Engaged Use

Given our expectations with regard to Problematic Use, it is logical that we might attempt to model Engaged Use as well. At the outset it is important to note that players might become adaptively engrossed in the enjoyment of an entertainment product in a much less systematic way than they become deleteriously ensnared by them. Simply, we can make a principled, theory based approach to predicting Problematic Use, but there may very well be no accounting for taste, as the Latin proverb goes. Predicting engagement across gaming genres seems to be a more eccentric problem, as what appeals to some gamers will not appeal to others even within the same genre.



*Hypothesis III* – Players who are motivated to play for Achievement and Escape will report higher levels of Engaged Use.

Given the focus of the Achievement motivation on game centered goals, it is logical that these players would experience a high from play related success, require more victories or longer sessions to satisfy their appetite, and think about gaming frequently when not doing it. The same stands for the Escapism motivation given that these players derive an enjoyable release from play, one they might seek to extend for as long as possible, and think about or plan for when not playing.

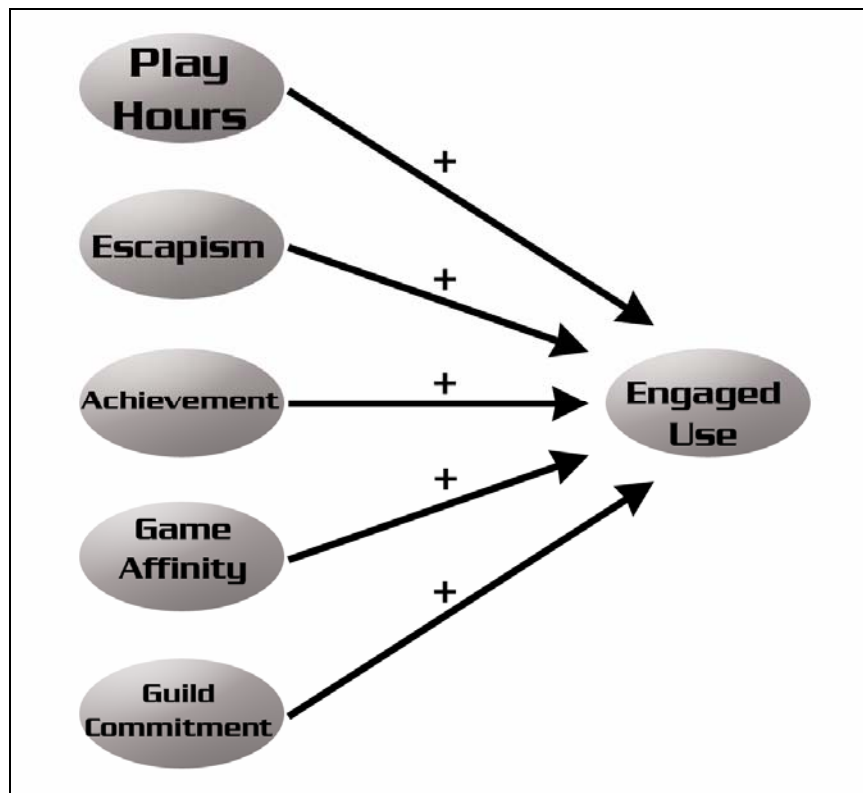


Figure 4.3 : A main effects model of Engaged Use

Now let us consider the other factors in the model of engaged use presented in Figure 4.3; hours of play, guild commitment, and game affinity. A chicken-and-egg problem arises when we consider hours and Engaged Use. Does the player become engaged by playing for many hours or play for many hours because they are engaged. The longitudinal analyses in Chapter 8 may help us straighten out this causal chain. Guild commitment, covered in detail in Chapter 5, is offered here under the assumption that a player who has

dedicated themselves to the success of a group of other players (a guild) might through that collaborative involvement become more engaged in the game. Similarly, game affinity, a simple measure of how much a player “likes” a game, seems to be logically associated (if not downright collinear) with how engaged that player might become. We can then test this model longitudinally to assess the degree to which any of these factors actually predict Engaged Use.

#### **4.5 Chapter Summary**

In this chapter we discussed the definition and measurement of the constructs of Problematic and Engaged Use. We saw that Problematic Use is associated with the harsher of Brown’s diagnostic criteria for behavioral addiction; behavioral salience, conflict, withdrawal, and relapse. At the same time, we saw how Engaged Use is characterized by the less negative criteria; euphoria, tolerance, and cognitive salience. Rather than characterizing a “good way” and a “bad way” to use gaming, Engaged and Problematic use amount to self-report measures of how the individual feels about their gaming behavior. They are not so much indicative of how one plays, but one feels about their gaming behavior and the impact they believe it has had on them. Following this we discussed the self-regulatory processes and how self-regulatory deficits might relate to the development of Problematic Use. We closed the chapter by establishing some testable longitudinal models of Problematic and Engaged use that we will evaluate in Chapter 8. The hypotheses associated with these models are as follows:

*Hypothesis I* – Self-Regulatory deficits will predict the development of problematic use.

*Hypothesis II* - Certain play motivation factors will distinguish players who are more susceptible to problematic use.

*Hypothesis III* – Players who are motivated to play for Achievement and Escape will report higher levels of Engaged Use.

*“Can you picture what will be  
So limitless and free  
Desperately in need...of some...stranger's hand  
In a...desperate land.”*

*-Jim Morrison*

## CHAPTER FIVE

### Social Integration & Depression

Depression is a mental state of depressed mood characterized by feelings of sadness, despair and discouragement. This disorder of mood can range from normal feelings of the “blues” through dysthymia (recurring minor depression with no mania or major depressive episodes) to major depression. Depression is often accompanied by feelings of low self esteem, guilt and self reproach, withdrawal from interpersonal contact and physical symptoms such as eating and sleep disturbances (Medsearch, 2004).

#### 5.1 Social Integration

Social integration hypotheses hold that the lack of general resources provided by the real or perceived presence and involvement of other people, commonly referred to as “social support,” play a central role in the development of depression (Cohen, 1985). In studies employing both longitudinal and cross sectional designs, these socially provisioned resources have been shown to “buffer” the “haves” from depression while being a harbinger of vulnerability to depression in the “have nots” (Cohen, 1985; Coyne, 1991; Lepore,

1991; Lepore, 1992; Peirce, 2000). It is believed that the mechanism supporting this “buffering hypothesis” is related to the sense of well being or “peace of mind” derived from the perceived availability of the advice, assistance, and emotional support a large and accessible social network can provide (Cohen, 1985). Further, the positive effects of social support and negative effects of a dearth of it extend beyond depression to general psychological, and even physical, health (Cohen, 1985). Social integration hypotheses of this kind date back to Durkheim’s work in the early 1900’s, which postulated a link between social structures and the regulation of behavior. Specifically, Durkheim observed that those with strong ties to their community were less likely to commit suicide (Durkheim, 1897).

## **5.2 Measuring Social Integration, Personality, & Depression**

As implied above, several important components belong to this general class of social resources, including the size of one’s social network, the frequency and amount of contact with that network, and the perceived social support derived from it. Again, just as access to social resources has been shown to be positively related to emotional wellbeing, strong feelings of isolation resulting from the lack of these resources, operationalized as loneliness, has demonstrated equally deleterious effects on the psychological state of those who suffer from it. It is these three predictors of depression; social network size, perceived social support, and loneliness, on which the current study relies.

### **5.2.1 Social Network Size**

Social network size is quite literally a measure of the number of relationships an individual maintains, be they with immediate or extended family, friends and coworkers, or acquaintances from church or other community outlets. Cohen’s Social Network Index (SNI) is a self-report instrument that assesses not only the structural size of one’s social network, but also the individual’s recent contact with members of it (Cohen, 1997). The SNI (see Appendix 3) contains a series of questions that establish an individual’s access to and frequency of contact with twelve distinct social relationship types ranging from spouse to community group member. All questions are asked within the context of interactions occurring within the two-week period prior to the completion of the instrument. Social network size as measured by the SNI has been shown to be positively correlated not only with emotional and psychological well being, but also with resistance to the common cold (Cohen, 1997). The SNI is comprised of two measures of social network

size, one quantifying the number of high contact relationships (HCRs) the person maintained in the previous two weeks and the other quantifying the total number of people the respondent has had contact with. Cohen (personal communication, September, 2003) has indicated that the HCR measure has been successfully employed in his studies, but that the latter (referred to as People in Social Network or PISN) has not proven as reliable. Based on Cohen's recommendation, this study employs only the high contact relationship (HCR) measure.

### **5.2.2 Perceived Social Support**

Perceived social support is referred to in the literature as the individual's subjective perception of the availability of interpersonal support from members of his or her social network (Cohen, 1984). The Interpersonal Support Evaluation List - 12 (ISEL-12, see Appendix 4) is a shorter version of Cohen's ISEL-40 and is designed to assess the degree to which a person feels they have ready access to social support should the need or desire for it arise (Cohen, 1983; Cohen, 1985). The respondent rates statements about their access to social resources on a 4 point scale from definitely false to definitely true. Perceived social support, as measured by the ISEL, helps mitigate the effects of stress on the physical and emotional wellbeing of a sample of college students (Cohen, 1983). This finding lends support to the "buffering" hypothesis discussed above.

### **5.2.3 Loneliness**

The UCLA-L (see Appendix 5) is an eight item instrument indexing the frequency of an individual's feelings of loneliness and lack of companionship. The respondent uses a four-point scale to report how often they have experienced feelings of withdrawal, social isolation and the like. Not surprisingly, loneliness is negatively correlated with measures of social integration and positively correlated with depression (Peplau, 1982; Hsu, 1987; Riggio, 1993)

Of course, these factors, while measurable separately, are intimately intertwined. Clearly, access to and contact with one's social network is central to the development and maintenance of the perception of social support since such relationships are enacted through communication. Similarly, the size of one's social network would seem logically to increase both the likelihood and frequency of such contact and thereby increase the level of perceived support available from it. Feelings of loneliness and withdrawal would, on the

other hand, seem to reflect a deficit in the amount and/or perceived utility of available social resources even in situations where the structural size and level of interaction with one's network is robust.

#### **5.2.4 Seven Factor Personality Inventory**

In addition to the environmental predictors included in social integration models (e.g. social network size, perceived social support, loneliness), a collection of personality traits has also come to be recognized as predictive of depression. Of the Big Five personality factors (Agreeableness, Conscientiousness, Emotional Stability, Extraversion, and Intelligence), Extraversion and Emotional Stability are traditionally considered to be associated with the development of depression. The seven factor personality inventory employed in the current study is rounded out by Attractiveness and Negative Valence. This inventory is included as a set of control variables, allowing us to account for the influence that individual differences in personality might have on our outcomes of interest.

#### **5.2.5 Measuring Depression**

In order to measure the construct of depression itself, an 8 item version of the Center for Epidemiologic Studies Depression Scale (CES-D) was used (Radloff, 1991). This widely used scale asks that the respondent rate the recent frequency of feelings of unhappiness and isolation (see Appendix 6).

### **5.3 Augmentation, Affect Regulation, & Displacement**

In a longitudinal study of the effects of internet use on depression Bessi re et. al. identified differential effects based on class of use and certain personal factors within and about the user (under review). Simply, both the way in which a person uses the internet and their existing levels of social resources and depression interact to determine the effect that use will have on their social and emotional outcomes. Before discussing Bessi re et. al.'s results and their relevance to the proposed study in detail, it is important to review two general hypotheses about the effect of internet use on depressive affect. The social augmentation hypothesis suggests that, for those with low levels of social resources in their lives, use of the internet to meet new people and participate in online groups will result in beneficial effects with respect to perceived social support and depressive affect by expanding their social networks and facilitating interaction within it. Results indicat-

ing positive effects for social communication on the internet are common in the literature (Katz & Aspden, 1997; Wellman, 2001; Robinson et al 2000). Also an antecedent based proposition, mood enhancement or affect regulation models hold that people initially high in depression who utilize the internet for entertainment and escapist purposes and are able to successfully regulate depressive affect through such self-medication techniques. Bessièrè et. al. found support for both the augmentation and affect regulation hypotheses. Specifically, they demonstrated that use of the internet for entertainment resulted in a significant reduction in depression for those who reported initially high levels of depression. Also, use of the internet to meet new people and participate in online groups predicted increases in depression for all but those with initially low social resources, for whom this type of internet use reduced depression (Bessièrè et. al, under review). These results underscore the predictive importance of not only the mode of internet use, but of personal and motivational factors surrounding the user. Both of these results are of particular relevance to a study of depression in online games given that the social nature of such games makes them a viable outlet for individuals seeking either entertainment, social participation in an online group, or both.

Contrary to the augmentation and affect regulation hypotheses, the social displacement hypothesis makes a far darker prediction. The displacement hypothesis posits that use of the internet for social communication reduces time normally spent on real-life social interaction in favor of more “superficial” and less resource rich online relationships (Kraut, 1998). This reduction in real-life social activity could then lead to feelings of social isolation and depression (Gershuny, 2000; Sanders et al., 2000; Nie & Hillygus, 2001). It is intuitively attractive to believe that, beyond simple participation in them, the development of commitment to an online group would exacerbate this displacement of real life activities.

Rather than discounting either of them, results like those found by Bessièrè et. al. encourage us to believe that each of these models may apply to different types of people who use the internet or online games for different purposes. Just as the affect regulation hypothesis is most applicable to individuals with initially high depressive affect, the displacement model may be most applicable in instances where the individual has limited leisure time to begin with.

#### 5.4 A Model of Problematic Use & Depression

If placed within the context of social integration, we are able to reason with greater granularity about the mechanism through which problematic use might lead to depression. Consider a scenario where problematic use of online games might lead to reduced social integration and that reduced social integration might, in turn, lead to greater depressive affect. In statistical terms, this would present a situation where social integration mediates the effect of problematic use on depression. The model presented in Figure 5.1 graphically depicts how problematic use might lead to decreased social integration by increasing loneliness and decreasing perceived social support and social network size. Such decreases in social integration would reduce the buffers to stress and anxiety provided by an individual's available social resources and could thereby lead to increases in depressive affect.

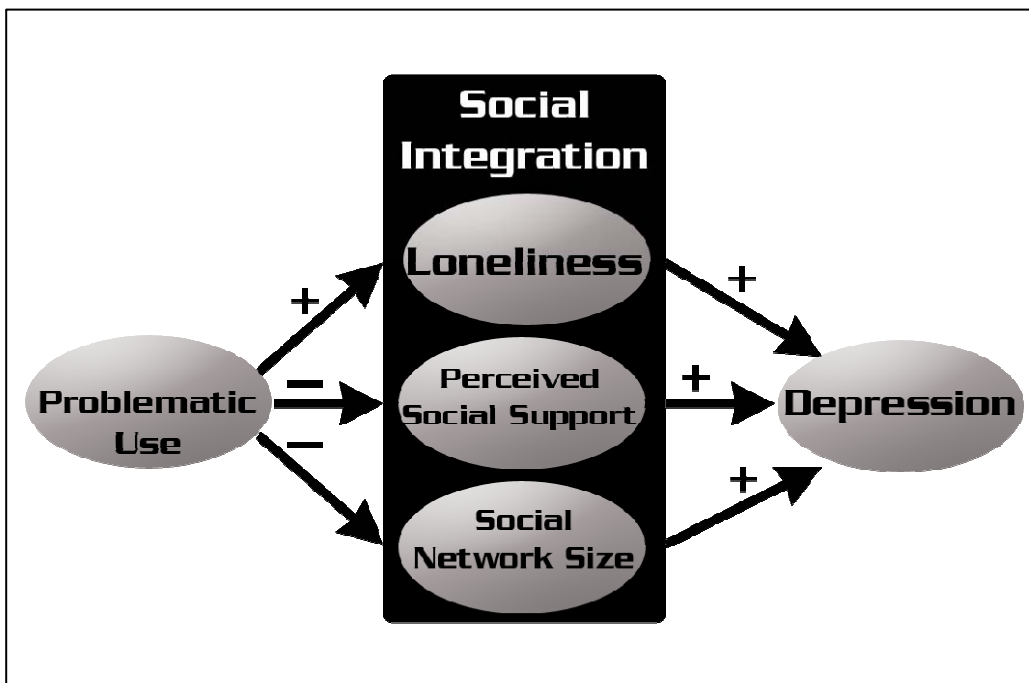


Figure 5.1 : Model of the effects of problematic use on social integration & depression

This model could be characterized as exemplary of the displacement hypothesis, in which use of an entertainment or communication medium displaces social involvement and thereby degrades feelings of social integration.



## 5.5 Organizational Commitment

In this section we discuss the definition and measurement of organizational commitment as it applies to persistent online gaming groups called guilds or clans. These player organizations are an important part of online gaming as they represent stable social entities in which players might choose to enact meaningful interpersonal relationships.

Currently, most online games attempt to foster some type of group formation among their players. Many player groups, like the environments they operate in, are persistent from one playing session to another. Developers have given different names to these officially organized, often large, player groups: player organization, org, allegiance, pledge, etc. These terms are essentially synonymous with “guild,” the term we will use here. Since there is some evidence that participation in guilds enhances players’ enjoyment of the game, it seems logical that guild membership would increase player commitment to the game as well (Yee, 2000; Yee, 2001). This enhanced commitment can logically translate into more time online. Seay et al. found that players who were highly committed to their guilds played significantly more hours per week than those moderately and minimally committed (Seay, 2003). Going a step further, lengthier subscriptions and thus more revenue for a game’s developers and publishers are also likely results of enhanced player commitment. Therefore, developers are interested in supporting the formation, operation, and maintenance of guilds as a central pillar of the player community.

Organizational commitment is included here as a way to measure a player’s level of social involvement in the segment of the online gaming community with which they are most intimately familiar, their persistent play group. Cross sectional analyses show a moderate relationship between organizational commitment and the Relationship player motivation ( $r(1871) = .328, p < .001$ ), as well as Engaged Use ( $r(1838) = .250, p < .001$ ). This first result seems to indicate a logical tendency of Relationship players to become dedicated and involved in the social groups they join online. The second suggest that enjoyment and involvement in a game is enhanced by dedicated participation in its indigenous social groups.

### 5.5.1 Measuring Guild Commitment

In order to quantify an individual’s dedication to their work organization, Mowday et al developed a measure of “job involvement” called the Organizational Commitment Ques-

tionnaire (OCQ, see Appendix 9) (Mowaday, 1979). The OCQ asks that the respondent rate their level of agreement with 15 statements like, “I find that my values and this organization's values are very similar” or “It wouldn't take much to cause me to leave this organization.” on a seven point Likert scale from Strongly Disagree to Strongly Agree. An adaptation of the OCQ was used in the current study to measure the degree to which individuals feel committed to their player organization. Though the scale was developed to index commitment to work organizations, minor alterations to its wording have been made to fit the online gaming domain.

Seay et al. found that both the social character of play and out-of-game communication contribute to players' commitment to their guilds (Seay, 2003). The researchers suggest that these social and communication factors are likely to operate cyclically as they enhance the play experience. Simply, if scheduling an event on a message board results in an event where a high number of guild members participate and enjoy themselves, then such a paradigm is likely to repeat itself with greater frequency in the future. At the same time those participating in the event are likely to experience increased motivation to play with the members of their organization based on their enjoyment of the previous experience.

## **5.6 Hypotheses regarding Social Integration**

Let's start by framing the general augmentation hypothesis in specific terms with respect to online gaming.

Hypothesis IV – Online gaming will lead to greater feelings of social integration for those who utilize it as a social medium.

A structural model representing the augmentation hypothesis is presented in Figure 5.2. This model tests the positive effects of the Relationship play motivation, play with real life friends and relatives, conversion (meeting online friends in real life), and guild commitment on the three measures of social integration discussed previously, loneliness, perceived social support, and social network size. Using gaming as a context in which to interact with friends and relatives might logically lead to greater feelings of social integration. Similarly augmenting ones social network by enacting online relationships, becoming committed to online social groups, and even meeting some online friends in person seem to be reasonable contributors to feelings of social integration.

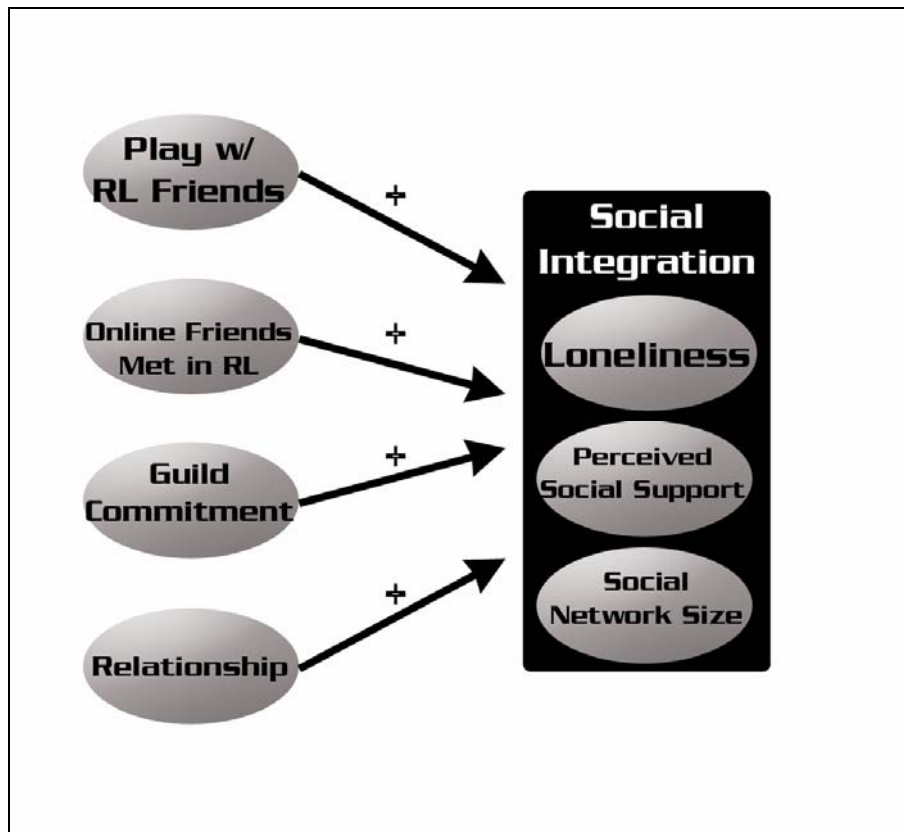


Figure 5.2 : The Augmentation Model of Social Integration

It is now appropriate to frame the competing, displacement hypothesis in specific terms.

Hypothesis V – Heavy participation in online gaming will lead to reduced feelings of social integration.

A model designed to test this displacement hypothesis is shown below in Figure 5.3. This model predicts negative effects for its predictors on the three measures of social integration. A high number of play hours could interfere with participation in social groups and fulfillment of social roles outside of gaming. Problematic use of gaming might similarly displace real world social involvement and lead to a lower sense of social integration. Commitment to social groups within the games one plays could lead to neglect of other groups the player might already participate in. Finally, certain play motivations, like the

escapism or achievement, might lead the player to focus on gaming such that it undermines current social ties.

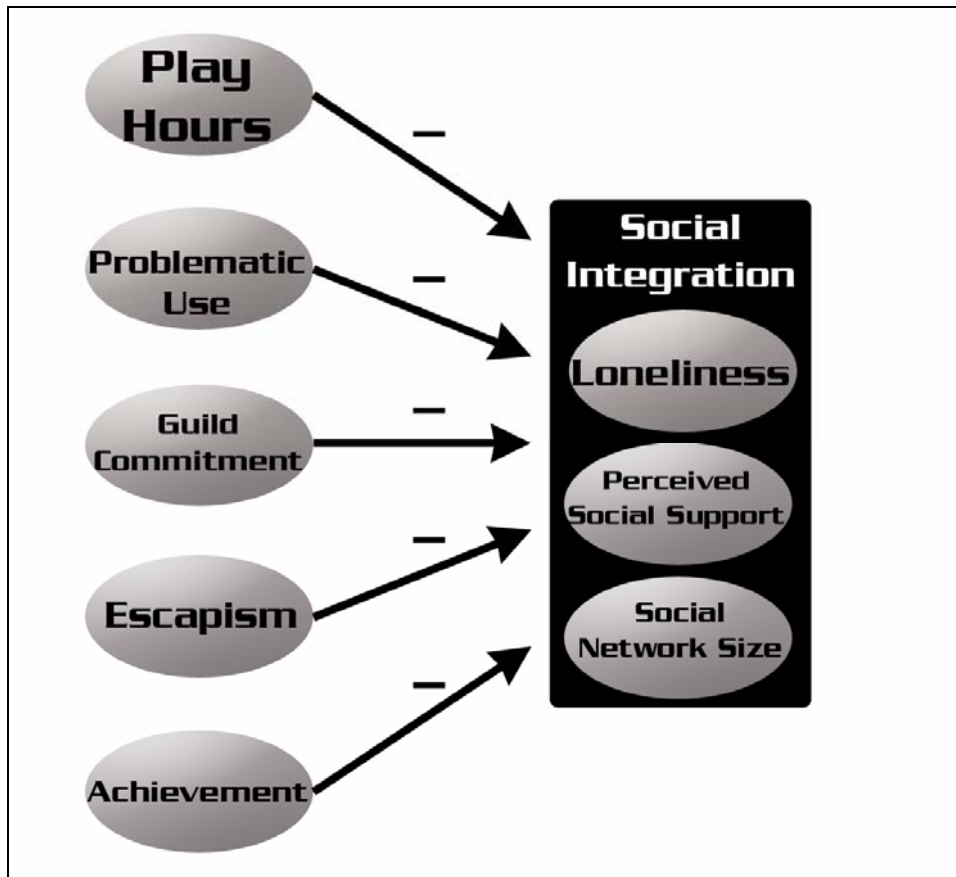


Figure 5.3 : The Displacement Model of Social Integration

## 5.7 A Depression Hypothesis

Given the effects that we have observed of gaming on social integration we are now prepared to investigate depression as a psychological consequence of play. We can approach depression with the help of the following simple hypothesis.

*Hypothesis VI* - Certain social integration and personality factors distinguish players who are more susceptible to depression.

In keeping with numerous findings in the literature on depression, this hypothesis suggests that individuals with high levels of depression will report low levels of perceived social support, small social networks, and high levels of loneliness; the social integration measures examined in the previous chapter. Further, these individuals will also display

the commonly found personality correlates of depression to include relatively low scores on the Extraversion and Emotional Stability dimensions and relatively higher levels of Negative Valence.

Next we offer another hypothesis to address the effect of depression on self-regulation with respect to problematic use.

## **5.8 Self-Regulation & Depression**

*Hypothesis VII-* The effect of self-regulatory deficits on problematic use will interact with depression.

This hypothesis is designed to evaluate the role of depression in the relationship between self-regulation and problematic use. Specifically, this hypothesis addresses the effect of depression on self-regulatory efficacy with respect to the development of problematic use of online games.

The current hypothesis hinges on a significant depression by self-regulation interaction in the presence of a main effect of self-regulation on problematic use. This would support the claim that the effect of self-regulatory deficits on problematic use may be moderated by depression. In this model, depression is not a necessary precursor of problematic use, but its presence may heighten the effects of deficient self-regulation on the development of problematic use.

The comorbidity of deficient self-regulation and depression may be inferred from an understanding of goal disengagement. As mentioned earlier in our discussion of self-regulation, an important part of the evaluative process surrounding goal attainment is the identification of less than adequate progress toward a given goal. Once one judges that one's progress toward a goal is inadequate, a choice must be made to maintain the current level of attainment effort, increase effort, or begin to disengage from pursuit of the goal. The evaluation and disengagement process is important and adaptive in that it allows the individual to adjust to changes in internal and environmental conditions. Failure to evaluate and disengage from goals can lead to continued pursuit of increasingly unattainable and relatively hopeless outcomes, a recipe for disappointment.

Elsewhere, it has been suggested that depression could moderate the effect of self-regulatory mechanisms on an individual's behavior (Kocovski and Endler, 2000). In general, depressive affect is related to self-imposed low expectations and unreasonably high standards for success (e.g. self-doubt about ability to succeed paired with inability to set reasonable and attainable goals). In addition, depressed individuals operate under the illusory belief that other people share these lowered expectations and unrealistic standards for them. Under such a paradigm, self-evaluation and self-consequence can easily break down. Adaptive self-evaluation is predicated on the identification of useful standards of comparison. It does an individual interested in losing weight through dieting relatively little good to compare themselves to a runway model, since such a comparison is very likely to lead to negative self-evaluation. Further, if one makes some form of reinforcement contingent on the meeting of an unrealistic standard, the individual will soon identify the goal as unattainable and, where possible, circumvent the contingency, thereby giving up any therapeutic effects it may have had if performed as designed. Even under conditions of success, where the individual negotiates the behavioral contingency as designed, depressed individuals are less likely to view the outcomes as sufficiently reinforcing to merit repetition. Depressed individuals tend to be low in expectancy to achieve goals, and apt to evaluate themselves negatively. Simply, depression lessens one's belief in their ability to manage their own behavior and blunts the capacity to identify success and enjoy its rewards.

With respect to online game play, the effectiveness of self-regulatory activities on amount and timing of play may be reduced for depressed individuals. This suggests a moderation model in which depressive affect interacts with self-regulatory deficits to exacerbate problematic play behavior. Without question, deficient self-regulatory behavior can logically lead to problematic use, as we have seen already in Chapter X. However, it is the non-additive effect of higher depression and low self-regulation that is of principal interest here. It seems likely that feedback or cyclic causation inherent in this system will lead depressed individuals to engage in lower levels of self-regulation over time. By examining these factors and their relationships longitudinally, it will be possible to make firmer claims about causal and temporal linkages among them.

## 5.9 Chapter Summary

In this chapter we described the concepts of depression and social integration. We defined social integration as the social and emotional resources one receives from their interactions and involvement with other human beings. Three measures of social integration were discussed, loneliness, social network size, and perceived social support. The relationship of these metrics to depression was discussed in terms of two general hypotheses, augmentation and displacement. Further, testable augmentation and displacement hypotheses were framed with specific reference to online gaming, as follows

*Hypothesis IV* – Online gaming will lead to greater feelings of social integration for those who utilize it as a social medium.

*Hypothesis V* – Heavy participation in online gaming will lead to reduced feelings of social integration.

Next the relationship of depression to personality factors and self-regulation was discussed, and two testable hypotheses about depression were advanced. The hypotheses regarding depression are presented below.

*Hypothesis VI* - Certain social integration and personality factors distinguish players who are more susceptible to depression.

*Hypothesis VII*- The effect of self-regulatory deficits on problematic use will interact with depression.

## CHAPTER SIX

### Approach & Rationale

In the preceding chapters we have laid out the issues of Problematic and Engaged use, the possible effects of online gaming on social integration, and discussed the role of depression. In parallel with each of these issues, attendant factors of interest believed to influence each were discussed. These factors included play motivation, self-regulation, and some social dimensions of gaming. Chapters 4 and 5 concluded with the delineation of models of how these attendant factors might influence the various outcomes of interest and development of hypotheses based on those models. In this chapter we will discuss how these models were empirically tested and statistically evaluated using data produced by the Project Massive survey.

#### 6.1 The Web Survey

During the spring of 2002 an initial inquiry was undertaken using several methods to investigate social activity and communication in online games. Initially, we conducted a live observation session with an existing elite guild. During this session, we were able to observe the activities of experienced players as they logged on, grouped and adventured together. Prior to the creation of the first online survey, we also conducted fifteen interviews with players of Everquest, a popular game at the time published by Sony Online Entertainment. Building on the information collected during the series of hour-long interviews with experienced online game players, we developed a 69-item survey and



posted it on the World Wide Web at [www.projectmassive.com](http://www.projectmassive.com). The survey was multiple-choice in format, but provided free response sections for use when the fixed choices were not satisfactory.

Recruitment of users for this phase of the study took place online via posts to web forums and direct recruiting within Ultima Online, Everquest, Dark Age of Camelot, Anarchy Online, and The Sims Online. Respondents were contacted via posts on forums and web pages, both game specific and devoted to the MMO community at large. In addition, some in-game recruiting was done via word-of-mouth techniques like broadcast chat.

Having completed this pilot phase of inquiry, the online survey was refined to address the specific outcomes of interest discussed in Chapters 4 and 5, including Problematic and Engaged Use, social integration, and depression. The decision was made to measure these outcomes and their attendant factors longitudinally by collecting three waves of data separated by three to four month intervals. We placed heavy emphasis on repeat participation by previous respondents so that change in their attitudes and ratings could be measured over time. These decisions were made according to the guidelines for longitudinal study design provided by Singer and Willet (2003).

The waves of data collection lasted 3-4 months each, and were separated by 3-4 month periods. In addition to the recruiting measures taken during the pilot, a post was made on slashdot.org that attracted several hundred respondents to kick off the first wave. At the end of each wave, respondents were asked if they would be interested in participating in future waves. Those who were interested in continued participation were asked to provide an email address at which they could be contacted. At the beginning of the ensuing wave, these addresses were used to send customized emails to each respondent inviting them to participate again and providing them with a unique identifier called their "Massive Number." The Massive Number was used to connect the records of a given respondent so that changes in their responses could be measured over time. In order to ensure privacy of respondents, email addresses, Massive Numbers, and response data never were allowed to coexist in the same file. Only the primary investigator had access to the file containing email addresses and their associated unique identifiers. Information on the start and end dates of data collection for the various waves of the survey are presented in Table 6.1, below.

Wave	Start	End
Pilot	Mar-02	Dec-02
1	Sep-04	Dec-04
2	Apr-05	Jul-05
3	Sep-05	Nov-05

Table 6.1. Start and end dates for the various wave of the Project Massive survey.

Again, emphasis was placed on repeat participation rather than new recruitment. Incentives including Amazon gift certificates and an iPod shuttle were offered to encourage continued support of the study. However, word of mouth and postings by participants in blogs and online forums generally provided more than enough fresh voices per wave. Soon after the posting of waves 2 and 3, unsolicited postings appeared on slashdot.org, bringing hundreds of new respondents on both occasions.

## 6.2 What was collected and why

This section presents the collected measures of interest in conceptual groupings to support description not only of what was collected in the survey, but why those measures were thought to be potentially interesting and important. For the most part, the conceptual groupings of variables, or predictor blocks, presented here parallel the organizational framework discussed in Chapter One and reiterated below in Figure 6.1.

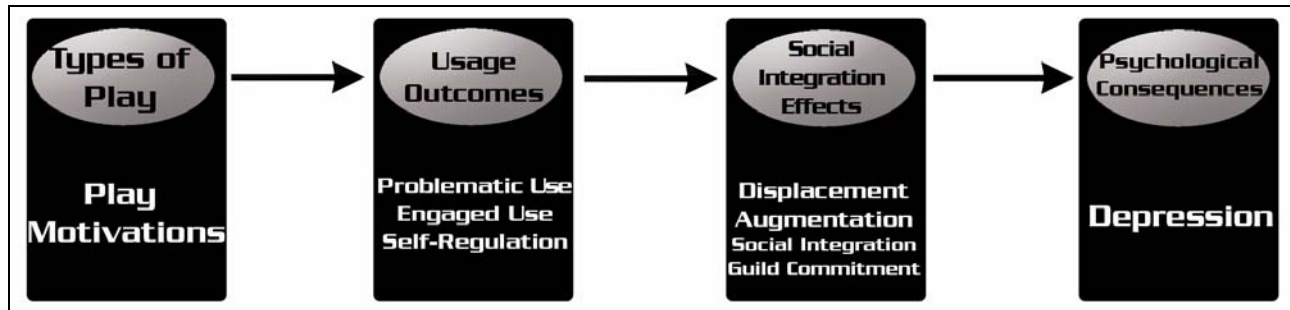


Figure 6.1 : The annotated framework

All of the dimensions covered in this section are discussed in much greater detail in the chapter with which they are associated. They are presented together here to provide a somewhat more unified overview of the measures selected for inclusion in the survey, their relationship to one another, and the experimental expectations associated with each.

### **6.2.1 Block 1 : Control variables - Demographics & Personality Inventory**

Though not represented expressly in the framework, gender and age were used in every model presented in this study. In some models, like that for depression, there are established expectations for these demographics to play a significant role. For the most part, however, we expect that gender and age will not be predictive of most of the dependent variables of interest here.

A Saucier 7-factor personality scale (Saucier, 1997) is also included in every model. The 7-factor model includes all of the “Big Five” personality factors (Agreeableness, Conscientiousness, Emotional Stability, Extraversion, and Intelligence) plus Attractiveness and Negative Valence. Just as with the demographics described above, we can expect significant personality effects on some of the dependent variables (e.g. Extraversion and Emotional Stability are often associated with the development of depression), but for the most part we expect few personality effects and make no a priori predictions outside of those traditionally called for by the personality literature. In examining the regression models presented later in this text, the reader will notice that a predictor block including gender, age, and the 7-factor personality model is entered into every model before any of the other predictors blocks. As such, these control variables will be referred to as Block 1.

### **6.2.2 Block 2 : Types of Play - Motivations, Play Hours & Affinity**

A player motivation scale adapted from Yee’s Facets scale (2002) was used to address interindividual differences in why and, to some degree, how players use online games. The five motivational types included in the scale (Achievement, Escapism, Roleplaying, Manipulation, and Relationship) are described briefly below. Keep in mind that, like many traditional personality scales, the motivational factors in this scale are not meant to be mutually exclusive, as a single player can score high (or low) in several of these dimensions at once. For a more detailed description of these types, please refer to Chapter 3.

The Achievement motivation type is characterized by an intense desire to be and to have the best. These players want to have the best gear, do the most damage, and be well known and powerful in the online worlds they inhabit. In some games, such accolades and accomplishments require a considerable commitment, as they result from practice,

study, and dedication to being (or at least being seen as) a top player. It is expected that players with high levels of Achievement motivation will exhibit higher levels of Engaged Use than players less motivated by game centered goals.

Escapism players use online gaming as a refuge from daily stresses and anxieties. Play allows these individuals to relax, vent, and take a break from whatever strains they might be under in the real world. Such behavioral escape mechanisms are highly adaptive parts of a healthy mental and emotional life. However, taken to an extreme the use of games to escape real world difficulties can lead to neglect and dereliction of responsibility. Players motivated to play by the desire to escape could prove to be more susceptible to Problematic Use.

The Roleplaying motivation is characterized by the desire to become immersed in a fantasy construct, creating histories and back stories around one's virtual avatar and taking on and acting out that character's life within the digital world. In doing so, the player often adopts speech and behavior patterns thought to be appropriate within the time and/or place represented by the game environment they have chosen. This motivation is distinct from the Escapism motivation in that it does not focus on an effort to take a break from or avoid real world concerns. Instead, the roleplaying motivation hinges on a desire to perform and participate in a fantasy storyline with other players. Oftentimes the role that the player enacts online is similar to their real-life persona or even an idealized version of themselves approximating who or how they would like to be in the real-world (Bessière et al, 2005). In other cases, roleplaying activity allows the pursuit of alter-ego characterizations and the "trying on" of new and novel personas and ways of relating to others.

The Manipulation motivation is associated with those players who enjoy harassing and manipulating others in order to derive a profit, the satisfaction of "yanking someone's chain," or both. Through virtual panhandling or elaborate scams and other exploits, these players take advantage of the anonymity offered by online games in their effort to derive enjoyment from the frustration and angst they cause in other members of the player community. Often referred to as "griefers," these individuals are a common menace and are tolerated to various degrees across the online gaming domain. A worthwhile analogy can be drawn between manipulation players and the "trolls" and "flamers" found in chatrooms and discussion forums around the internet.

The Relationship motivation is associated with players who come to online games seeking to meet other people with which to transact real and meaningful interpersonal relationships. These players discuss real world issues within the game, share life experiences, and provide interpersonal support for one another. Relationship players commonly regard a collection of their online associates as “good friends,” people with whom they enjoy spending time and have shared robust and rewarding social relations. Relationship players can be expected to experience increased social integration and reduction in depressive affect as a result of their participation in online games.

Though most of predictor block 2 is comprised of the player motivation types described above, two rather simple measures of play behavior are also included, play hours and affinity. Play hours is a simple measure of the average weekly time a player spends playing online games. Affinity is an equally simple 5 point Likert-type measure of how much the player actually likes the game they are playing most frequently at the time they responded to the survey. Though it may seem counter-intuitive, gamers do not always fully enjoy the games that they play. Not unlike popular fiction novels, some games are played through while waiting for something better to be released, because someone recommended them, or simply because they were available. Still, we might expect that gamers with higher levels of affinity for a game would experience a greater level of Engaged Use.

### **6.2.3 Block 3 : Usage Outcomes – Problematic & Engaged Use & Self-Regulation**

Problematic Use is a measure of the degree to which a player reports feeling that their gaming has caused substantial difficulty in their real life. Specifically this refers to gaming becoming a behavioral pre-occupation, leading to conflict within themselves and with others. Problematic Use also involves the player experiencing feelings of anxiety when unable to play, and failure to cut back on or alter timing and amount of play in spite of repeated attempts to do so. Though principally viewed as an outcome, or dependent variable, in this work, problematic use is also of interest as a proposed predictor of depression.

Engaged Use describes a state of adaptive interest in and involvement with an entertainment medium. Engagement is defined by the feeling of enjoyment derived from involvement with the medium, the progressive need for more consumption to acquire that

desired enjoyable effect, and a level of cognitive occupation that includes thinking about the medium even when away from it. Though any of these factors could be taken to a deleterious extreme, they can be viewed as a great deal less necessarily maladaptive and even quite desirable relative to the descriptors of Problematic Use.

Self Regulation defines a class of behavioral and cognitive strategies that an individual can employ to manage their own behavior. Self-regulatory functioning can be broken into three broad classes, self-monitoring, self-evaluation, and self-consequation. Self-monitoring involves the simple and value neutral observation of one's own behavior; simply knowing what you are doing and how much of it or for how long you have been doing it. Self-evaluation builds on self-monitoring by comparing the information gained thru monitoring to internally and externally generated standards. Acknowledging that in a given week you have been online for longer than you usually are or for perhaps twice as long as some of the people you play with would be an example of self-evaluation. Self-consequation takes one more step and implements rewards or punishments for meeting or exceeding some standard or set of self-evaluative standards. For example, an individual might reward himself with a fancy dinner for not playing at work for a whole week or even set play itself up as a reward for completing some important but unsavory task.

The description of the self-regulatory processes offered here so far deals with regulation of play at the behavioral level. It is essential to recognize that the self-regulatory processes are a general set of strategies than can be applied at any level of the behavioral hierarchy. Just as self-regulation can be used to regulate day to day behavior, it can also be used to monitor progress toward life goals, both to reward achievements and to manage the process of disengagement from seemingly unattainable or temporally less valuable aspirations. That said, we certainly expect that individuals who practice self-regulation might be less likely to experience Problematic Use. At the same time we can also expect that self-regulating individuals will be less likely to experience depression, not because of their avoidance of Problematic Use alone, but because they are equipped with and use this general set of regulatory strategies to maintain balance in their lives at many behavioral and emotional levels.

#### **6.2.4 Block 4 : Social Integration & Social Dimensions of Gaming**

Social integration refers to the real and perceived resources and support available to an individual due to their involvement with and relational and physical proximity to others.

Commonly referred to as social support, this general class of resources is thought to provide a buffer from depressive affect for those that have it while leaving those without it more vulnerable (Cohen, 1985). Three different measures of social integration are collected in the present study; loneliness, perceived social support, and social network size.

Loneliness is simply defined by feelings of detachment and lack of companionship. It is, quite unsurprisingly, indicative of a lack of available social resources and positively associated with depressive affect (Peplau, 1982; Hsu, 1987; Riggio, 1993). On the contrary, perceived social support is a more or less direct measure of the real or perceived availability of social resources and is negatively correlated with depression. Items measuring perceived social support address the ease with which an individual might acquire advice, aid, or companionship given a need for them. Finally, social network size quantitatively measures the number of people with which an individual has recently transacted and maintained “high-contact” relationships including spouses, children, relatives, friends and co-workers. In a way similar to that of perceived social support, social network size indexes social integration by quantifying the membership of an individual’s social circle and providing some indication of their access to social resources. Social network size is thus negatively associated with the development of depressive affect.

The social dimensions of gaming included in this block are simple measures indexing the social orientation of a player’s approach to their gaming experience. The first measure (Play w/ RL Friends) asks how often an individual plays online games with real life friends and relatives. The second (Online Fr met Game) asks what portion of a player’s online friends were made through gaming. Finally, the third measure (Online Fr met in RL) reports the portion of an individual’s online friends that they have actually met in real life. We can expect that a higher amount of time spent playing with friends and relatives would enhance social integration, since gaming can become a bonding activity in the same way as any other recreation activity shared among close friends and family members.

The final measured in Block 4 is a measure of organizational commitment. Organizational commitment, as measured by the Organizational Commitment Questionnaire (OCQ), assesses a player’s level of involvement in and dedication to their persistent play group. Depending on the theoretical orientation one favors, it can be reasoned that individuals who become committed to online social groups might experience enhanced

feelings of social integration (augmentation) or reduced feelings of social integration due to online relationships supplanting those in real life (displacement).

### **6.2.5 Block 5 - Depression**

The sole factor contained in predictor block 5 is a measure of depressive affect. This measure was obtained using the Center for Epidemiologic Studies depression scale, commonly known as the CES-D. We expect to find that measures commonly associated with depression in other populations, like social integration metrics, Extraversion and Emotional Stability, will significantly predict depression in online gamers. Further, it is expected that individuals scoring high in the Relationship play motivation will experience decreases in depressive affect over time due to their participation in socially rewarding online activities.

## **6.3 A Brief Description of Prospective Analysis**

Prospective analysis was used to evaluate the longitudinal effects of the factors contained in the predictor blocks above on the dependent variable of interest (e.g. Problematic and Engaged Use, depression). In prospective analysis, a regression equation is built in which lagged predictor variables are used to model a future value of the dependent variable of interest (Cohen & Cohen, 1983). Initially a lagged value of the dependent variable is entered into the regression equation alone. For example, a regression equation modeling Problematic Use for a given wave of the survey is created using only the participant's Problematic Use score from the previous wave. Next, each predictor block is added to the regression equation incrementally. If a predictor block adds nothing to the model and is causally "downstream" of the dependent variable according to the experimental framework we have expressed, that block is removed. It is important to note that all dependent variables are modeled using values of the predictor block variables collected during the previous wave. This technique allows inspection of the unique variance in the dependent variable accounted for by the lagged variables over and above that accounted for by the previously measured level of the DV. Prospective analysis exposes those predictors that add explanatory power to the model in excess of that generated by the lagged dependent variable. Further, since all predictors in the longitudinal analyses contained here are centered, the size of their effects can be compared to one another, within the same model.



## 6.4 The Assembled Hypotheses

Table 6.2 contains a complete list of the hypotheses expressed in Chapters 4 and 5.

<i>Hypothesis I</i>	Self-Regulatory deficits will predict the development of problematic use.
<i>Hypothesis II</i>	Certain play motivation factors will distinguish players who are more susceptible to problematic use.
<i>Hypothesis III</i>	Players who are motivated to play for Achievement and Escape will report higher levels of Engaged Use.
<i>Hypothesis IV</i>	Online gaming will lead to greater feelings of social integration for those who utilize it as a social medium.
<i>Hypothesis V</i>	Heavy participation in online gaming will lead to reduced feelings of social integration.
<i>Hypothesis VI</i>	Certain social integration and personality factors distinguish players who are more susceptible to depression.
<i>Hypothesis VII</i>	The effect of self-regulatory deficits on problematic use will interact with depression

Table 6.2. The assembled hypotheses as described in chapters 4 & 5.

We will test these hypotheses using prospective analysis with predictor blocks described in section 6.2. Chapter 8 deals with the modeling of Problematic and Engaged Use, covering hypotheses I, II, III and VII. Chapter 9 describes the modeling of social integration and depression, covering hypotheses IV, V, and VI.

## 6.5 Chapter Summary

In this chapter we discussed the development and construction of the Project Massive web survey. Next we organized the collected measures described in detail in chapters 4 and 5 into conceptual blocks to be used in a uniform statistical modeling procedure. During the description of the contents of each predictor block, specific expectations for a collection of the predictor measures were discussed. Prospective analysis, the statistical technique selected to allow us to analyze the longitudinal effects of the selected predictors on our dependent variables of interest was introduced and explained. The chapter closed with a recapitulation of the hypotheses described in Chapters 4 and 5 which will be tested in Chapters 8 and 9.

## CHAPTER SEVEN

### Demographics & Summary Results

During the course of data collection for Project Massive, demographic and summary statistics of the kind presented in this chapter were made available to the public at the project's website. None of the modeling and inferential statistics presented in the later parts of this document were made available to the public prior to the close of data collection for wave 3. This was done in order to avoid exerting undue influence on the subject pool. Graphic presentations covering a great assortment of summary measures from the various waves are available at [www.ProjectMassive.com](http://www.ProjectMassive.com)

#### 7.1 The Respondent Pool

A total of 4490 unique respondents participated in the Project Massive websurvey. Information on the number of participants by wave and when each wave was conducted is presented in Table 7.1. below.

Wave	Participants	Returning	Start	End
Pilot	1836	n/a	Mar-02	Dec-02
1	1503	n/a	Sep-04	Dec-04
2	1089	397	Apr-05	Jul-05
3	790	331	Oct-05	Nov-05

Table 7.1. Number of participants by wave with dates of collection.

The number of respondents participating in at least two waves of the survey was 499. This is the pool of participants which we are able to use make longitudinal models, since we have at least two waves of data from them. Analyses of this type are contained in Chapters 8 & 9. Most of the summary results presented in the current chapter are drawn from an aggregate pool of 2790 records containing data from the first time a given subject responded to the survey regardless of wave.

### 7.1.1 Demographics

Participants in the study ranged in age from 11 to 70 with an average age of 28 ( $M=27.98$ ). Males comprised 88% of the sample, with 327 female respondents making up the other 12%. 74.8% of respondents had jobs or were self-employed. 49% of the respondents were single, 41% were married, and 21% of the respondents had children. The distribution of marital status in the sample is shown in Figure 7.1.

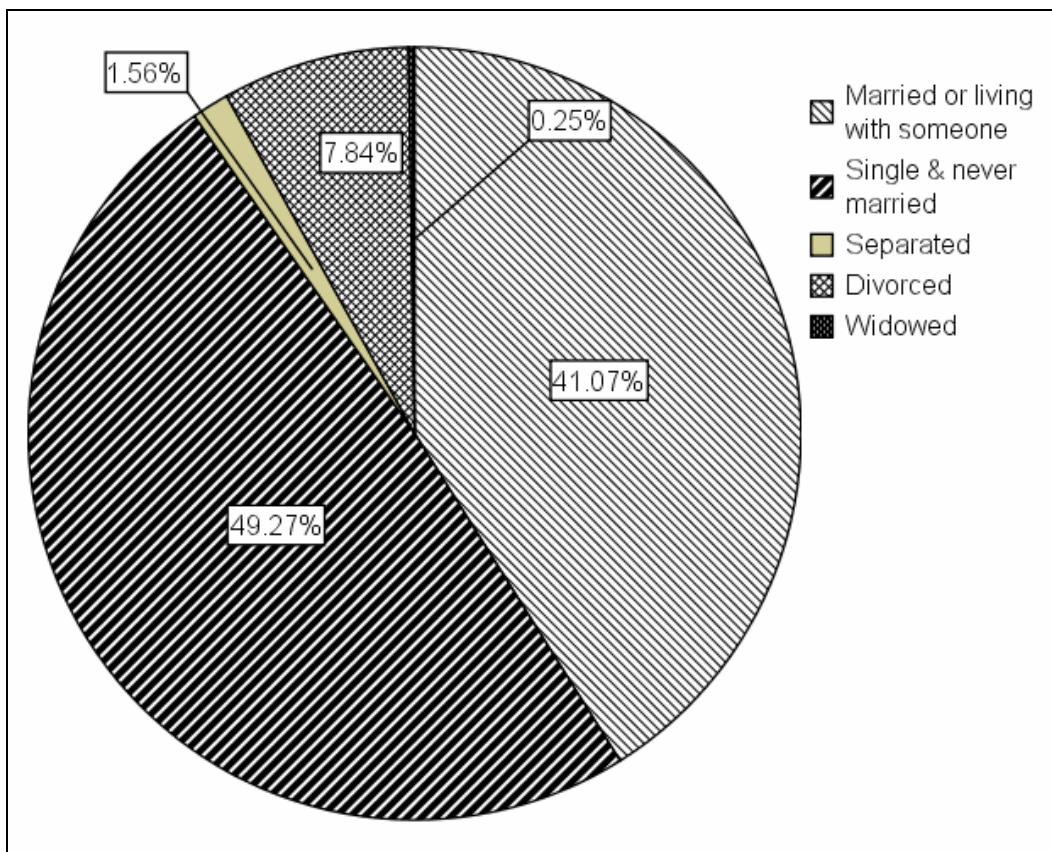


Figure 7.1 : Marital status distribution of participants.

## 7.2 Weekly Hours of Play

The mean number of hours spent playing online games per week was 21.7, the equivalent of a half-time job. As is shown in Figure 7.2, the distribution is skewed to the right, with a sizable minority of players (~15%) indicating they play more than 54 hours per week.

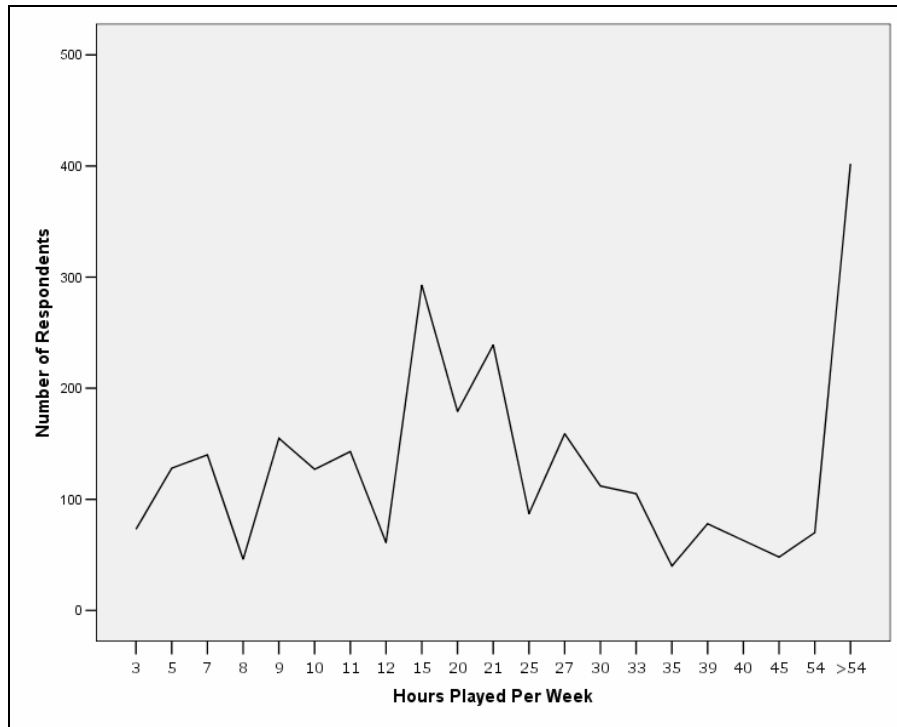


Figure 7.2 : The average hours played per week in a player's most played game.

On average respondents spent 36% of their weekly online time playing by themselves, 33% of it playing with members of their player organization, 15% playing with online friends not in their guild, 18% playing with strangers, and 6% just “hanging out” logged in with no intention to play. These averages add up to 108% because respondents were asked for general estimates that need not total to 100%.

## 7.3 Playing and Communicating

Eighty-six percent of the respondents to played MMORPGs more than any other games. The other 14% preferred console games, real time strategy and first person shooters.

Forty-seven percent of players considered player vs. environment gameplay to be the most important aspect of online games, while 20% preferred player vs. player and 6% preferred non-combat gameplay like crafting. Twenty-six percent of respondents regarded the player community experience as the most important aspect of online gaming.

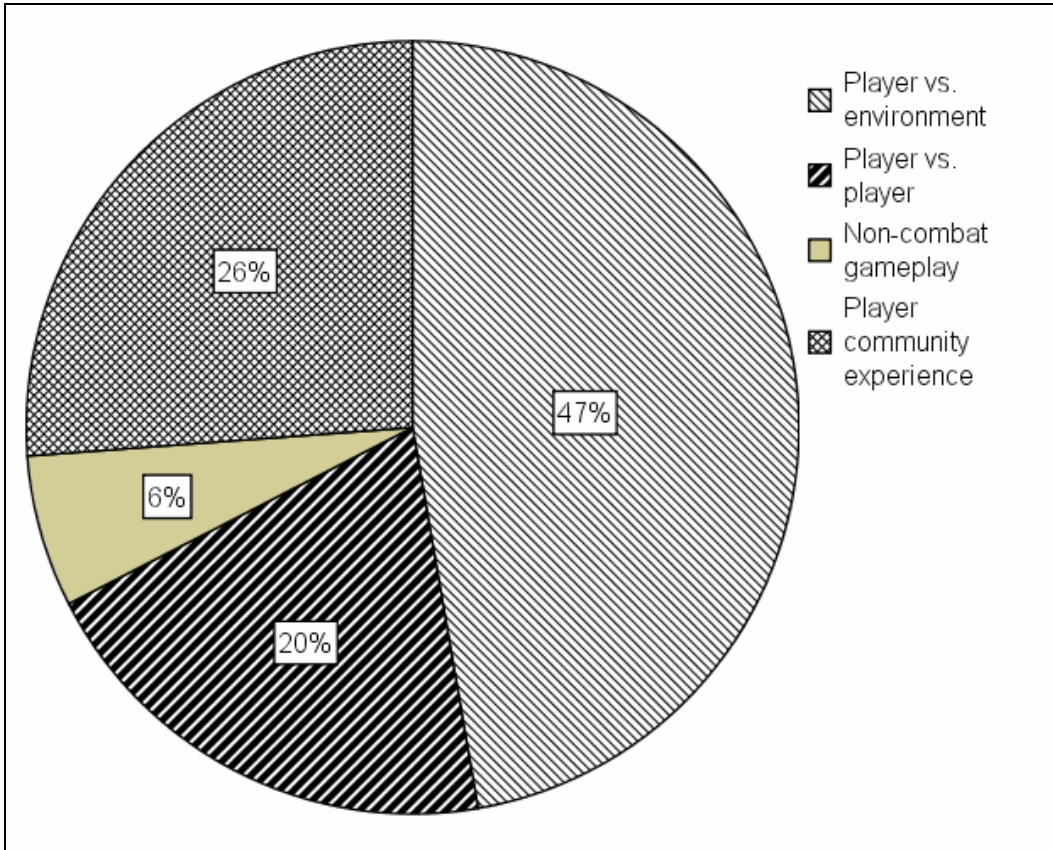


Figure 7.3 : Player responses when asked most important aspect of a game.

When asked about the main reason for their continued subscription to for-pay online games or services, the most common response was “Fun” at 29.89% followed by friendships and social contacts at 15.02%. “Addiction to the game” was listed as the primary reason for continuing to play by 8.27% of respondents.

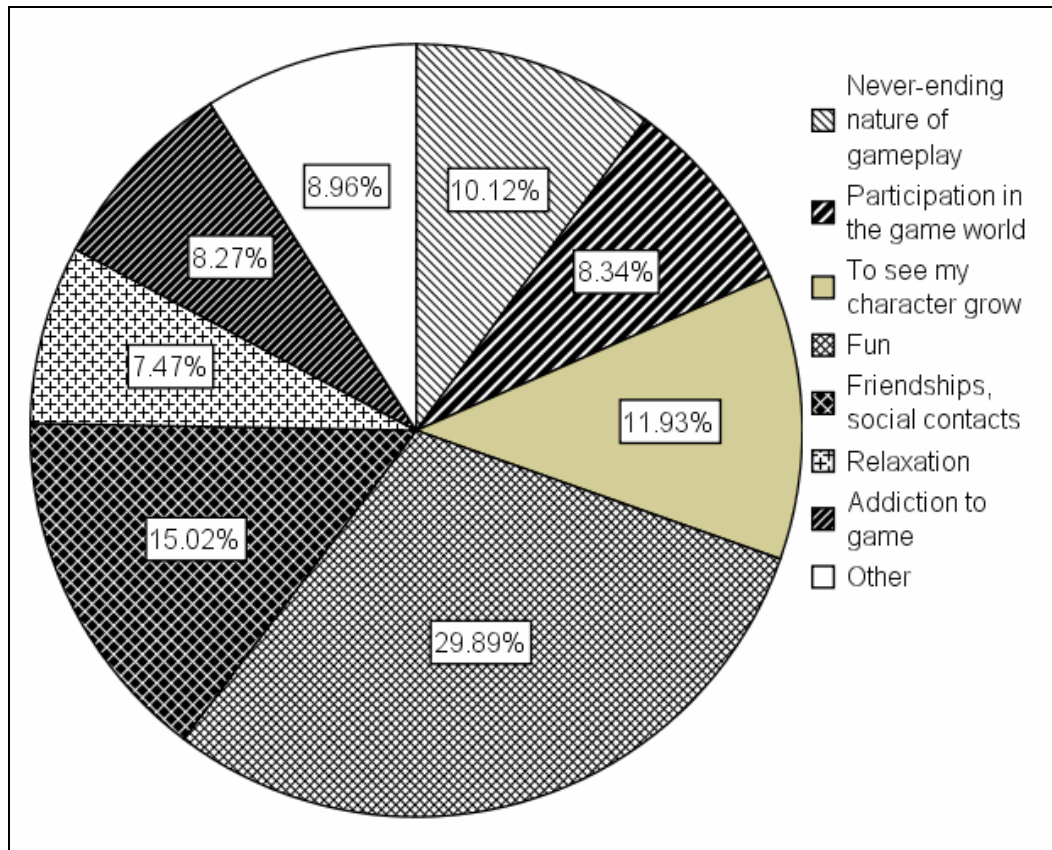


Figure 7.4 : Main reason for continued subscription to online game or service.

Seventy-one percent of respondents indicated that they were members of player organizations, clans or guilds. Forty-two percent reported that they were officers in their player organization.

Thirty-six percent of players reported playing with real-life friends and relatives frequently, while an additional 10% reported always playing with real-life friends. Forty-four percent indicated that over 70% of their online friends were made through online gaming. However, relatively few (30%) had met more than 1 in 10 of their online friends in real life.



## 7.4 Cross-sectional Analyses of Interest

There are a number of interesting cross-sectional analyses to be derived from the volumes of data collected during this study. What follows is a small collection of those most germane to the discussion at hand.

### 7.4.1 Discriminative Differences in Player Motivation

In Chapter 3 we discussed the player motivation taxonomy used in this study. Though derived from data collected and factor-analyzed by Yee and modified for use here, our discussion of the distinctions among the motivation types was largely conceptual in nature. Table 7.2 presents statistical evidence of the discriminative differences between the player motivation types in terms of their cross-sectional relationship with various survey measures.

n~2700	Engaged Use	Problematic Use	Depression	Age	Group Play	Online Friends met thru gaming	Guild Commitment
Achievement	0.288	0.297	0.118	-0.145	-0.023	0.053	-0.001
Escapism	0.345	0.370	0.283	0.026	0.026	0.155	0.136
Roleplaying	0.063	-0.006	0.063	0.038	-0.009	0.007	0.079
Manipulation	0.062	0.228	0.115	-0.316	0.052	0.005	0.011
Relationship	0.129	0.102	0.035	-0.006	0.240	0.371	0.328

Table 7.2. Evidence of Discriminative Validity among the Player Motivations.

We see that both Achievement and Escapism have moderately positive relationships with Engaged and Problematic Use, but that only Escapism is associated with Depression.

The Manipulation type has a robust negative relationship with age, indicating that players of this type tend to be younger. With respect to the Relationship motivation, we see that these players are uniformly interested in the social aspects of play.

### 7.4.2 Discriminative Differences in Usage Outcomes

Chapter 4 presented a discussion of the difference between Engaged and Problematic use as they are derived from a bifurcation in the diagnostic criteria for behavioral addiction.

Table 7.3 offers discriminative statistical evidence in favor of this conceptual distinction.

n~2600	Hours	Depression	Loneliness	Perceived Social Support	Self-Regulation	Guild Commitment	Game Affinity
Problematic Use	.318	.380	.284	-.250	-.345	.076	.086
Engaged Use	.263	.085	.076	-.012	-.014	.250	.404

Table 7.3. Evidence of Discriminative Differences between Problematic and Engaged Use.

Though both outcomes are associated with hours of play, we see a rather stark contrast in the usage outcomes' associations with the other measures. Only Problematic Use is associated with depression, loneliness, perceived social support and self-regulation. Engaged Use shows no relationship with these measures, but does show positive correlation with both guild commitment and game affinity.

Table 7.4 shows the zero order correlations of Problematic Use with the player motivation factors. In addition, the correlation with self-regulation and hours of play per week are shown.

Player Motivation and Other Correlates of Problematic Use	Correlation w/ Problematic Use (n)
Escapism	.370 (2669)
Achievement	.297 (2657)
Manipulation	.228 (2656)
Relationship	.102 (2663)
Roleplaying	-.006 (2648)
Hours of play per week	.318 (2677)
Self-Regulation	-.345 (2489)

Table 7.4. The relationship of certain metrics with Problematic Use.



Employment of multiple regression to model problematic use cross-sectionally yields the results presented in Table 7.5. This model accounts for 35% of the variance in problematic use (adjusted R<sup>2</sup> (2236) = 0.354).

	Standardized Beta	Standard Error	T-Ratio	p value
Achievement	0.126	0.019	6.803	0.000
Escapism	0.230	0.017	12.199	0.000
Manipulation	0.109	0.021	6.027	0.000
Relationship	0.029	0.013	1.541	0.124
Roleplaying	-0.051	0.016	-2.769	0.006
SSRQ	-0.227	0.031	-11.711	0.000
Depression	0.130	0.038	6.528	0.000
Play Hours	0.243	0.001	12.763	0.000

Table 7.5. Regression model predicting Problematic Use

The regression model shows highly significant effects for the Achievement, Escapism, and Manipulation motivations and for play hours and self-regulation.

Table 7.6 shows the zero order correlation of Engaged Use with the play motivations and a collection of other factors. We see that the Escapism and Achievement motivations correlate rather well with Engaged Use, as do hours of play, guild commitment, and game affinity.

Player Motivation and Other Correlates of Engaged Use	Correlation w/ Engaged Use (n)
Escapism	.345 (2639)
Achievement	.288 (2628)
Manipulation	.062 (2624)
Relationship	.129 (2637)
Roleplaying	.063 (2617)
Hours of play per week	.263 (2645)
Guild Commitment	.250 (1840)
Game Affinity	.404 (2661)

Table 7.6. The relationship of certain metrics with Engaged Use

Using these factors in a cross sectional regression model of engaged use yields the results presented in Table 7.7. This model accounts for 36% of the variance in engaged use (adjusted  $R^2$  (1704) = 0.358).

	Standardized Beta	Standard Error	T-Ratio	p value
Achievement	0.208	0.013	9.628	0.000
Escapism	0.208	0.011	9.922	0.000
Manipulation	-0.021	0.014	-1.014	0.311
Relationship	-0.035	0.009	-1.569	0.117
Roleplaying	0.044	0.010	2.087	0.037
Play Hours	0.206	0.001	10.136	0.000
Guild Commitment	0.139	0.011	6.611	0.000
Game Affinity	0.346	0.014	17.560	0.000

Table 7.7. Regression model predicting Engaged Use

This model shows a strong effect for game affinity, equivalent effects for the Achievement and Escapism motivations and hours of play, and a slightly weaker but highly significant effect for Guild commitment.

### 7.4.3 Cross-sectional Correlates of Depression

Table 7.8 displays the zero order correlations between the personality and environmental factors mentioned here and depression. Problematic Use is also included to establish its cross-sectional relationship with depression.

Social and Personality Cor-relates of Depression	Cor-	Correlation w/ Depression (n)
Loneliness		.608 (2577)
Perceived Social Support		-.362 (2572)
Social Network Size		-.290 (2638)
Extraversion		-.293 (2605)
Agreeableness		-.028 (2593)
Conscientiousness		-.035 (2601)
Emotional Stability		-.540 (2578)
Intelligence		-.103 (2595)
Attractiveness		-.343 (2602)
Negative Valence		.192 (2582)
Self-Regulation		-.429 (2450)
Problematic Use		.380 (2577)

Table 7.8. Correlation of certain metrics with depression

A cross sectional regression model including all of these elements (except social network size, which did not significantly contribute to the model) as predictors accounts for over 53% of the variance in depression for the current sample (adjusted  $R^2 = .536$ ).

## 7.5 Chapter Summary

In this chapter we described the composition of the survey sample across the various waves. A collection of demographic results and summary statistics was also presented. The chapter closed with a set of cross-sectional analyses supporting the longitudinal analyses to be described in Chapters 8 & 9.

## CHAPTER EIGHT

### Modeling Usage Outcomes

In this chapter we will begin to examine longitudinal models that predict Engaged and Problematic Use. Following the procedure and structure outlined in Chapter 7, we will use prospective analysis to test the effects of the specified predictors over time on the Usage Outcomes. We will be testing the models presented in Chapter 4 in order to evaluate the following three hypotheses:

*Hypothesis I* – Self-Regulatory deficits will predict the development of problematic use.

*Hypothesis II* - Certain play motivation factors will distinguish players who are more susceptible to problematic use.

*Hypothesis III* – Players who are motivated to play for Achievement and Escape will report higher levels of Engaged Use.

In addition we will be evaluating the interactive effects of self-regulation and depression on Problematic Use in order to assess the following:

*Hypothesis VII*- The effect of self-regulatory deficits on problematic use will interact with depression.

## 8.1 Modeling Problematic Use

In order to produce the first model predicting Problematic Use, we introduce only one predictor, the lagged measure of the dependent variable. What this means is that we are seeing how much variance in the dependent variable is accounted for by a measure of the same variable taken at the previous time period. We are asking how well the level of Problematic Use a respondent reported the last time they responded to the survey predicts how much Problematic Use they will report next time. Entering a lagged measure of the dependent variable, the model shown in Table 8.1 is obtained.

	Estimate	Standard Error	T-Ratio	p value
Intercept	2.873	0.034	85.291	0.000
Problematic Use (Lagged)	0.717	0.035	20.633	0.000

Table 8.1. Regression model predicting Problematic Use with lagged measure

This model accounts for 47% of the variance in the dependent variable, indicating that reports of Problematic Use are rather stable over time (adjusted R<sup>2</sup> (479) = 0.469).

Entering predictor block 1 raises the variance accounted for to roughly 49% (adjusted R<sup>2</sup> (432) = 0.486). However, no significant effects are obtained for these predictors. This model is shown in Table 8.2.

	Estimate	Standard Error	T-Ratio	p value
Intercept	2.861	0.038	74.987	0.000
Problematic Use (Lagged)	0.713	0.038	18.710	0.000
Block 1 - Controls				
Female	0.057	0.101	0.566	0.572
Age	0.000	0.037	0.000	1.000
Extraversion	-0.048	0.040	-1.202	0.230
Agreeableness	0.018	0.040	0.457	0.648
Conscientiousness	-0.059	0.037	-1.606	0.109
Emotional Stability	-0.023	0.043	-0.549	0.583
Intelligence	-0.056	0.038	-1.484	0.139
Attractiveness	0.030	0.043	0.690	0.490
Negative Valence	0.047	0.039	1.219	0.224

Table 8.2. Regression model predicting Problematic Use with Block 1

The addition of predictor block 2, which contains the play motivations, hours of play, and affinity, raises the variance accounted for to 51% (adjusted R<sup>2</sup> (402) =0.506).and shows a collection of effects for the play motivations. This model is shown in Table 8.3.

	Estimate	Standard Error	T-Ratio	p value
Intercept	2.860	0.039	73.506	0.000
Problematic Use (Lagged)	0.680	0.043	15.746	0.000
Block 1 - Controls				
Female	-0.008	0.107	-0.075	0.940
Age	-0.028	0.039	-0.710	0.478
Extraversion	-0.044	0.041	-1.072	0.285
Agreeableness	0.031	0.041	0.761	0.447
Conscientiousness	-0.065	0.037	-1.745	0.082
Emotional Stability	-0.018	0.044	-0.407	0.684
Intelligence	-0.062	0.038	-1.631	0.104
Attractiveness	0.043	0.044	0.986	0.325
Negative Valence	0.028	0.041	0.674	0.501
Block 2 – Types of Play				
Achievement	0.030	0.039	0.773	0.440
Escapism	0.118	0.041	2.867	0.004
Roleplaying	0.063	0.039	1.643	0.101
Manipulation	-0.092	0.045	-2.058	0.040
Relationship	-0.107	0.041	-2.606	0.010
Hours	0.033	0.042	0.795	0.427
Affinity	0.051	0.036	1.417	0.157

Table 8.3. Regression model predicting Problematic Use with Blocks 1 & 2

The significant positive effect of the Escapism motivation suggests that players high in Escapism motivation at Time 1 report higher levels of problematic use at Time 2 than while those lower in Escapism tend to report reduced levels at the second time period. The significant negative effects for Manipulation and Relationship suggest the inverse; that players scoring highly on these dimensions are likely to report reduced levels of Problematic Use at Time 2.

The block 3 predictors increase the model's predictive power yet again, this time to 52% (adjusted R<sup>2</sup> (369) =0.523). This model is shown in Table 8.4.

	Estimate	Standard Error	T-Ratio	p value
Intercept	2.846	0.041	70.094	0.000
Problematic Use (Lagged)	0.650	0.049	13.316	0.000
Block 1 - Controls				
Female	-0.003	0.110	-0.028	0.977
Age	-0.031	0.041	-0.756	0.450
Extraversion	0.005	0.044	0.113	0.910
Agreeableness	0.030	0.042	0.714	0.476
Conscientiousness	-0.041	0.039	-1.038	0.300
Emotional Stability	-0.003	0.046	-0.059	0.953
Intelligence	-0.047	0.040	-1.184	0.237
Attractiveness	0.090	0.048	1.887	0.060
Negative Valence	-0.025	0.044	-0.562	0.574
Block 2 – Types of Play				
Achievement	0.052	0.040	1.286	0.199
Escapism	0.077	0.043	1.788	0.075
Roleplaying	0.067	0.040	1.677	0.094
Manipulation	-0.102	0.046	-2.221	0.027
Relationship	-0.092	0.042	-2.166	0.031
Hours	0.088	0.049	1.793	0.074
Affinity	0.049	0.041	1.190	0.235
Block 3 – Usage Outcomes				
Engaged Use	-0.008	0.050	-0.170	0.865
Self-Regulation	-0.181	0.058	-3.153	0.002

Table 8.4. Regression model predicting Problematic Use with Blocks 1, 2 & 3

Self-regulation shows significant negative effect on Problematic use, meaning that it significantly predicts declines in Problematic Use. This indicates that individuals who employ Self-regulation are likely to report lower levels of problematic use, and that those who do not self-regulate tend to report higher levels of problematic use at Time 2. The play motivation effects for Manipulation and Relationship are maintained in this iteration of the model, but the significance of the escapism motivation effect is reduced in significance below the .05 level.

Predictor block 4, containing the social dimensions of gaming, and predictor block 5, depression, added no significant effects to the model. It is important to state explicitly that depression was not a significant predictor of Problematic Use.

Adding the significant interactions of Self-regulation by Depression and Hours of play by Affinity renders the final predictive model of problematic use shown in Table 8.5, below. This model accounts for roughly 53% of the variance in Problematic Use (adjusted  $R^2$  (372) = 0.525).

	Estimate	Standard Error	T-Ratio	p value
Intercept	2.940	0.045	66.034	0.000
Problematic Use (Lagged)	0.677	0.049	13.727	0.000
Block 1 - Controls				
Female	-0.011	0.109	-0.103	0.918
Age	-0.009	0.040	-0.226	0.822
Intelligence	-0.064	0.039	-1.611	0.108
Attractiveness	0.071	0.046	1.551	0.122
Block 2 – Types of Play				
Achievement	0.039	0.040	0.982	0.327
Escapism	0.075	0.044	1.721	0.086
Roleplaying	0.046	0.040	1.139	0.255
Manipulation	-0.092	0.045	-2.021	0.044
Relationship	-0.074	0.042	-1.757	0.080
Hours	0.071	0.050	1.420	0.157
Affinity	0.072	0.040	1.805	0.072
Block 3 – Usage Outcomes				
Engaged Use	-0.061	0.049	-1.256	0.210
Self-Regulation	-0.132	0.053	-2.498	0.013
Block 4 – Social Dimensions				
Play w/ RL Friends	0.011	0.039	0.271	0.787
Block 5 - Depression				
Depression	0.077	0.051	1.487	0.138
Interactions				
SSRQ* Depression	0.113	0.032	3.573	0.000
Hours * Affinity	-0.080	0.038	-2.087	0.038

Table 8.5. Final regression model predicting Problematic Use

Let us review the final model presented in Table 8.5 starting with the relatively strong negative main effect associated with self-regulation. Again, this demonstrates a longitudinally negative relationship between self-regulation and problematic use. This result indicates that those individuals reporting high levels of self-regulatory activity are less likely to report problematic usage of video games in the future. Conversely, it indicates that those individuals reporting lower levels of self-regulatory activity are more likely to report higher levels of problematic use in the future when compared to their self-regulating peers. This result fully supports the prediction made in Hypothesis I, clearly



indicating that individuals who actively monitor and manage their behavior in general are less likely to allow their involvement in online gaming to cause them real life problems.

While there still appear to be near significant trends for the collection of player motivations observed earlier (Escapism, Manipulation, and Roleplaying), these effects are altered in both size and significance by the introduction of Self-Regulation and the interactions. Overall, Escapism is associated with increases in Problematic Use while Relationship play and Manipulation are associated with decreases. These effects are changed slightly with the introduction of Self-Regulation into the model. The effect of Manipulation remains significant, but the positive effect of Escapism and the negative effect of Relationship play are dampened, becoming only marginally significant. The negative effect of Manipulation play on Problematic Use indicates that players who are motivated to play by their enjoyment of harassing and annoying others are likely to report lower levels of Problematic Use at a second time period than those players less inclined to behave in such a manner.

The interaction of self-regulation and depression indicates that depression moderates the effect of self-regulatory behavior on problematic use. At lower levels of depression, self-regulation has the negative effect on problematic use illustrated by its main effect. However, as depression increases above mean levels, the effect of self-regulation on problematic use is eliminated. Simply, depressive affect reduces the effectiveness of the self-regulatory processes, ablating their negative effect on problematic use. This result offers specific support for Hypothesis VII, which posits the exact moderating relationship obtained here.

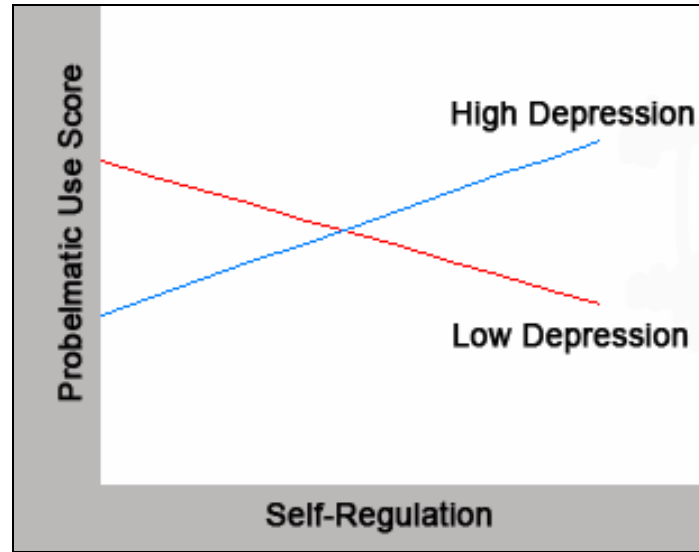


Figure 8.1 : A plot of the self-regulation by depression interaction on Problematic Use

The Hours by Affinity interaction illustrates that how much a player likes a game will moderate the effect that hours of weekly play has on problematic use. At low levels of affinity, hours of play has a strong positive effect on problematic use. However, at higher levels of game affinity, increases in hours of play have no effect on problematic use levels. This suggests that players who enjoy and have high regard for the game that they play can play it for many hours each week without feeling that the activity is causing them any problems. However, individuals who continue to play a game that they view negatively or do not like for many hours each week report higher levels of problematic use.

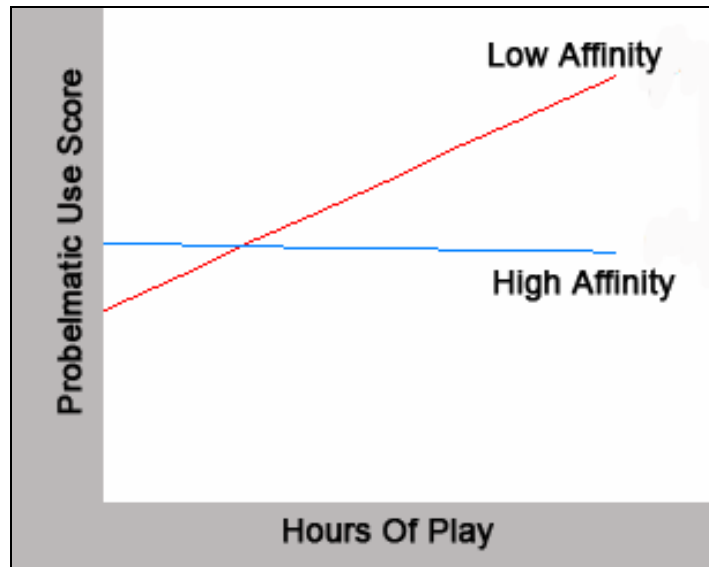


Figure 8.2 : A plot of the hours of play by game affinity interaction on Problematic Use.

It is important to note that even though cross-sectional analyses show an association between hours of play and problematic use, hours of play (or amount of consumption) in and of itself is not predictive of problematic use. This result further discounts the simple media effects model in which amount of exposure is determinant of the outcome of use. Along with the zero order correlation described in Chapter 7, this indicates that while hours of play may have a positive cross-sectional relationship with reports of problematic use, it does not have longitudinally predictive power. Simply, a large amount of play is certainly associated with problematic use cross-sectionally, but is not predictive of future problematic usage issues, particularly in situations where the player enjoys the game that they are playing (e.g. high game affinity).

Finally, a note about something else that was not found. As discussed earlier, Danforth used a seven-factor personality inventory, including the Big Five plus Attractiveness and Negative Valence, which showed little predictive value with respect to the development of “addiction”. This result has been replicated in the current study. The final model presented in table 8.5 reflects the removal of five of the seven personality factor from the model due to their lack of contribution to the model fit.

## 8.2 Modeling Engaged Use

Now let us turn our attention to creating a predictive model of Engaged Use. Again, we start by entering a lagged measure of the dependent variable of interest.

	Estimate	Standard Error	T-Ratio	p value
Intercept	4.552	0.025	185.241	0.000
Engagement (Lagged)	0.305	0.025	12.260	0.000

Table 8.6. Regression model predicting Engaged Use with Lagged Measure

By itself, the lagged measure of engagement accounts for 24% of the variance in the dependent variable, future engagement (adjusted  $R^2(477) = 0.238$ ). This indicates that Engaged Use is considerably less stable over time than Problematic Use.

We proceed by checking the effects of gender, age, and personality by entering the Block 1 predictors into the model, as is shown in Table 8.7.

	Estimate	Standard Error	T-Ratio	p value
Intercept	4.545	0.028	161.643	0.000
Engagement (Lagged)	0.305	0.027	11.482	0.000
Block 1 – Controls				
Female	0.028	0.075	0.372	0.710
Age	-0.003	0.027	-0.119	0.906
Extraversion	-0.067	0.030	-2.225	0.027
Agreeableness	-0.020	0.029	-0.681	0.496
Conscientiousness	-0.004	0.027	-0.152	0.879
Emotional Stability	0.003	0.031	0.104	0.917
Intelligence	0.012	0.028	0.422	0.673
Attractiveness	-0.022	0.032	-0.691	0.490
Negative Valence	-0.008	0.028	-0.297	0.766

Table 8.7. Regression model predicting Engaged Use with Block 1

Adding Block 1 reduces the variance accounted for very slightly to roughly 23% (adjusted  $R^2(431) = 0.232$ ). A reduction in variance accounted for following the addition of a set of variables to a regression model indicates a parsimony penalty. This means that the model fit was not improved in proportion to the number of predictors added to the model, making things more complex without making them proportionally more explanatory. However, we do see a significant negative effect for the Extraversion personality factor. This suggests that individuals scoring high in extraversion are less likely to be-

come deeply involved in the games they play, as well as the inverse, that introverts are more likely to become engaged.

	Estimate	Standard Error	T-Ratio	p value
Intercept	4.564	0.029	156.045	0.000
Engagement (Lagged)	0.248	0.034	7.241	0.000
Block 1 – Controls				
Female	-0.006	0.081	-0.078	0.938
Age	-0.010	0.029	-0.357	0.721
Extraversion	-0.067	0.031	-2.161	0.031
Agreeableness	-0.014	0.030	-0.448	0.654
Conscientiousness	0.004	0.028	0.141	0.888
Emotional Stability	0.022	0.033	0.663	0.508
Intelligence	0.005	0.029	0.160	0.873
Attractiveness	-0.009	0.033	-0.281	0.779
Negative Valence	-0.012	0.030	-0.395	0.693
Block 2 – Types of Play				
Achievement	0.066	0.030	2.192	0.029
Escapism	0.019	0.031	0.597	0.551
Roleplaying	0.023	0.029	0.790	0.430
Manipulation	-0.039	0.033	-1.169	0.243
Relationship	-0.003	0.031	-0.096	0.924
Hours	0.110	0.035	3.175	0.002
Affinity	-0.001	0.030	-0.019	0.985

Table 8.8. Regression model predicting Engaged Use with Blocks 1 & 2

The addition of predictor block 2, including the play motivations, hours of play, and game affinity, increases the variance accounted for to 24% (adjusted  $R^2(402) = 0.241$ ), as is shown in Table 8.8. Two additional significant effects of interest are obtained in this model, positive effects for both the Achievement player type and hours of play per week. The Achievement results suggest that players scoring higher in this dimension are more likely to become engaged than players scoring lower. The play hours result is similar, indicating that individuals playing a high number of hours will report higher levels of engagement than those playing less.

	Estimate	Standard Error	T-Ratio	p value
Intercept	4.555	0.030	150.444	0.000
Engagement (Lagged)	0.241	0.037	6.538	0.000
Block 1 – Controls				
Female	0.074	0.083	0.896	0.371
Age	-0.019	0.030	-0.617	0.538
Extraversion	-0.077	0.033	-2.363	0.019
Agreeableness	-0.021	0.031	-0.663	0.507
Conscientiousness	-0.005	0.029	-0.180	0.857
Emotional Stability	0.011	0.035	0.326	0.745
Intelligence	0.011	0.030	0.375	0.708
Attractiveness	-0.032	0.036	-0.893	0.373
Negative Valence	-0.016	0.033	-0.496	0.620
Block 2 – Types of Play				
Achievement	0.068	0.030	2.228	0.026
Escapism	0.011	0.032	0.359	0.720
Roleplaying	0.030	0.030	1.007	0.315
Manipulation	-0.042	0.034	-1.217	0.224
Relationship	-0.012	0.032	-0.390	0.697
Hours	0.114	0.037	3.108	0.002
Affinity	0.004	0.031	0.124	0.902
Block 3 – Usage Outcomes				
Problematic Use	0.020	0.036	0.540	0.590
Self-Regulation	0.023	0.043	0.533	0.594

Table 8.9. Regression model predicting Engaged Use with Blocks 1, 2 &amp; 3

The addition of predictor block 3 increases the variance accounted for to 26% (adjusted  $R^2(368) = 0.257$ ). However, no additional significant effects are obtained, as shown in Table 8.9. Predictor blocks 4 and 5 contain no significant effects and are causally downstream of Engagement with respect to our proposed framework, so models containing them are omitted from further discussion. However, we do have one significant interaction to discuss, an Age by Escapism effect shown in Table 8.10.

	Estimate	Standard Error	T-Ratio	p value
Intercept	4.565	0.029	155.802	0.000
Engagement (Lagged)	0.254	0.035	7.181	0.000
Block 1 – Controls				
Female	-0.021	0.081	-0.256	0.798
Age	-0.002	0.029	-0.086	0.932
Extraversion	-0.061	0.031	-1.968	0.050
Agreeableness	-0.017	0.031	-0.543	0.588
Conscientiousness	0.003	0.028	0.115	0.909
Emotional Stability	0.027	0.033	0.816	0.415
Intelligence	0.008	0.029	0.271	0.787
Attractiveness	-0.013	0.033	-0.412	0.681
Negative Valence	-0.013	0.031	-0.428	0.669
Block 2 – Types of Play				
Achievement	0.060	0.030	1.999	0.046
Escapism	0.015	0.032	0.487	0.626
Roleplaying	0.020	0.029	0.685	0.494
Manipulation	-0.037	0.034	-1.099	0.273
Relationship	0.004	0.031	0.132	0.895
Hours	0.107	0.035	3.025	0.003
Affinity	0.001	0.030	0.043	0.965
Block 3 – Usage Outcomes				
Problematic Use	0.025	0.034	0.730	0.466
Interactions				
Age*Escapism	0.075	0.025	3.019	0.003

Table 8.10. Regression model predicting Engaged Use with Blocks 1-3 and Interaction

The model shown in Table 8.10, containing predictor blocks 1 and 2, Engagement form block 3, and the interaction, accounts for 26% of the variance in Engaged Use (adjusted  $R^2(394) = 0.260$ ).

The model in Table 8.10 presents a small collection of significant, positive predictors of Engaged Use. Hours of play, the achievement motivation, and the interaction of age and the escapism player type are all positively associated with changes in Engaged Use. In addition, the Extraversion factor is negatively associated with changes in Engaged Use. This negative effect suggests that extraverts are less likely to become deeply involved in gaming than introverts, a rather uncontroversial notion.

The relationship between hours of play and engagement indicates that a high number of play hours predicts increases in reports of Engaged Use. Similarly, low numbers of play

hours predict a decrease in future levels of Engaged Use. This result suggests that one becomes more engaged as they spend more time playing and less engaged as less time is spent with gaming.

A significant interaction is obtained between the player's age and the escapism play motivation. In decomposing this interaction, we must consider the slight negative relationship between age and engaged use. Older players are less likely to report engagement than younger players. However, older players who are motivated to play as an escape report levels of engagement just as high as younger players. Thus, pursuit of the Escapism player motivation nullifies the negative effect of age on Engaged Use.

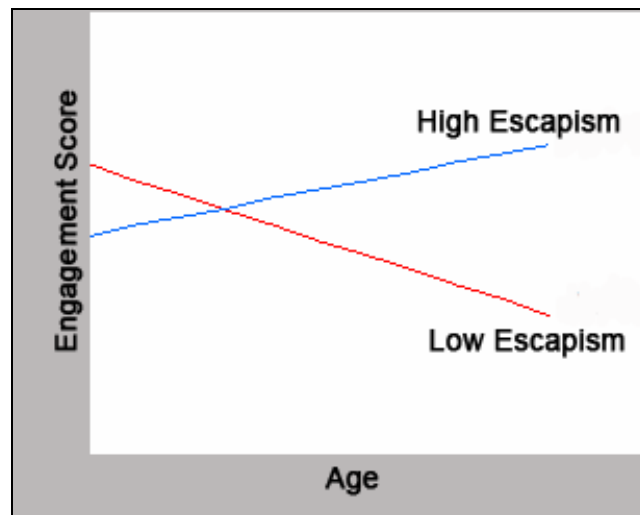


Figure 8.3 : A plot of the Escapism by Age interaction on Engaged Use.

With respect to player motivation, the obtained model offers support for hypothesis III, which predicted a positive relationship between Engaged Use and both Achievement and Escapism. The expected effect of Achievement is obtained in addition to the Age by Escapism interaction covered above. The significant effect for Achievement in the complete model indicates that players who derive a sense of accomplishment from experiencing, understanding, and mastering every aspect of a game do tend to become more engaged in the activity than those who play online games for other reasons. The interaction of Age and Escapism indicates that Escapism acts on Engaged use in the predicted fashion, but principally for older players.



### 8.3 Chapter Summary

In this chapter we displayed and briefly discussed the results of models predicting Engaged and Problematic Use. The following four hypotheses were tested.

*Hypothesis I* – Self-Regulatory deficits will predict the development of problematic use.

*Hypothesis II* - Certain play motivation factors will distinguish players who are more susceptible to problematic use.

*Hypothesis III* – Players who are motivated to play for Achievement and Escape will report higher levels of Engaged Use.

*Hypothesis VII*- The effect of self-regulatory deficits on problematic use will interact with depression.

	Estimate	Standard Error	T-Ratio	p value
Manipulation	-0.092	0.045	-2.021	0.044
Self-Regulation	-0.132	0.053	-2.498	0.013
SSRQ * Depression	0.113	0.032	3.573	0.000
Hours * Affinity	-0.080	0.038	-2.087	0.038

Table 8.11. Significant Longitudinal Effects Summary for Problematic Use

The significant predictors of Problematic Use are summarized in Table 8.11. A significant negative effect of Self-regulation on Problematic Use supports the predictions made in Hypothesis I. This suggests that self-regulatory activity is important and effective in shielding the player from allowing their gaming behavior to cause noticeable problems in their life. Those players who actively monitor their play, evaluate it against internally and externally generated standards, and reward themselves for managing their behavior are unlikely to use games problematically.

The significant negative effect of Manipulation on Problematic use is an interesting one. In general, we might consider grief play to arise from a situation in which the core game mechanic has failed to engage the player and forced him to pursue other avenues of enjoyment within the game's confines. Obstruction of the enjoyment of those who do gainfully operate within the game's mechanics seems a logical, if juvenile, approach. It can be reasoned that the enjoyment obtained from causing grief to other players suffers from diminishing returns, as a certain scam or act of harassment might dwindle in appeal with

repetition. Further, one might only be able to garner so much amusement from manipulating a given mark before it becomes necessary to find a new victim. Such diminishing returns would not reward a player for repeated and extended pursuit of manipulation play compared to escapism and achievement play which are more regularly, if not almost continuously, reinforced. As such, manipulation play's attenuated reinforcement schedule combined with a lack of interest in the game's core goals might encourage such players to seek other modes of stimulation outside of gaming, thus leading to lower reported levels of Problematic Use over time. In sum with the marginally significant effects for Escapism (predicting increases in problematic use) and Relationship play (predicting decreases), the player motivation results obtained partially support the prediction made in Hypothesis II.

The significant interaction of Self-Regulation and Depression, indicating that depressive affect dampens the effectiveness of the self-regulatory processes, offers strong and explicit support for Hypothesis VII.

	Estimate	Standard Error	T-Ratio	p value
Extraversion	-0.061	0.031	-1.968	0.050
Achievement	0.060	0.030	1.999	0.046
Hours	0.107	0.035	3.025	0.003
Age*Escapism	0.075	0.025	3.019	0.003

Table 8.12. Significant Longitudinal Effects Summary for Engaged Use

Table 8.12 summarizes the significant effects predicting Engaged Use. A significant main effect of the Achievement motivation offers partial support for Hypothesis III. Players who emphasize, adopt, and pursue game-centered goals tend to become more engaged in the games that they play than those players who play for other reasons. The proposed positive effect of Escapism on Engaged Use holds only for older players.

## CHAPTER NINE

# Modeling Social Integration and Depression

### 9.1 Testing the Augmentation and Displacement Hypotheses

As was the case with the usage outcomes in Chapter 8, prospective analysis was used to test the longitudinal effects of certain predictors on the three measures of social integration. The augmentation and displacement models described in Chapter 5 are tested in order to evaluate the following two hypotheses:

*Hypothesis IV* – Online gaming will lead to greater feelings of social integration for those who utilize it as a social medium.

*Hypothesis V* – Heavy participation in online gaming will lead to reduced feelings of social integration.

In addition, this chapter describes the testing of the depression models contained in Chapter 5, allowing us to assess the veracity of hypothesis VI, presented below.

*Hypothesis VI* - Certain social integration and personality factors distinguish players who are more susceptible to depression.

### 9.1.1 Loneliness

Rather than producing separate models to evaluate the augmentation and displacement hypotheses, a single predictive model of each social integration variable was produced in a manner matching that used in modeling Problematic and Engaged Use. These models combined both the augmentation and displacement predictors, in order to create a unified model of the predictors' effects on the outcome variables.

As always, the lagged measure of the dependent variable, loneliness, is entered into the model first. This lagged predictor alone accounts for nearly 60% of the variance in loneliness, indicating that the construct seems quite stable over time (adjusted  $R^2$  (481) = 0.595). This model is shown in Table 9.1.

	Estimate	Standard Error	T-Ratio	p value
Intercept	2.241	0.020	111.100	0.000
Loneliness (Lagged)	0.553	0.021	26.646	0.000

Table 9.1. Regression model predicting Loneliness with Lagged Measure

Next the block 1 predictors, including, gender, age, and the personality dimensions, were entered. This model improved the explained variance to nearly 61% (adjusted  $R^2$  (433) = 0.609).

	Estimate	Standard Error	T-Ratio	p value
Intercept	2.230	0.023	98.668	0.000
Loneliness (Lagged)	0.486	0.030	16.463	0.000
Block 1 - Controls				
Female	0.109	0.060	1.834	0.067
Age	-0.047	0.022	-2.196	0.029
Extraversion	-0.094	0.026	-3.579	0.000
Agreeableness	-0.003	0.023	-0.147	0.883
Conscientiousness	-0.025	0.022	-1.128	0.260
Emotional Stability	0.005	0.027	0.179	0.858
Intelligence	0.008	0.023	0.362	0.718
Attractiveness	-0.010	0.026	-0.383	0.702
Negative Valence	0.025	0.023	1.117	0.265

Table 9.2. Regression model predicting Loneliness with Block 1

Table 9.2 shows that two significant predictors of loneliness were contained within predictor block 1; age and Extraversion. The age effect suggests that older players grow slightly less lonely than younger players. Similarly, the Extraversion effect indicates that

players high in Extraversion grow less lonely than those lower on this personality dimension. The nearly significant contribution of gender is worth noting at this point, as it will become more impactful going forward with the addition of coming covariates.

The addition of predictor block 2, as shown in Table 9.3, improves the model incrementally to explain approximately 62% of the variance in loneliness (adjusted  $R^2$  (400) = 0.616). In spite of the small improvement in explained variance, no additional significant effects are obtained for the predictors in block 2.

	Estimate	Standard Error	T-Ratio	p value
Intercept	2.216	0.023	94.758	0.000
Loneliness (Lagged)	0.474	0.031	15.221	0.000
Block 1 – Controls				
Female	0.123	0.064	1.922	0.055
Age	-0.063	0.024	-2.643	0.009
Extraversion	-0.094	0.027	-3.495	0.001
Agreeableness	-0.009	0.025	-0.383	0.702
Conscientiousness	-0.029	0.023	-1.250	0.212
Emotional Stability	-0.011	0.028	-0.379	0.705
Intelligence	0.007	0.023	0.312	0.756
Attractiveness	-0.013	0.027	-0.490	0.624
Negative Valence	0.002	0.025	0.061	0.951
Block 2 – Types of Play				
Achievement	0.034	0.024	1.412	0.159
Escapism	0.003	0.024	0.139	0.890
Roleplaying	0.017	0.023	0.717	0.474
Manipulation	-0.030	0.027	-1.118	0.264
Relationship	-0.035	0.025	-1.398	0.163
Hours	0.012	0.024	0.499	0.618
Affinity	-0.001	0.022	-0.034	0.973

Table 9.3. Regression model predicting Loneliness with Blocks 1 & 2

With the addition of predictor block 3, shown in Table 9.4, the model's descriptive power is reduced fractionally (adjusted R<sup>2</sup> (361) =0.610). This is another example of a parsimony penalty, where model fit suffers due to the addition of a number of non-significant predictors. No new significant effects are obtained for the block 3 predictors, though the Achievement and Relationship motivations trend toward significance at this stage.

	Estimate	Standard Error	T-Ratio	p value
Intercept	2.211	0.025	88.949	0.000
Loneliness (Lagged)	0.464	0.034	13.773	0.000
Block 1 – Controls				
Female	0.121	0.067	1.815	0.070
Age	-0.070	0.025	-2.760	0.006
Extraversion	-0.105	0.029	-3.669	0.000
Agreeableness	-0.020	0.026	-0.782	0.435
Conscientiousness	-0.022	0.025	-0.885	0.377
Emotional Stability	0.000	0.030	0.007	0.994
Intelligence	0.014	0.025	0.573	0.567
Attractiveness	0.001	0.029	0.031	0.975
Negative Valence	0.007	0.027	0.240	0.810
Block 2 – Types of Play				
Achievement	0.042	0.025	1.667	0.096
Escapism	0.009	0.026	0.350	0.727
Roleplaying	0.024	0.025	0.979	0.328
Manipulation	-0.032	0.028	-1.140	0.255
Relationship	-0.040	0.026	-1.518	0.130
Hours	0.039	0.030	1.300	0.195
Affinity	0.001	0.026	0.056	0.955
Block 3 – Usage Outcomes				
Engaged Use	-0.033	0.031	-1.066	0.287
Problematic Use	-0.012	0.030	-0.399	0.690
Self-Regulation	-0.019	0.036	-0.519	0.604

Table 9.4. Regression model predicting Loneliness with Blocks 1, 2 & 3

Predictor block 4 increases the descriptive power of the model to 63% (adjusted R<sup>2</sup> (306) =0.633). Though no factors within block 4 are themselves significant, the inclusion of this block in the model renders significant the three trending effects that we have been monitoring; gender and the Achievement and Relationship motivations. This model is shown in Table 9.5.

	Estimate	Standard Error	T-Ratio	p value
Intercept	2.228	0.026	87.300	0.000
Loneliness (Lagged)	0.454	0.036	12.562	0.000
Block 1 – Controls				
Female	0.162	0.069	2.335	0.020
Age	-0.079	0.026	-3.032	0.003
Extraversion	-0.114	0.030	-3.787	0.000
Agreeableness	-0.018	0.027	-0.688	0.492
Conscientiousness	-0.016	0.025	-0.634	0.527
Emotional Stability	-0.011	0.031	-0.353	0.724
Intelligence	0.010	0.025	0.391	0.696
Attractiveness	-0.021	0.031	-0.691	0.490
Negative Valence	0.006	0.028	0.224	0.823
Block 2 – Types of Play				
Achievement	0.076	0.026	2.916	0.004
Escapism	-0.014	0.027	-0.500	0.617
Roleplaying	0.038	0.026	1.460	0.145
Manipulation	-0.041	0.029	-1.410	0.160
Relationship	-0.057	0.030	-1.915	0.056
Hours	0.037	0.031	1.196	0.233
Affinity	0.024	0.027	0.895	0.371
Block 3 – Usage Outcomes				
Engaged Use	-0.026	0.032	-0.807	0.420
Problematic Use	-0.026	0.032	-0.822	0.412
Self-Regulation	0.005	0.038	0.137	0.891
Block 4 – Social Dimensions				
Play w/ RL Friends	-0.035	0.026	-1.343	0.180
Online Fr met Game	0.037	0.028	1.306	0.193
Online Fr met in RL	0.031	0.024	1.317	0.189
Organizational Commitment	-0.019	0.026	-0.758	0.449

Table 9.5. Regression model predicting Loneliness with Blocks 1-4

The addition of predictor block 5, which controls for the influence of depression, changes the model very little, as the variance accounted for holds steady at 63% (adjusted R<sup>2</sup> (292) = 0.629). No significant interactions were obtained among the predictors.

	Estimate	Standard Error	T-Ratio	p value
Intercept	2.230	0.026	85.148	0.000
Loneliness (Lagged)	0.466	0.039	11.880	0.000
Block 1 – Controls				
Female	0.173	0.072	2.390	0.017
Age	-0.086	0.027	-3.144	0.002
Extraversion	-0.102	0.032	-3.182	0.002
Agreeableness	-0.020	0.028	-0.711	0.478
Conscientiousness	-0.007	0.026	-0.282	0.778
Emotional Stability	-0.019	0.034	-0.569	0.570
Intelligence	0.010	0.026	0.362	0.717
Attractiveness	-0.030	0.032	-0.959	0.338
Negative Valence	0.006	0.029	0.199	0.843
Block 2 – Types of Play				
Achievement	0.081	0.027	2.985	0.003
Escapism	-0.016	0.029	-0.571	0.569
Roleplaying	0.048	0.027	1.781	0.076
Manipulation	-0.045	0.030	-1.506	0.133
Relationship	-0.059	0.031	-1.880	0.061
Hours	0.043	0.032	1.325	0.186
Affinity	0.023	0.027	0.844	0.399
Block 3 – Usage Outcomes				
Engaged Use	-0.033	0.034	-0.973	0.332
Problematic Use	-0.017	0.033	-0.518	0.605
Self-Regulation	-0.005	0.040	-0.116	0.908
Block 4 – Social Dimensions				
Play w/ RL Friends	-0.049	0.027	-1.790	0.075
Online Fr met Game	0.037	0.029	1.274	0.204
Online Fr met in RL	0.034	0.024	1.429	0.154
Organizational Commitment	-0.018	0.026	-0.675	0.500
Block 5 - Depression				
Depression	-0.034	0.037	-0.919	0.359

Table 9.6. Regression model predicting Loneliness with all Blocks



Due to the parsimony penalty inflicted upon the model following the addition of block 3, a final model of loneliness which accounts for 62% of the variance is produced by removing all of block 3 and some of the block 4 predictors from the model.(adjusted R2 (378) =0.622). This model is shown in Table 9.7.

	Estimate	Standard Error	T-Ratio	p value
Intercept	2.217	0.024	93.345	0.000
Loneliness (Lagged)	0.474	0.034	13.794	0.000
Block 1 - Controls				
Female	0.156	0.066	2.364	0.019
Age	-0.075	0.025	-3.058	0.002
Extraversion	-0.084	0.028	-2.996	0.003
Agreeableness	-0.016	0.025	-0.651	0.515
Conscientiousness	-0.026	0.024	-1.085	0.278
Emotional Stability	-0.017	0.031	-0.539	0.590
Intelligence	0.013	0.023	0.576	0.565
Attractiveness	-0.024	0.027	-0.889	0.375
Negative Valence	0.017	0.025	0.675	0.500
Block 2 – Types of Play				
Achievement	0.031	0.024	1.279	0.202
Escapism	-0.006	0.025	-0.222	0.825
Roleplaying	0.025	0.024	1.069	0.286
Manipulation	-0.024	0.027	-0.891	0.374
Relationship	-0.026	0.026	-1.037	0.300
Hours	0.029	0.025	1.134	0.257
Affinity	0.000	0.022	0.021	0.983
Block 4 – Social Dimensions				
Play w/ RL Friends	-0.072	0.023	-3.110	0.002
Block 5 - Depression				
Depression	-0.023	0.033	-0.695	0.488

Table 9.7. Final regression model predicting Loneliness

First, let us examine the results supporting the augmentation hypothesis with respect to loneliness. Hypothesis IV predicted that gaming would increase feelings of social integration for those that use it socially. The significant negative effect of the frequency of play with real life friends and relatives supports this notion. The other “augmentation” predictors suggested by the model presented in Chapter 5, Relationship play motivation, online friends met in real life, and guild commitment, did not turn out to be significantly predictive of a reduction in loneliness. The finding that individuals high in Extraversion re-

ported less loneliness than their more introverted counterparts meets expectations established in the personality literature.

Turning to the displacement hypothesis, we see that the intuitive predictors of displacement, as outlined in Chapter 5, did not perform well in predicting loneliness. Neither the Achievement nor the Escapism play motivation significantly predicted an increase in loneliness. Further, hours of play, guild commitment, and problematic use all make insignificant contributions to the model. These results offer no support for the displacement claims of hypothesis V.

### 9.1.2 High Contact Social Network Size

Our initial model of social network size, containing only the lagged measure, accounts for 56% of the variance in future social network size (adjusted  $R^2$  (494) = 0.560). This suggests that high contact social network size is relatively stable over time.

	Estimate	Standard Error	T-Ratio	p value
Intercept	4.481	0.056	79.741	0.000
Social Net Size (Lagged)	1.412	0.056	25.118	0.000

Table 9.8. Regression model predicting Social Network Size with Lagged Measure

No predictor from any of the five predictor blocks displayed a significant effect on social network size. As such, we can skip the block-wise presentation and show the assembled model in table 9.9. At 56%, this complete model accounts for no more variance than the model containing the lagged measure alone (adjusted R<sup>2</sup> (296) =0.562).

	Estimate	Standard Error	T-Ratio	p value
Intercept	4.467	0.080	55.957	0.000
Social Net Size (Lagged)	1.397	0.080	17.363	0.000
Block 1 – Controls				
Female	-0.409	0.220	-1.858	0.064
Age	0.076	0.084	0.901	0.369
Extraversion	-0.004	0.088	-0.046	0.964
Agreeableness	0.096	0.085	1.132	0.258
Conscientiousness	0.018	0.079	0.226	0.821
Emotional Stability	-0.072	0.102	-0.709	0.479
Intelligence	-0.102	0.079	-1.295	0.196
Attractiveness	0.050	0.095	0.521	0.603
Negative Valence	-0.008	0.088	-0.085	0.932
Block 2 – Types of Play				
Achievement	-0.123	0.082	-1.504	0.134
Escapism	-0.057	0.087	-0.654	0.513
Roleplaying	0.041	0.081	0.509	0.611
Manipulation	-0.022	0.090	-0.239	0.811
Relationship	0.080	0.095	0.838	0.403
Hours	-0.160	0.099	-1.618	0.107
Affinity	-0.086	0.082	-1.043	0.298
Block 3 – Usage Outcomes				
Engaged Use	-0.024	0.101	-0.237	0.813
Problematic Use	0.178	0.100	1.785	0.075
Self-Regulation	-0.084	0.122	-0.686	0.493
Block 4 – Social Dimensions				
Play w/ RL Friends	0.132	0.084	1.571	0.117
Online Fr met Game	0.097	0.089	1.096	0.274
Online Fr met in RL	-0.088	0.073	-1.215	0.225
Organizational Commitment	-0.090	0.080	-1.122	0.263
Block 5 - Depression				
Depression	-0.120	0.110	-1.093	0.275

Table 9.9. Regression model predicting Social Network Size with all Blocks

None of the displacement or augmentation predictors exerted any effect on social network size. This indicates that hours of play, commitment to online social groups, problematic use, and even meeting online friends in real life did not lead to any change in the

size of the players' high contact social networks. Neither Hypothesis IV or V are supported by this model of social network size. This absence of effects can be taken to suggest that online gaming has minimal effects, positive or negative, on the number of people with which players maintain high contact relationships.

### 9.1.3 Perceived Social Support

Now we come to the third measure of social integration, perceived social support. Entering the lagged measure creates a model accounting for 50% of the variance in the dependent variable (adjusted R<sup>2</sup> (478) =0.504). Again, this indicates a good level of stability over time in the measure.

	Estimate	Standard Error	T-Ratio	p value
Intercept	3.243	0.020	162.510	0.000
Social Support (Lagged)	0.439	0.020	22.065	0.000

Table 9.10. Regression model predicting Perceived Social Support with Lagged Measure

The addition of predictor block 1 (see Table 9.11) leaves the variance accounted for unchanged and adds no significant predictors to the model (adjusted R<sup>2</sup> (431) =0.505).

	Estimate	Standard Error	T-Ratio	p value
Intercept	3.252	0.023	142.226	0.000
Social Support (Lagged)	0.436	0.026	17.039	0.000
Block 1 - Controls				
Female	-0.049	0.060	-0.814	0.416
Age	-0.035	0.021	-1.664	0.097
Extraversion	0.044	0.025	1.742	0.082
Agreeableness	0.031	0.024	1.301	0.194
Conscientiousness	0.009	0.022	0.382	0.702
Emotional Stability	-0.023	0.026	-0.899	0.369
Intelligence	-0.008	0.023	-0.336	0.737
Attractiveness	0.008	0.026	0.307	0.759
Negative Valence	-0.038	0.022	-1.705	0.089

Table 9.11. Regression model predicting Perceived Social Support with Block 1

Predictor block 2 again leaves the variance accounted for largely unchanged at roughly 50%, but does add a significant predictor (adjusted R<sup>2</sup> (399) = 0.504). The Achievement player motivation displays a just significant negative relationship with perceived social support in the iteration of the model. This model is shown in Table 9.12.

	Estimate	Standard Error	T-Ratio	p value
Intercept	3.250	0.024	134.979	0.000
Social Support (Lagged)	0.435	0.027	15.988	0.000
Block 1 - Controls				
Female	-0.036	0.066	-0.542	0.588
Age	-0.017	0.024	-0.727	0.468
Extraversion	0.034	0.026	1.294	0.196
Agreeableness	0.023	0.025	0.900	0.369
Conscientiousness	0.016	0.024	0.667	0.505
Emotional Stability	-0.022	0.028	-0.794	0.428
Intelligence	-0.010	0.024	-0.420	0.674
Attractiveness	0.014	0.028	0.523	0.601
Negative Valence	-0.022	0.025	-0.877	0.381
Block 2 – Types of Play				
Achievement	-0.049	0.024	-2.002	0.046
Escapism	-0.031	0.025	-1.239	0.216
Roleplaying	-0.006	0.023	-0.265	0.791
Manipulation	0.034	0.027	1.255	0.210
Relationship	0.036	0.025	1.404	0.161
Hours	0.019	0.025	0.758	0.449
Affinity	0.008	0.022	0.345	0.731

Table 9.12. Regression model predicting Perceived Social Support with Blocks 1 & 2

The addition of predictor block 3 (see Table 9.13) strengthens the model a bit in terms of variance explained, raising it to 52% (adjusted  $R^2(360) = 0.517$ ). However, no additional significant effects are obtained, and the pre-existing one for the Achievement motivation is knocked out of significance.

	Estimate	Standard Error	T-Ratio	p value
Intercept	3.250	0.025	128.258	0.000
Social Support (Lagged)	0.435	0.029	15.193	0.000
Block 1 - Controls				
Female	-0.029	0.068	-0.426	0.670
Age	-0.013	0.025	-0.518	0.605
Extraversion	0.044	0.028	1.580	0.115
Agreeableness	0.037	0.026	1.421	0.156
Conscientiousness	0.022	0.025	0.907	0.365
Emotional Stability	-0.003	0.029	-0.115	0.908
Intelligence	-0.004	0.025	-0.173	0.862
Attractiveness	0.022	0.030	0.736	0.462
Negative Valence	-0.030	0.027	-1.105	0.270
Block 2 – Types of Play				
Achievement	-0.044	0.025	-1.751	0.081
Escapism	-0.035	0.027	-1.314	0.190
Roleplaying	-0.003	0.025	-0.137	0.891
Manipulation	0.034	0.029	1.195	0.233
Relationship	0.038	0.026	1.420	0.156
Hours	0.042	0.031	1.347	0.179
Affinity	0.018	0.026	0.705	0.482
Block 3 – Usage Outcomes				
Engaged Use	-0.036	0.031	-1.177	0.240
Problematic Use	-0.017	0.031	-0.544	0.587
Self-Regulation	-0.055	0.036	-1.525	0.128

Table 9.13. Regression model predicting Perceived Social Support with Blocks 1, 2 & 3

The addition of predictor block 4 reduces the models variance accounted for to 47% (adjusted R<sup>2</sup> (302) = 0.473). A rather substantial parsimony penalty is assessed here, indicating that the model should be adjusted to remove some of the noise added by the non-explanatory factors. It does, however, show a significant positive effect on perceived social support for those players who report playing with friends and relatives. As with loneliness, this suggests that players who play online games with real-life friends and relatives report feeling increased levels of social support relative to those who do so less frequently. This model is shown below, in Table 9.14.

	Estimate	Standard Error	T-Ratio	p value
Intercept	3.245	0.028	117.527	0.000
Social Support (Lagged)	0.394	0.033	12.064	0.000
Block 1 - Controls				
Female	-0.045	0.075	-0.606	0.545
Age	-0.012	0.028	-0.426	0.671
Extraversion	0.050	0.031	1.609	0.109
Agreeableness	0.025	0.029	0.857	0.392
Conscientiousness	0.021	0.027	0.780	0.436
Emotional Stability	0.003	0.032	0.094	0.925
Intelligence	-0.006	0.028	-0.233	0.816
Attractiveness	0.033	0.034	0.983	0.326
Negative Valence	-0.045	0.030	-1.503	0.134
Block 2 – Types of Play				
Achievement	-0.049	0.028	-1.738	0.083
Escapism	-0.026	0.030	-0.869	0.386
Roleplaying	-0.011	0.027	-0.422	0.673
Manipulation	0.023	0.031	0.740	0.460
Relationship	0.033	0.032	1.018	0.309
Hours	0.007	0.034	0.212	0.833
Affinity	0.017	0.029	0.585	0.559
Block 3 – Usage Outcomes				
Engaged Use	-0.048	0.035	-1.393	0.164
Problematic Use	0.009	0.034	0.266	0.791
Self-Regulation	-0.039	0.042	-0.930	0.353
Block 4 – Social Dimensions				
Play w/ RL Friends	0.072	0.028	2.518	0.012
Online Fr met Game	0.014	0.031	0.445	0.657
Online Fr met in RL	-0.006	0.025	-0.237	0.813
Organizational Commitment	0.031	0.028	1.134	0.258

Table 9.14. Regression model predicting Perceived Social Support with Blocks 1 thru 4

The addition of block 5, containing only depression, further reduces the variance accounted for, but does not change the significance values of any factor in a material way (adjusted R2 (288) =0.459).

	Estimate	Standard Error	T-Ratio	p value
Intercept	3.247	0.029	113.736	0.000
Social Support (Lagged)	0.393	0.035	11.379	0.000
Block 1 - Controls				
Female	-0.051	0.078	-0.651	0.515
Age	-0.016	0.030	-0.546	0.585
Extraversion	0.050	0.033	1.525	0.128
Agreeableness	0.029	0.030	0.959	0.339
Conscientiousness	0.028	0.029	0.969	0.333
Emotional Stability	0.016	0.037	0.427	0.669
Intelligence	-0.010	0.029	-0.345	0.730
Attractiveness	0.036	0.035	1.038	0.300
Negative Valence	-0.050	0.031	-1.601	0.111
Block 2 – Types of Play				
Achievement	-0.046	0.029	-1.563	0.119
Escapism	-0.026	0.031	-0.821	0.412
Roleplaying	-0.006	0.029	-0.218	0.827
Manipulation	0.019	0.032	0.595	0.552
Relationship	0.028	0.033	0.844	0.399
Hours	0.018	0.036	0.509	0.611
Affinity	0.021	0.029	0.698	0.486
Block 3 – Usage Outcomes				
Engaged Use	-0.059	0.036	-1.629	0.104
Problematic Use	0.011	0.036	0.312	0.755
Self-Regulation	-0.040	0.044	-0.912	0.363
Block 4 – Social Dimensions				
Play w/ RL Friends	0.068	0.030	2.264	0.024
Online Fr met Game	0.016	0.032	0.489	0.625
Online Fr met in RL	-0.005	0.026	-0.187	0.851
Organizational Commitment	0.034	0.028	1.204	0.230
Block 5 - Depression				
Depression	0.015	0.039	0.400	0.689

Table 9.15. Regression model predicting Perceived Social Support with all Blocks



Removing blocks 3 and 5 and some of block 4 renders the following model which accounts for 51% of the variance in perceived social support and contains both of the significant effects observed during the modeling process (adjusted R<sup>2</sup> (398) =0.514). This final model of Perceived Social Support is shown in Table 9.16.

	Estimate	Standard Error	T-Ratio	p value
Intercept	3.249	0.024	136.236	0.000
Social Support (Lagged)	0.424	0.027	15.637	0.000
Block 1 - Controls				
Female	-0.052	0.066	-0.794	0.428
Age	-0.016	0.024	-0.669	0.504
Extraversion	0.029	0.026	1.105	0.270
Agreeableness	0.025	0.025	1.021	0.308
Conscientiousness	0.020	0.023	0.850	0.396
Emotional Stability	-0.026	0.027	-0.936	0.350
Intelligence	-0.008	0.024	-0.329	0.742
Attractiveness	0.018	0.027	0.648	0.518
Negative Valence	-0.027	0.025	-1.095	0.274
Block 2 – Types of Play				
Achievement	-0.051	0.024	-2.110	0.035
Escapism	-0.028	0.025	-1.135	0.257
Roleplaying	-0.010	0.023	-0.417	0.677
Manipulation	0.034	0.027	1.259	0.209
Relationship	0.031	0.025	1.217	0.224
Hours	0.009	0.025	0.344	0.731
Affinity	0.009	0.022	0.420	0.675
Block 4 – Social Dimensions				
Play w/ RL Friends	0.067	0.023	2.945	0.003

Table 9.16. Final regression model predicting Perceived Social Support

The significant positive effect of play with real life friends and relatives on perceived social support indicates that those players who play with friends and relatives report an increased sense of available social support relative to those players who do not. Given that play with friends and relatives can be interpreted as a social use of online gaming (rather than a necessity brought on by a scarcity of gaming equipment), this finding supports hypothesis IV.

The significant negative effect of Achievement play on perceived social support indicates the players scoring high on Achievement tend to feel that they have less access to social resources over time than those scoring lower on the Achievement dimension. This could be because, for some, achievement play is centered on the relatively solitary pursuit of

personal accolades and wealth or because achievement players spend relatively less time cultivating social relationships than other players. Finally, it is worth mentioning that the inclusion of depression in this model made no changes to the effects, but reduced the model fit by approximately one percent. As such, depression is not included in the final model.

## 9.2 Gaming & Social Integration

The significant effect of frequency of play with real life friends on loneliness and perceived social support offers support for hypothesis IV, our instantiation of the augmentation hypothesis. In keeping with the findings of Bessi re et al with respect to internet use, gaming does have positive effects on the social integration of players who use gaming as a medium in which to communicate and spend time with friends and loved ones. Quite clearly, gaming can be just as useful a venue as any other social activity in which to transact and maintain close relationships with family and friends. Through both friendly competition and collaboration, gamers are able to share experiences and time with those close to them, strengthening the social bonds that are so essential to emotional health.

	Estimate	Standard Error	T-Ratio	p value
Female	0.156	0.066	2.364	0.019
Age	-0.075	0.025	-3.058	0.002
Extraversion	-0.084	0.028	-2.996	0.003
Play w/ RL Friends	-0.072	0.023	-3.110	0.002

Table 9.17. Significant Longitudinal Effects Summary for Loneliness

	Estimate	Standard Error	T-Ratio	p value
Achievement	-0.051	0.024	-2.110	0.035
Play w/ RL Friends	0.067	0.023	2.945	0.003

Table 9.18. Significant Longitudinal Effects Summary for Perceived Social Support

The negative effect of the Achievement play motivation on perceived social support offers partial support for hypothesis V. It can be reasoned that individuals who are motivated to play by the sense of accomplishment derived from success in the games that they play might become somewhat isolated in their pursuit of individual triumphs and place less emphasis on social aspects of play and the success of others than do less achievement oriented players.

It is important to point out the result that problematic use was not predictive of a significant change in any of the measures of social integration. While this certainly does not allow us to conclude that there is no linkage between problematic use and depression, it does discount claims that problematic use of gaming leads to social isolation and pathologically deleterious effects on social integration. Further, the absence of this relationship between Problematic Use and any of the social integration measures completely discounts the mediation model presented in Chapter 5. Recall that this model suggested that Problematic Use might lead to depression by reducing social integration. Since no relationship between Problematic Use and social integration is obtained, it is impossible to obtain the described mediating relationship.

### 9.3 Modeling Depression

We approach the modeling of depression in the same way used for the previous models. The initial model containing only the lagged measure of depression accounts for roughly 37% of the variance in future reports of depression (adjusted R<sup>2</sup> (461) = 0.365).

	Estimate	Standard Error	T-Ratio	p value
Intercept	1.717	0.020	87.869	0.000
Depression (Lagged)	0.328	0.020	16.315	0.000

Table 9.19. Regression model predicting Depression with Lagged Measure

Adding the demographics and personality factors contained in predictor block 1 (see Table 9.20) increases the variance described to 38% (adjusted  $R^2(415) = 0.379$ ). This block contains two significant effects, a positive effect for gender and a negative one for Emotional Stability.

	Estimate	Standard Error	T-Ratio	p value
Intercept	1.701	0.022	76.412	0.000
Depression (Lagged)	0.272	0.029	9.533	0.000
Block 1 - Controls				
Female	0.170	0.060	2.855	0.005
Age	-0.040	0.022	-1.855	0.064
Extraversion	-0.027	0.024	-1.123	0.262
Agreeableness	-0.032	0.023	-1.386	0.167
Conscientiousness	-0.029	0.022	-1.328	0.185
Emotional Stability	-0.073	0.028	-2.582	0.010
Intelligence	-0.007	0.022	-0.313	0.754
Attractiveness	0.013	0.025	0.513	0.608
Negative Valence	0.038	0.022	1.696	0.091

Table 9.20. Regression model predicting Depression with Block 1

The gender effect suggests that females report slightly higher levels of depression than males. The Emotional Stability effect recapitulates the expected result that individuals who are high in emotional stability are less likely to become more depressed than those scoring lower on this personality dimension.

Addition of predictor block 2, as shown in Table 9.21, raises the explained variance to 39% (adjusted R<sup>2</sup> (385) =0.385). Two more significant effects are obtained, a positive effect for the Roleplaying motivation and a negative effect for the Relationship motivation.

	Estimate	Standard Error	T-Ratio	p value
Intercept	1.703	0.023	73.116	0.000
Depression (Lagged)	0.251	0.030	8.271	0.000
Block 1 - Controls				
Female	0.219	0.065	3.372	0.001
Age	-0.040	0.024	-1.709	0.088
Extraversion	-0.024	0.025	-0.986	0.325
Agreeableness	-0.026	0.024	-1.081	0.280
Conscientiousness	-0.035	0.023	-1.556	0.120
Emotional Stability	-0.088	0.030	-2.940	0.003
Intelligence	-0.008	0.023	-0.362	0.717
Attractiveness	0.019	0.026	0.707	0.480
Negative Valence	0.026	0.025	1.065	0.288
Block 2 – Types of Play				
Achievement	-0.016	0.023	-0.688	0.492
Escapism	0.012	0.025	0.499	0.618
Roleplaying	0.051	0.023	2.267	0.024
Manipulation	0.040	0.026	1.525	0.128
Relationship	-0.064	0.025	-2.594	0.010
Hours	0.028	0.025	1.158	0.248
Affinity	0.016	0.022	0.760	0.448

Table 9.21. Regression model predicting Depression with Blocks 1 & 2

The positive effect of the Roleplaying motivation on depression suggests that individuals scoring high on the Roleplaying dimension tend to become more depressed over time than those less motivated to Roleplay. The opposite is true for the Relationship motivation, in that its negative predictive relationship with depression suggests that players who use online gaming as a social medium report lower levels of depression over time than those less motivated to play for social purposes.

Predictor block 3's entry reduces the variance accounted for fractionally to 38% (adjusted  $R^2(350) = 0.379$ ). However, a significant negative effect for Self-Regulation is obtained. This model is shown in Table 9.22.

	Estimate	Standard Error	T-Ratio	p value
Intercept	1.705	0.025	68.440	0.000
Depression (Lagged)	0.216	0.034	6.369	0.000
Block 1 - Controls				
Female	0.211	0.068	3.081	0.002
Age	-0.036	0.025	-1.442	0.150
Extraversion	-0.013	0.027	-0.467	0.641
Agreeableness	-0.024	0.026	-0.918	0.359
Conscientiousness	-0.031	0.024	-1.271	0.204
Emotional Stability	-0.092	0.032	-2.927	0.004
Intelligence	-0.003	0.024	-0.136	0.892
Attractiveness	0.045	0.029	1.536	0.125
Negative Valence	0.015	0.027	0.559	0.577
Block 2 – Types of Play				
Achievement	-0.019	0.025	-0.738	0.461
Escapism	0.000	0.027	0.010	0.992
Roleplaying	0.052	0.025	2.115	0.035
Manipulation	0.046	0.028	1.633	0.103
Relationship	-0.057	0.026	-2.167	0.031
Hours	0.043	0.030	1.425	0.155
Affinity	0.018	0.025	0.740	0.460
Block 3 – Usage Outcomes				
Engaged Use	0.010	0.031	0.317	0.752
Problematic Use	-0.012	0.031	-0.401	0.689
Self-Regulation	-0.075	0.036	-2.070	0.039

Table 9.22. Regression model predicting Depression with Blocks 1, 2 & 3

This effect indicates that individuals who actively self-regulate are less likely to develop depression than those who engage in lesser levels of self-regulatory activity. This outcome is quite logical, given the generality of the self-regulatory processes as outline in Chapter 4.

The introduction of predictor block 4 reduces the explained variance to 36% (adjusted R<sup>2</sup> (295) =0.363), below that accounted for by the lag variable alone (see Table 9.23).

	Estimate	Standard Error	T-Ratio	p value
Intercept	1.698	0.027	63.650	0.000
Depression (Lagged)	0.193	0.036	5.359	0.000
Block 1 - Controls				
Female	0.254	0.073	3.468	0.001
Age	-0.069	0.028	-2.505	0.013
Extraversion	-0.005	0.029	-0.178	0.859
Agreeableness	-0.026	0.028	-0.937	0.349
Conscientiousness	-0.018	0.027	-0.690	0.491
Emotional Stability	-0.100	0.034	-2.942	0.004
Intelligence	0.006	0.026	0.210	0.834
Attractiveness	0.038	0.032	1.189	0.235
Negative Valence	-0.001	0.029	-0.044	0.965
Block 2 – Types of Play				
Achievement	0.007	0.027	0.262	0.794
Escapism	-0.012	0.029	-0.406	0.685
Roleplaying	0.060	0.027	2.234	0.026
Manipulation	0.014	0.030	0.449	0.654
Relationship	-0.060	0.031	-1.925	0.055
Hours	0.047	0.033	1.420	0.157
Affinity	0.027	0.027	0.974	0.331
Block 3 – Usage Outcomes				
Engaged Use	-0.003	0.033	-0.090	0.928
Problematic Use	-0.004	0.034	-0.127	0.899
Self-Regulation	-0.100	0.040	-2.467	0.014
Block 4 – Social Dimensions				
Play w/ RL Friends	-0.021	0.028	-0.735	0.463
Online Fr met Game	-0.040	0.030	-1.340	0.181
Online Fr met in RL	0.058	0.024	2.388	0.018
Organizational Commitment	0.010	0.026	0.361	0.718

Table 9.23. Regression model predicting Depression with Blocks 1, 2, 3 & 4

Inclusion of predictor block 4 reduces the effect of the Relationship motivation in significance to just above the .05 level. One new significant effect is obtained, a positive effect of meeting online friends in real life on depression. This effect suggests that individuals who meet more of their online friends in real life are likely to report higher levels of depression in the future than those individuals who meet fewer of their online friends.

Of special interest in modeling depression are the three measures of social integration discussed earlier in this chapter. Due to a high level of conceptual overlap and statistical

collinearity, loneliness, social network size, and perceived social support cannot all be used in the same model of depression. As such Tables 9.24, 9.25, and 9.26 present separate models using each social integration measure separately to predict depression.

	Estimate	Standard Error	T-Ratio	p value
Intercept	1.695	0.027	63.279	0.000
Depression (Lagged)	0.162	0.038	4.232	0.000
Block 1 - Controls				
Female	0.266	0.074	3.618	0.000
Age	-0.063	0.028	-2.275	0.024
Extraversion	0.028	0.032	0.860	0.391
Agreeableness	-0.027	0.028	-0.970	0.333
Conscientiousness	-0.019	0.027	-0.709	0.479
Emotional Stability	-0.087	0.035	-2.506	0.013
Intelligence	0.002	0.027	0.072	0.942
Attractiveness	0.047	0.032	1.452	0.148
Negative Valence	-0.010	0.030	-0.329	0.742
Block 2 – Types of Play				
Achievement	0.015	0.028	0.542	0.589
Escapism	-0.011	0.029	-0.371	0.711
Roleplaying	0.057	0.028	2.060	0.040
Manipulation	0.004	0.030	0.146	0.884
Relationship	-0.056	0.032	-1.762	0.079
Hours	0.044	0.033	1.341	0.181
Affinity	0.031	0.028	1.122	0.263
Block 3 – Usage Outcomes				
Engaged Use	-0.005	0.034	-0.161	0.873
Problematic Use	-0.005	0.034	-0.148	0.882
Self-Regulation	-0.101	0.041	-2.460	0.014
Block 4 – Social Dimensions				
Play w/ RL Friends	-0.017	0.028	-0.610	0.542
Online Fr met Game	-0.032	0.030	-1.077	0.282
Online Fr met in RL	0.057	0.024	2.323	0.021
Organizational Commitment	0.014	0.027	0.511	0.610
Loneliness	0.094	0.040	2.323	0.021

Table 9.24. Predicting Depression w/ all blocks plus loneliness (adjusted R2 (290) =0.371)



	Estimate	Standard Error	T-Ratio	p value
Intercept	1.695	0.027	62.853	0.000
Depression (Lagged)	0.194	0.037	5.265	0.000
Block 1 - Controls				
Female	0.258	0.074	3.476	0.001
Age	-0.070	0.028	-2.478	0.014
Extraversion	-0.004	0.031	-0.139	0.890
Agreeableness	-0.024	0.029	-0.846	0.398
Conscientiousness	-0.018	0.027	-0.675	0.500
Emotional Stability	-0.097	0.035	-2.799	0.005
Intelligence	0.006	0.027	0.235	0.814
Attractiveness	0.034	0.032	1.054	0.293
Negative Valence	-0.001	0.030	-0.041	0.968
Block 2 – Types of Play				
Achievement	0.011	0.028	0.405	0.686
Escapism	-0.010	0.030	-0.355	0.723
Roleplaying	0.056	0.027	2.058	0.040
Manipulation	0.010	0.031	0.318	0.751
Relationship	-0.060	0.032	-1.891	0.060
Hours	0.049	0.033	1.472	0.142
Affinity	0.028	0.028	0.991	0.323
Block 3 – Usage Outcomes				
Engaged Use	-0.007	0.034	-0.197	0.844
Problematic Use	-0.007	0.034	-0.213	0.832
Self-Regulation	-0.100	0.041	-2.452	0.015
Block 4 – Social Dimensions				
Play w/ RL Friends	-0.023	0.028	-0.822	0.412
Online Fr met Game	-0.038	0.030	-1.256	0.210
Online Fr met in RL	0.058	0.024	2.382	0.018
Organizational Commitment	0.009	0.027	0.322	0.748
Social Support	-0.003	0.033	-0.092	0.927

Table 9.25. Predicting Depression with all blocks plus perceived social support (adjusted  $R^2(290) = 0.359$ )

	Estimate	Standard Error	T-Ratio	p value
Intercept	1.696	0.027	63.132	0.000
Depression (Lagged)	0.196	0.036	5.398	0.000
Block 1 - Controls				
Female	0.252	0.074	3.425	0.001
Age	-0.073	0.028	-2.589	0.010
Extraversion	-0.008	0.030	-0.282	0.778
Agreeableness	-0.029	0.028	-1.021	0.308
Conscientiousness	-0.017	0.027	-0.631	0.528
Emotional Stability	-0.101	0.034	-2.947	0.003
Intelligence	0.005	0.027	0.203	0.839
Attractiveness	0.035	0.032	1.105	0.270
Negative Valence	0.001	0.030	0.021	0.983
Block 2 – Types of Play				
Achievement	0.008	0.027	0.289	0.773
Escapism	-0.013	0.029	-0.437	0.662
Roleplaying	0.063	0.027	2.310	0.022
Manipulation	0.011	0.030	0.365	0.716
Relationship	-0.063	0.032	-1.982	0.048
Hours	0.050	0.033	1.502	0.134
Affinity	0.024	0.028	0.879	0.380
Block 3 – Usage Outcomes				
Engaged Use	-0.005	0.033	-0.161	0.872
Problematic Use	-0.003	0.034	-0.076	0.940
Self-Regulation	-0.102	0.041	-2.495	0.013
Block 4 – Social Dimensions				
Play w/ RL Friends	-0.021	0.028	-0.740	0.460
Online Fr met Game	-0.039	0.030	-1.316	0.189
Online Fr met in RL	0.055	0.024	2.243	0.026
Organizational Commitment	0.009	0.027	0.339	0.735
Social Net Size	0.023	0.027	0.852	0.395

Table 9.26. Predicting Depression w/ all blocks plus social network size (adjusted R2 (293) =0.362)

The model including all of the predictor blocks and loneliness shows the only significant predictive effect of the social integration measures and accounts for the most variance at 37% (adjusted R2 (291) =0.372). As is to be expected, this result indicates that individuals reporting higher levels of loneliness are likely to report increased levels of depression in the future compared to their less lonely counterparts.

Integrating the model including loneliness with a model trimmed to ameliorate the number of non-contributing factors in the full model yields a final model of depression ac-

counting for 38% of the variance (adjusted R<sup>2</sup> (299) =0.379). Note that this final model, shown in Table 9.27, is only marginally better than the initial model including only the lagged measure of depression.

	Estimate	Standard Error	T-Ratio	p value
Intercept	1.689	0.026	65.037	0.000
Depression (Lagged)	0.164	0.037	4.397	0.000
Block 1 - Controls				
Female	0.259	0.072	3.597	0.000
Age	-0.062	0.027	-2.250	0.025
Extraversion	0.023	0.032	0.740	0.460
Agreeableness	-0.031	0.028	-1.096	0.274
Conscientiousness	-0.022	0.026	-0.846	0.398
Emotional Stability	-0.089	0.034	-2.630	0.009
Intelligence	-0.001	0.025	-0.037	0.971
Attractiveness	0.054	0.032	1.703	0.090
Negative Valence	-0.012	0.029	-0.393	0.694
Block 2 – Types of Play				
Achievement	0.011	0.027	0.418	0.677
Escapism	-0.008	0.027	-0.298	0.766
Roleplaying	0.051	0.026	1.976	0.049
Manipulation	0.006	0.030	0.194	0.846
Relationship	-0.054	0.029	-1.841	0.067
Hours	0.022	0.026	0.849	0.397
Affinity	0.032	0.024	1.288	0.199
Block 3 – Usage Outcomes				
Self-Regulation	-0.091	0.038	-2.368	0.019
Block 4 – Social Dimensions				
Online Fr met in RL	0.050	0.023	2.164	0.031
Loneliness	0.101	0.039	2.583	0.010

Table 9.27. Final model predicting Depression

#### 9.4 Discussing the Depression Model

Our creation of a predictive model of depression allows us to test hypothesis IV:

*Hypothesis VI* - Certain social integration and personality factors distinguish players who are more susceptible to depression.

First let us discuss the results for gender, age, Emotional Stability, and loneliness. The positive effect of gender on depression indicates that females are more likely than males to experience increased depression. Similarly, the negative age effect suggests that younger players report higher levels of depression than older players. The negative main

effect for Emotional Stability is unsurprising by itself, as it parallels established findings with respect to the role of personality in happiness and the development of depressive affect (Hills & Argyle, 2001). What is surprising is the failure to obtain a similar effect for Extraversion or Negative Valence, both of which correlate highly with depression cross-sectionally (a negative correlation in the case of Extraversion). Another significant result is the positive effect of loneliness on depression, a well-established relationship and welcome reality check for the model. Though in no way ground breaking, this collection of results support hypothesis VI, indicating that the social and personality factors predict depression in online gamers in much the same way they do other populations.

The significant negative main effect of self-regulation on depression supports the notion that the self-regulatory processes operate at many levels of an individual's behavioral hierarchy. It is important to reiterate here that the items in the SSRQ do not address self-regulation of gaming behavior specifically, but rather inventory the respondent's employment of the self-regulatory processes to behavior regulation in general. As such, this result demonstrates the generality of the self-regulatory processes in adaptive behavior management.

The positive effect of the Roleplaying motivation on depression suggests that individuals scoring high on the Roleplaying dimension tend to report increased levels of depression relative to those less motivated to Roleplay. Since real-life is almost always a little less grandiose than fantasy, perhaps active participation and immersion in the narrative flow of an idealized fantasy world can sometimes leads to disappointment in the less romantic, less marvelous real-world to which the player must ultimately return. Similar effects, dubbed "post-performance depression" have been observed in dancers and actors after shooting wraps on a film or stage plays cease their run (Robson & Gillies, 1987).

We can consider the unexpected and initially puzzling positive effect of meeting online friends in real life on depression along these same lines of reality falling short in comparison to fantasy. This result indicates that players who meet a higher percentage of their online friends in real life tend to report increased levels of depression relative to those who meet fewer of them. Similar to the Roleplaying effect, it is possible that the reality of meeting and interacting with someone in real life is disappointing or underwhelming relative to the idealized persona that individual has projected online and the rather more romantic and fantastic interactions that idealization enabled. Two players

rendezvousing at a local coffee shop might be understandably disappointed in the reality of their actual meeting when they are accustomed to meeting up as a cunning rogue and powerful mage fighting side by side in the dungeons of Stormreach. Admittedly, this letdown being enough to influence the development of depressive affect seems rather dubious. However, making the effort to meet new people resulting in repeated disappointment in the actual reality of the meeting might logically lead to negative emotional consequences over time.

It is worth mentioning the marginally significant negative effect for Relationship play on depression. This result is consistent with the positive outcomes of social play observed with respect to the social integration measures. Just as individuals who use the internet in general for social purposes become less depressed over time, this result is a near miss in adding further support to the same notion in the specific context of online games (Bessi re et al, under review).

What we do not see is any indication that Problematic Use leads to depression. This result, paired with the fact that we found no influence of Problematic Use on the social integration measure, seriously undercuts any assertion that social integration might mediate the effect of Problematic Use on depression. Simply, while we have obtained an effect of social integration on depression, we have obtained no effect of Problematic Use on either of these factors.

When models of depression including either the play motivations or the personality factors are compared without the other predictors, the personality factors give a much better account of the data. The player motivations account for only 8% of the variance in depression (adjusted  $R^2(462) = .077$ ) compared to 23% for the personality factors (adjusted  $R^2(443) = .231$ ). This would seem to indicate rather firmly that the individual's personality is more descriptive and determinant of the psychological outcomes of play than are the motivations for that play, as defined by the Facets scale.

## 9.5 Chapter Summary

In this chapter we reported the results of statistical models designed to test augmentation and displacement hypotheses about the effects of online gaming. The augmentation perspective outlined in Hypothesis IV predicted that online gaming would lead to greater feelings of social integration for those who utilize it as a social medium. The obtained

effects for play with real life friends and relatives on loneliness and perceived social support provide evidence in favor of this hypothesis as such social play leads to less loneliness and higher assessment of available social resources. The displacement model in Hypothesis V predicted that heavy participation in online gaming would lead to reduced feelings of social integration. This argument is only partially supported by the negative effect of the Achievement motivation on perceived social support. Neither hours of play nor Problematic or Engaged Use displayed any relationship to the social integration measures. The fact that no significant relationship was obtained between Problematic Use and any measure of social integration weakens any assertion that Problematic Use might lead to reductions in social integration which might in turn increase depressive affect levels.

	Estimate	Standard Error	T-Ratio	p value
Female	0.156	0.066	2.364	0.019
Age	-0.075	0.025	-3.058	0.002
Extraversion	-0.084	0.028	-2.996	0.003
Play w/ RL Friends	-0.072	0.023	-3.110	0.002

Table 9.28. Significant Longitudinal Effects Summary for Loneliness

	Estimate	Standard Error	T-Ratio	p value
Achievement	-0.051	0.024	-2.110	0.035
Play w/ RL Friends	0.067	0.023	2.945	0.003

Table 9.29. Significant Longitudinal Effects Summary for Perceived Social Support

The depression model set forth in Hypothesis VI forecasted that certain social integration and personality factors distinguish players who are more susceptible to depression. The effects for Emotional Stability and Loneliness support this assertion. In the negative effect of Self-regulation on depression, we see a recapitulation of the effectiveness of the self-regulatory processes in allowing an individual to manage their behavioral and emotional life. Interestingly, positive effects on depression were obtained for the Roleplaying motivation and percentage of online friends met in real life.

	Estimate	Standard Error	T-Ratio	p value
Female	0.259	0.072	3.597	0.000
Age	-0.062	0.027	-2.250	0.025
Emotional Stability	-0.089	0.034	-2.630	0.009
Roleplaying	0.051	0.026	1.976	0.049
Self-Regulation	-0.091	0.038	-2.368	0.019
Online Fr met in RL	0.050	0.023	2.164	0.031
Loneliness	0.101	0.039	2.583	0.010

Table 9.30. Significant Longitudinal Effects Summary for Depression

*"An unexciting truth may be eclipsed by a thrilling lie."*

– Aldous Huxley

## CHAPTER TEN

### Discussion & Conclusion

In the preceding chapters we have laid out a collection of factors surrounding the effect of online gaming on the social and psychological wellbeing of the gamer. These issues include play motivation, Problematic and Engaged Use, social integration, depression, and the multi-level effects of the self-regulatory processes. We then advanced a set of testable hypotheses designed to address how these factors relate to one another. Next, we developed a strategy for collecting and analyzing the necessary data to evaluate the hypotheses as described. Lastly, the results of that collection and analysis were reported and briefly discussed. Now we must bring it all together, creating an integrative treatment of what has been learned and what is still left to be discovered. Let us begin our integrative discussion by reviewing the results with respect to each of our seven hypotheses.

#### 10.1 Hypothesis I

Hypothesis I stated that self-regulatory deficits would predict the development of Problematic Use. The obtained significant negative effect of Self-regulation on changes in Problematic Use supports the prediction made in Hypothesis I. Those individuals who report low levels of self-regulatory activity tend to go on to report significantly higher levels of future problematic use. On the other hand, those individuals who actively regulate the timing and amount of their play behavior through self-monitoring, self-evaluation and self-consequation report significantly lower levels of future problematic use than



their counterparts. Further, the effect of self-regulation on Problematic Use is the largest and most robust of all predictive factors measured. Clearly, the self-regulatory processes are essential in allowing online gaming to remain a benign and enjoyable pass-time rather than an obstructive pre-occupation. Active self-regulation appears to be a player's best defense.

	Estimate	Standard Error	T-Ratio	p value
Manipulation	-0.092	0.045	-2.021	0.044
Self-Regulation	-0.132	0.053	-2.498	0.013
SSRQ * Depression	0.113	0.032	3.573	0.000
Hours * Affinity	-0.080	0.038	-2.087	0.038

Table 10.1. Significant Longitudinal Effects Summary for Problematic Use

## 10.2 Hypothesis II

Hypothesis II predicted that certain play motivation factors would distinguish players who are more susceptible to Problematic Use. The significant negative effect of Manipulation offers only minimal support for Hypothesis II, as it was expected that Escapism and Achievement would have a significant positive effect.

The negative effect of the Manipulation motivation indicates that players who thrive on aggravating and manipulating others tend to report lower levels of Problematic Use than those players not so motivated. It is interesting to note that the cross-sectional relationship of manipulation play to problematic use is positive in valence, the opposite of the longitudinal relationship obtained here. This may lend credence to the argument made in Chapter Eight which suggested that grief players are not satisfied with the core game mechanic and resort to deriving enjoyment from operating outside it. Further, grief play might suffer from an attenuated reinforcement schedule that diminishes relatively quickly upon repetition compared to the more stable reinforcement one gets from escapism and achievement play. The fact that grief play has a cross-sectionally positive relationship with Problematic Use suggests that in the near term it offers enough reward to compel some players to over-indulge in its pursuit. However, the longitudinally negative relationship of grief play with problematic use supports this notion that, with time, grief players tend to report lower levels of problematic use, perhaps due to the diminished enjoyment associated with repeated manipulative exploits within the same game or upon the same set of victims and their desire to find a game they find more enjoyable in general. Given the age and gender profile of these players (young males), one can hope that paren-

tal supervision plays some role in constraining their usage (if not their in-game behavior) such that it does not become problematic.

The Escapism motivation does have a near significant positive effect on Problematic Use. This would suggest that players who are high in the Escapism motivation tend to report increases in Problematic Use. What this means is that the use of online gaming as a curative respite from real world stressors, while adaptive in moderation, can have deleterious effects on those who use it in this manner. The fact that there is no interaction with weekly hours of play means that responsibility for an increased levels of Problematic Use lies with the Escapism motivation and not the hours spent pursuing it. That is, one need not spend many hours “escaping” but rather resort to the escape behavior at inappropriate times or in unsuitable situations in order to feel that the behavior has begun to have negative effects on their real life. This is not to suggest that Escapism is a necessarily insidious and maladaptive way to go about using online games. On the contrary, it is hard to argue against the relaxing and restorative effects of pursuit of any recreational activity used to release or relieve feelings of stress and anxiety. Building on the findings of Hypothesis I, let it suffice to say that Escapism players should continue in their adaptive use of gaming as a stress reliever, but be vigilant in their application of the self-regulatory processes to ensure that their “breaks from reality” are taken at appropriate times and in appropriate amounts. Again this effect is not quite significant in the final model, since the variance for which it accounts is more robustly explained by the Self-regulation factor and the significant interactions.

Another nearly significant effect is that of the Relationship play motivation. This result suggests that players who use online gaming as a medium in which to meet people and interact with them in meaningful social ways report lower levels of Problematic Use than those less socially motivated. It seems that those who view playing as an adaptive social activity that rounds out their existing social life are less likely to later report that they feel the activity has been causing real life difficulty for them. In fact, as we will see in analysis of social integration, players who use games as a social medium seem to derive tangible benefits from the way in which they approach and utilize online gaming .

In sum, the fact that the player motivations were less predictive of Problematic Use than expected is not so much indicative of their descriptive weakness as it is a testament to the centrality of Self-regulation. As we see in Table 10.2 below, without Self-Regulation and

its interaction with depression in the model, Manipulation, Escapism, and Relationship all significantly contribute to the model.

	Estimate	Standard Error	T-Ratio	P value
Intercept	2.860	0.039	73.506	0.000
Problematic Use (Lagged)	0.680	0.043	15.746	0.000
Block 1 - Controls				
Female	-0.008	0.107	-0.075	0.940
Age	-0.028	0.039	-0.710	0.478
Extraversion	-0.044	0.041	-1.072	0.285
Agreeableness	0.031	0.041	0.761	0.447
Conscientiousness	-0.065	0.037	-1.745	0.082
Emotional Stability	-0.018	0.044	-0.407	0.684
Intelligence	-0.062	0.038	-1.631	0.104
Attractiveness	0.043	0.044	0.986	0.325
Negative Valence	0.028	0.041	0.674	0.501
Block 2 – Types of Play				
Achievement	0.030	0.039	0.773	0.440
Escapism	0.118	0.041	2.867	0.004
Roleplaying	0.063	0.039	1.643	0.101
Manipulation	-0.092	0.045	-2.058	0.040
Relationship	-0.107	0.041	-2.606	0.010
Hours	0.033	0.042	0.795	0.427
Affinity	0.051	0.036	1.417	0.157

Table 10.2. Regression model predicting Problematic Use with Blocks 1 & 2

### 10.3 Hypothesis III

Hypothesis III suggested that players who are motivated to play for Achievement and Escape would report higher levels of Engaged Use. The significant main effect of the Achievement motivation offered partial support for this hypothesis, as did the significant age by Escapism interaction.

	Estimate	Standard Error	T-Ratio	p value
Extraversion	-0.061	0.031	-1.968	0.050
Achievement	0.060	0.030	1.999	0.046
Hours	0.107	0.035	3.025	0.003
Age*Escapism	0.075	0.025	3.019	0.003

Table 10.3. Significant Longitudinal Effects Summary for Engaged Use

The fact that Extraversion showed a negative longitudinal effect on Engaged Use is unsurprising, when we consider the logical, if stereotypical, assumption that individuals high in Extraversion seem less likely to become deeply involved in online gaming than do more introverted individuals. The social character of online gaming makes this assertion a bit more complex; however, the obtained data do seem to indicate that gregariousness and the likelihood of becoming deeply interested and absorbed in online gaming are at odds.

The positive effect of the Achievement motivation indicates that players who are motivated by the accomplishment of game-centered goals and acquisition of virtual wealth are more likely to become deeply engaged in online gaming. It makes perfect sense that an individual who gladly adopts and pursues the goals set forth by the game mechanics of a virtual world would derive enjoyment from that pursuit, spend increasing amounts of time involved in it, and think about it when not participating in the activity. Achievement play as defined by advancement, attainment, and acquisition lies at the center of much conventional game design, particularly in the MMORPG genre. The goals and progress structures (e.g. level treadmills, skill trees) upon which these games have been historically based support and encourage Achievement play. Looking beyond the MMO space, the tournament competitions and ranking-based rating systems that pervade online gaming from console sports titles to PC strategy games also cater to the needs of the Achievement player. It is thus logical that those players who's motivations are best served by a wide selection of online games are the same players who become most engaged in them.

The positive effect of hours of play on engagement allows a simple assertion; the more you play, the more absorbed you get. Similarly, low numbers of play hours predict a decrease in future levels of Engaged Use. These results indicate that one becomes more engaged as they spend more time playing and less engaged as less time is spent with gaming.

The significant "Age by Escapism" interaction, is interesting. In decomposing this interaction, we must consider the slight negative relationship between age and engaged use. In general, older players report lower levels of engagement than younger players. However, older players who score highly on Escapism report levels of engagement just as high as younger players. Thus, it seems that pursuit of the Escapism player motivation

ameliorates the negative effect of age on the development of Engaged Use, allowing older players to become just as engrossed in the experience as their younger counterparts.

The fact that the final model of Engaged Use accounts for only 26% of the variance in the outcome indicates that Engaged Use is less well described by the factors measured in this study than is Problematic Use. Clearly, this model is by no means an exhaustive account of the factors influencing a player to become deeply and adaptively involved in online gaming, as much variance is left unexplained. In fact, the Engaged Use model explains exactly half as much variance as the Problematic Use model. Though they are likely rather esoteric and variant, future studies should endeavor to take closer aim at the factors influencing Engaged Use.

#### 10.4 Hypothesis IV

Embodying the augmentation perspective, Hypothesis IV predicted that online gaming would lead to greater feelings of social integration for those who utilize it as a social medium. The finding that players who frequently play online games with real life friends and relatives reported decreased levels of loneliness supports the claim that online gaming when used as a social medium can have positive effects on the player's level of social integration. Further, the positive effect of play with real life friends and relatives on level of perceived social support recapitulates this assertion. These two results support the general augmentation hypothesis and make a fairly compelling case that online gaming, like many other recreational activities, can lead to higher levels of social integration when utilized as a context for social activity.

	Estimate	Standard Error	T-Ratio	p value
Female	0.156	0.066	2.364	0.019
Age	-0.075	0.025	-3.058	0.002
Extraversion	-0.084	0.028	-2.996	0.003
Play w/ RL Friends	-0.072	0.023	-3.110	0.002

Table 10.4. Significant Longitudinal Effects Summary for Loneliness

	Estimate	Standard Error	T-Ratio	p value
Achievement	-0.051	0.024	-2.110	0.035
Play w/ RL Friends	0.067	0.023	2.945	0.003

Table 10.5. Significant Longitudinal Effects Summary for Perceived Social Support

### 10.5 Hypothesis V

Hypothesis V embodies the displacement perspective, asserting that heavy participation in online gaming would lead to reduced feelings of social integration. The negative effect of the Achievement motivation on perceived social support provides the only evidence in favor of this hypothesis. This effect indicates that Achievement players tend to become lonelier over time than their less achievement oriented counterparts. What might be loosely considered the canonical indicators of heavy usage like Engaged and Problematic Use and hours of play showed no predictive relationship with any of the three measures of social integration. For the most part this seems to indicate that participation in online gaming has little negative effect on the social integration of those who play, save the moderate decrease in perceived social support experienced by some Achievement players.

### 10.6 Hypothesis VI

Hypothesis VI makes the claim that certain social integration and personality factors distinguish players who are more susceptible to depression. Implicit in this hypothesis is the assertion that just as the player motivations give a better predictive account of Problematic and Engaged Use, so shall social integration and personality factors give a better account of depressive affect. The positive effect of Loneliness and negative effect of Emotional Stability on depression support this hypothesis rather well, though a similar negative effect of Extraversion was expected.

	Estimate	Standard Error	T-Ratio	p value
Female	0.259	0.072	3.597	0.000
Age	-0.062	0.027	-2.250	0.025
Emotional Stability	-0.089	0.034	-2.630	0.009
Roleplaying	0.051	0.026	1.976	0.049
Self-Regulation	-0.091	0.038	-2.368	0.019
Online Fr met in RL	0.050	0.023	2.164	0.031
Loneliness	0.101	0.039	2.583	0.010

Table 10.6. Significant Longitudinal Effects Summary for Depression

The positive effects of both the Roleplaying motivation and the percentage of online friends met in real life on depression seem indicative of a disappointing contrast between fantasy and reality. Perhaps roleplayers are dissatisfied that they must serially return to a reality that is not quite so fantastic as the digital one in which they perform on a nightly basis. Similarly, since online friends generally cannot be to us offline what they are to us online, meeting them in real life might make for a deflating experience. Doing so repeatedly with similar results would only enhance this deflation.

The negative effect of Self-Regulation on depression reinforces the assertion that the self-regulatory processes are general and can be employed simultaneously at many levels of the behavioral hierarchy. Just as self-regulation allows gamers to manage play behavior and avoid Problematic Use, so too does it allow evaluation and adjustment of mood, action, and the pursuit of life goals in the avoidance of depressive affect.

## 10.7 Hypothesis VII

Hypothesis seven specifically predicted that the effect of self-regulatory deficits on problematic use would interact with depression. Explicit support for this hypothesis is provided by the significant Self-Regulation by Depression interaction obtained in the Problematic Use model. This interaction indicates that depressive affect moderates the effect of the self-regulatory processes on the development of Problematic Use. At lower levels of depression, the self-regulatory processes work, as indicated by their main effect, to lower problematic use levels. With increased levels of depression the negative effect of the self-regulatory processes are blunted and they become less effective in preventing Problematic Use. In this model, depression is not a necessary precursor of problematic

use, but its presence may catalyze and accelerate the effects of deficient self-regulation on the development of problematic use.

Recall our earlier discussion of depressive affect and its relation to self-imposed lower expectations and unreasonably high standards for success. This can be characterized as a brutal pairing of self-doubt about one's ability to succeed and a tendency to set unreasonable and unattainable goals. Lack of self-belief paired with inability to set and evaluate progress toward reasonable goals undermines the basis of the self-regulatory processes. Specifically, an overarching tendency to view one's self negatively devalues the self-evaluative process. Further, if one is unable to identify and value self-evaluative successes, then self-consequation becomes impossible. Even when one does register a self-evaluative success, depressed individuals are less likely to view the rewards of self-consequation as sufficiently reinforcing to merit repetition (Kocovski and Endler, 2000). As discussed in Chapter Four, depression lessens one's belief in their ability to manage their own behavior and blunts the capacity to identify success and enjoy its rewards. The results obtained in support of Hypothesis VII provide empirical evidence in favor of the notion that depression undermines the self-regulatory processes through this mechanism and in doing so makes even those individuals who do self-regulate vulnerable to problematic usage of online games.

## **10.8 Bringing it together**

Now that we have reviewed the individual hypotheses, let us turn to what we have learned more broadly. It seems safe to say that the data provide no indication that online gaming is a broadly negative activity. On the contrary, the overwhelming majority of those surveyed indicate no elevation in loneliness, depression, or problematic use. This seems to indicate that, for most, online gaming is an adaptive and enjoyable, or at least benign, activity.

The effect that online gaming has on those who participate in it seems to hinge principally upon how one plays, why one plays, and with whom one plays. Further, it seems that how much one plays does not matter. Online gaming would seem to share this quality with many recreational activities, where the activity itself and time spent on it are not as important as why you do it and who you do it with in determining the emotional outcomes of participation. Importantly, when approached as a social medium in which to



spend time with friends and relatives, online gaming has clear positive effects on social wellbeing.

This study has identified and demonstrated the central importance of self-regulation in changing problematic gaming behavior or preventing it developing from developing altogether. The results clearly indicate that self-regulation is important in shielding the user from problematic use. Further, the fact that self regulation predicts decreases in self-regulation indicates its effectiveness in reducing or eliminating problematic use once it arises.

The results of this study point to no causative link in either direction between depression and problematic use. Contrary to conventional wisdom, problematic use does not seem to lead to depression, neither directly nor through proposed negative effects on social integration. Neither does depression significantly predict the onset of problematic use. Instead, a moderation model in which depressive affect lessens the impact of the self-regulatory processes and leaves the player more vulnerable to problematic usage is supported.

With respect to the effect of online gaming on the player's level of social integration, more evidence was obtained for the augmentation hypothesis than the displacement hypothesis in the social integration models. Play with real life friends and relatives turns out to be an important way in which gaming can enhance the social life of the player. Only the Achievement motivation, which emphasizes the pursuit of game centered goals, virtual wealth and personal recognition, seemed to displace social integration by lessening the player's level of perceived social support over time.

Online gaming can have positive effects on the social integration of those who use it as a social medium.

## **10.9 Future Work**

### **10.9.1 Supporting Self-Regulation In-Game**

Given the broad positive effects of Self-regulation, we can safely claim its importance in maintaining online gaming as a healthy and adaptive pursuit. However, it does seem that not all gamers self-regulate and that those who do not leave themselves open to collec-

tion of negative outcomes. How might we support those users who seem to be less able or inclined to monitor and adjust their play?

Though, by even the most reckless of estimates, the overwhelmingly vast majority of players never seem to experience problematic use, steps can still be taken to assist those who do by supporting self-monitoring and self-evaluation. The self-regulation results of this study have been used to inform the design of a prototype of a lightweight user interface modification to do just that.

World of Warcraft from Blizzard Entertainment offers a highly customizable XML-based user interface that allows players to modify and enhance their play experience through the creation of user interface modifications called “add-ons” or “mods.” Hundreds of UI mods exist for World of Warcraft ranging in content from systems designed to support and facilitate coordinated action in large groups (CTRAid Assist) to database intensive item information and management assistants (LootLink). Those mods that prove sufficiently useful and popular are at times adopted by Blizzard and integrated into the games standard use interface.



Figure 10.1 : A play monitoring screen from the MassiveMonitor prototype

Figure 10.1 shows one screen from the MassiveMon UI modification running in the World of Warcraft user interface. The left frame depicts a simple line graph of a player weekly hours of play plotted against weekly averages for the player's guild and server. Such information could be employed to support the self-monitoring and self-evaluation by presenting personal and comparative criterion information in a non-invasive and easily parse-able form. Currently many games do provide the user with usage information, but only in text form and without any comparative data.



Figure 10.2 : A guild management screen from the MassiveMonitor UI mod prototype

Figure 10.2 shows a possible way in which shared usage information could be used to enhance collaborative activities. This screen shows two plots of the number of guild members online through out two separate days. If information of this type were made readily available to guild officers within the game's interface, it could prove a great boon to the frequency and success of large group events. Admittedly, the usefulness of functions of this type is reduced for smaller guilds, but reduction in the complexity and time commitment of guild management is quite desirable for many players who choose to un-

undertake such duties. Further, as guilds comprise a fairly large portion of the MMO player base and can tend to encourage players to continue subscriptions if for no other reason than not to lose contact with their online friends, their “care and feeding” is of concern to developers.

A fully realized version of MassiveMon could empower the user to observe and manage their own online behavior. The application would support self-monitoring and self-evaluation activities by recording and graphically reporting to the user their weekly usage of a given game or set of applications. Further, if the user so chooses, they could view a graph of their usage compared to average weekly usage of players grouped by game, age, gender, etc. Data about the user’s behavior will be kept on the client and not reported or delivered to any external source, as the application is intended as a self-management tool and would be not be designed as an instrument of data collection. However, the addition of networked information sharing to the application would provide the ability for the user to share their information with other selected users. This functionality would be useful in many ways, allowing groups to form covenants in which they support each other through peer monitoring, or simply providing useful information to one another about common times of play.

### **10.10 Limitations**

There are several important limitations to this research that deserve discussion. Foremost among them are the standard caveats associated with survey research of this type. All the data collected for this study were self-reports. As such, issues of social desirability and accuracy of response need to be taken into account. Further, though we have a good picture of who we did get as respondents, we do not know anything about those people that did not hear about or choose not to participate in Project Massive. Every effort was made to ensure that users of a wide number of platforms and games were included in the study, however most came from the massively multiplayer genre.

Only one psychological outcome of gaming was addressed in this study, depression. Though there may be several other possible negative outcomes (e.g. aggression), one should also consider the various positive outcomes of play. Happiness, self-esteem and assertiveness all would make valid additions to a more general inquiry addressing the psychological impact of online gaming. Further, the analyses covered in this document

do not account for any differences in usage outcome that might stem from the content of the actual game being played.

### **10.11 Conclusion**

The analyses contained within this document shed a fair amount of light on the phenomena surrounding the development of Problematic Use. We are able to speak with confidence about what doesn't cause problematic use and what helps prevent it, leveraging this information to explain why some players describe themselves as "addicted" while others remain adaptively engaged. The results of Project Massive indicate that self-regulatory activity is essential in addressing problematic usage. These self-regulatory findings can inform the design of informal personal strategies and formal software systems aimed at helping players and developers alike manage play behavior and protect against problematic use. Further, these findings and their implications are applicable to the more general case of internet dependency.

We have answered the concerns expressed in the popular media about the effect of play on the user. Does play lead to detachment and depression? No, it does not seem to. Instead, online games can lead to a richer and more rewarding social life for those who use it as a social medium in which to interact with friends and relatives.

If they are not already an important part of our present, online communities like those that exist in and around online games will become an immense force in our future. They will come to affect many aspects of our lives; how we communicate, how we learn, how we relax, what we buy, and even whom we trust. Understanding the effects that participation in these digital communities has on the day-to-day lives and well being of those who participate in them is imperative as we strive to ensure that humanity is empowered and not ensnared by the technologies that we create.

Project Massive is a small but important step in that direction

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## Appendix 1

### Engagement Addiction Scale II

While reading this series of statements, relate them to the online game you play most. Please indicate the degree to which you agree with each statement (i.e. the degree to which the statement is true for you).

Strongly Agree/Agree/Somewhat Agree/Neutral/Somewhat Disagree/Disagree/Strongly Disagree

Note : in the online survey, “the online game I play” is replaced with the name of the respondents most frequently played game

EAS-II Addiction Subscale Items	Addiction Factor Loading	Engagement Factor Loading
Arguments have sometimes arisen at home because of the time I spend on the online game I play	0.535	
I am sometimes late for engagements because I am playing the online game I play	0.550	0.295
I feel a sense of power when I am playing the online game I play	0.384	
I have made unsuccessful attempts to reduce the time I spend playing the online game I play	0.619	
I have never used the online game I play as an escape from socializing	0.397	
I never miss meals because of playing the online game I play	0.456	
I often fail to get enough sleep because of playing the online game I play	0.530	
I often feel that I spend more money than I can afford on the online game I play	0.380	
I sometimes neglect important things because of an interest in the online game I play	0.739	
I think that I am addicted to the online game I play	0.539	
My social life has sometimes suffered because of me playing the online game I play	0.694	
Playing the online game I play has sometimes interfered with my work	0.669	
When I am not playing the online game I play I often feel agitated	0.622	

**Appendix 1 (continued)**

EAS-II Engagement Subscale Items	Addiction Factor Loading	Engagement Factor Loading
I feel happy at the thought of playing the online game I play		0.670
I like the challenge that learning to play the online game I play presents		0.395
I often experience a buzz of excitement while playing the online game I play		0.417
I pay little attention when people talk about the online game I play		0.439
I rarely think about playing the online game I play when I am not using a computer	0.265	0.486
I spend little of my spare time playing the online game I play		0.504
I tend to want to spend increasing amounts of time playing the online game I play	0.354	0.405
I try to make my the online game I play play sessions last as long as possible	0.285	0.320
I would hate to go without playing the online game I play for more than a few days		0.509
It is important to me to be good at the online game I play.		0.408
It would not matter to me if I never played the online game I play again		0.685
The jargon in the online game I play sounds stupid to me		0.320
The less I have to do with the online game I play, the better	-0.294	0.630
The online game I play is unimportant in my life		0.646
When I see the online game I play, I feel drawn towards it	0.326	0.502

## Appendix 2

### Saucier 7 Factor Personality Scale

Please use the rating scale below to describe how accurately each statement describes *you*. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age. So that you can describe yourself in an honest manner, your responses will be kept in absolute confidence.

Very Inaccurate/Moderately Inaccurate/Neither Inaccurate nor Accurate/Moderately Accurate/Very Accurate

#### FACTOR I (EXTRAVERSION)

Am open about my feelings.  
Take charge.  
Talk to a lot of different people at parties.  
Make friends easily.  
Never at a loss for words.

#### FACTOR II (AGREEABLENESS)

Feel others' emotions.  
Have a soft heart.  
Sympathize with others' feelings.  
Am concerned about others.  
Make people feel at ease.

#### FACTOR III (CONSCIENTIOUSNESS)

Do things by the book.  
Try to follow the rules.  
Believe laws should be strictly enforced.  
Pay attention to details.  
Like order.

#### FACTOR IV (EMOTIONAL STABILITY)

Seldom feel blue.  
Am relaxed most of the time.  
Feel comfortable with myself.  
Am not easily bothered by things.  
Take things as they come.

**Appendix 2 (continued)**

## FACTOR V (INTELLECT)

Have excellent ideas.

Quick to understand things.

Have a rich vocabulary.

Use my brain.

Carry the conversation to a higher level.

## ATTRACTIVENESS

Keep myself well-groomed.

Like to tidy up.

Get things done quickly.

Believe that I am important.

Keep improving myself.

## NEGATIVE VALENCE

Copy others.

Demand attention.

Try to impress others.

Need the approval of others.

Conform to others' opinions.

Change myself to suit others.

Talk mainly about myself.

Interfere in other people's business.

Want to be told I am right.

Want to prove myself.

## Appendix 3

### Social Network Index

Instructions: This questionnaire is concerned with how many people you see or talk to on a regular basis including family, friends, workmates, neighbors, etc. Please read and answer each question carefully. Answer follow-up questions where appropriate.

1. Which of the following best describes your marital status?

- (1) currently married & living together, or living with someone in marital-like relationship  
 (2) never married & never lived with someone in a marital-like relationship  
 (3) separated  
 (4) divorced or formerly lived with someone in a marital-like relationship  
 (5) widowed

2. How many children do you have? (If you don't have any children, check '0' and skip to question 3.)

0    1    2    3    4    5    6    7 or more

2a. How many of your children do you see or talk to on the phone at least once every 2 weeks?

0    1    2    3    4    5    6    7 or more

3. Are either of your parents living? (If neither is living, check '0' and skip to question 4.)

(0) neither    (1) mother only    (2) father only  
 (3) both

3a. Do you see or talk on the phone to either of your parents at least once every 2 weeks?

(0) neither    (1) mother only    (2) father only  
 (3) both

4. Are either of your in-laws (or partner's parents) living? (If you have none, check the appropriate space and skip to question 5.)

(0) neither    (1) mother    (2) father    (3) both    (4) not applicable





**Appendix 3 (continued)**

8. Do you attend any classes (school, university, technical training, or adult education) on a regular basis? (If not, check 'no' and skip to question 9.)

\_\_\_\_\_ no      \_\_\_\_\_ yes

8a. How many fellow students or teachers do you talk to at least once every 2 weeks? (This includes at class meetings.)

\_\_\_\_\_0    \_\_\_\_\_1    \_\_\_\_\_2    \_\_\_\_\_3    \_\_\_\_\_4    \_\_\_\_\_5    \_\_\_\_\_6    \_\_\_\_\_7  
or more

9. Are you currently employed either full or part-time? (If not, check 'no' and skip to question 10.)

\_\_\_\_\_ (0) no      \_\_\_\_\_ (1) yes, self-employed      \_\_\_\_\_ (2) yes, employed  
by others

9a. How many people do you supervise?

\_\_\_\_\_0    \_\_\_\_\_1    \_\_\_\_\_2    \_\_\_\_\_3    \_\_\_\_\_4    \_\_\_\_\_5    \_\_\_\_\_6    \_\_\_\_\_7  
or more

9b. How many people at work (other than those you supervise) do you talk to at least once every 2 weeks?

\_\_\_\_\_0    \_\_\_\_\_1    \_\_\_\_\_2    \_\_\_\_\_3    \_\_\_\_\_4    \_\_\_\_\_5    \_\_\_\_\_6    \_\_\_\_\_7  
or more

10. How many of your neighbors do you visit or talk to at least once every 2 weeks?

\_\_\_\_\_0    \_\_\_\_\_1    \_\_\_\_\_2    \_\_\_\_\_3    \_\_\_\_\_4    \_\_\_\_\_5    \_\_\_\_\_6    \_\_\_\_\_7 or  
more

**Appendix 3 (continued)**

11. Are you currently involved in regular volunteer work? (If not, check 'no' and skip to question 12.)

\_\_\_\_\_ no                  \_\_\_\_\_ yes

11a. How many people involved in this volunteer work do you talk to about

volunteering-related issues at least once every 2 weeks?

\_\_\_\_\_0    \_\_\_\_\_1    \_\_\_\_\_2    \_\_\_\_\_3    \_\_\_\_\_4    \_\_\_\_\_5    \_\_\_\_\_6  
\_\_\_\_\_7 or more

12. Do you belong to any groups in which you talk to one or more members of the group about group-related issues at least once every 2 weeks? Examples include social clubs, recreational groups, trade unions, commercial groups, professional organizations, groups concerned with children like the PTA or Boy Scouts, groups concerned with community service, etc. (If you don't belong to any such groups, check 'no' and skip the section below.)

\_\_\_\_\_ no                          \_\_\_\_\_ yes

## Appendix 4

### ISEL-12

**Instructions:** This scale is made up of a list of statements each of which may or may not be true about you. For each statement circle "definitely true" if you are sure it is true about you and "probably true" if you think it is true but are not absolutely certain. Similarly, you should circle "definitely false" if you are sure the statement is false and "probably false" if you think it is false but are not absolutely certain.

1. definitely false      2. probably false      3. probably true      4. definitely true

1. If I wanted to go on a trip for a day (for example, to the country or mountains), I would have a hard time finding someone to go with me.
2. I feel that there is no one I can share my most private worries and fears with.
3. If I were sick, I could easily find someone to help me with my daily chores.
4. There is someone I can turn to for advice about handling problems with my family.
5. If I decide one afternoon that I would like to go to a movie that evening, I could easily find someone to go with me.
6. When I need suggestions on how to deal with a personal problem, I know someone I can turn to.
7. I don't often get invited to do things with others.
8. If I had to go out of town for a few weeks, it would be difficult to find someone who would look after my house or apartment (the plants, pets, garden, etc.).
9. If I wanted to have lunch with someone, I could easily find someone to join me.
10. If I was stranded 10 miles from home, there is someone I could call who could come and get me.
11. If a family crisis arose, it would be difficult to find someone who could give me good advice about how to handle it.
12. If I needed some help in moving to a new house or apartment, I would have a hard time finding someone to help me.

## Appendix 5

### UCLA-L

Instructions: Please indicate how often you have felt the way described in each statement.

never felt this way / rarely felt this way / sometimes felt this way / often felt this way

1. I lack companionship.
2. There is no one I can turn to.
3. I am an outgoing person.
4. I feel left out.
5. I feel isolated from others.
6. I can find companionship when I want it.
7. I am unhappy being so withdrawn.
8. People are around me but not with me.

## Appendix 6

### CES-D

Below is a list of the ways you might have felt or behaved recently. Please indicate how many days in the past week you felt this way by checking the appropriate box.

5-7 days / 3-4 days / 1-2 days / 0 days

- I felt that everything I did was an effort
- I felt depressed
- My sleep was restless
- I could not get "going"
- I had trouble keeping my mind on what I was doing
- I felt that I could not shake off the blues even with help from my family or friends
- I had periods of irritability or anger
- I felt I couldn't control the important things in my life
- I felt confident about ability to handle my personal problems
- I felt that things were going my way
- I felt difficulties were piling up so high that I could not overcome them
- I was happy
- I felt lonely
- I felt hopeful about the future
- I felt fearful
- I was bothered by things that don't usually bother me

## Appendix 7

### Short Self-Regulation Questionnaire

Please respond to the following questions selecting the response that best describes how you are.

Strongly Agree/Agree /Neutral/Disagree/Strongly Disagree

- I usually keep track of my progress toward my goals.
- I have trouble making up my mind about things.
- I get easily distracted from my plans.
- I don't notice the effects of my actions until it's too late.
- I am able to accomplish goals I set for myself.
- I put off making decisions.
- It's hard for me to notice when I've "had enough" (alcohol, food, sweets).
- If I wanted to change, I am confident that I could do it.
- When it comes to deciding about a change, I feel overwhelmed by the choices.
- I have trouble following through with things once I've made up my mind to do something.
- I don't seem to learn from my mistakes.
- I can stick to a plan that's working well.
- I usually only have to make a mistake one time in order to learn from it.
- I have personal standards, and try to live up to them.
- As soon as I see a problem or challenge, I start looking for possible solutions.
- I have a hard time setting goals for myself.
- I have a lot of willpower.
- When I'm trying to change something, I pay a lot of attention to how I'm doing.
- I have trouble making plans to help me reach my goals.
- I am able to resist temptation.
- I set goals for myself and keep track of my progress.
- Most of the time I don't pay attention to what I'm doing.
- I tend to keep doing the same thing, even when it doesn't work.
- I can usually find several different possibilities when I want to change something.
- Once I have a goal, I can usually plan how to reach it.
- If I make a resolution to change something, I pay a lot of attention to how I'm doing.
- Often I don't notice what I'm doing until someone calls it to my attention.
- I usually think before I act.
- I learn from my mistakes.
- I know how I want to be.
- I give up quickly.

## Appendix 8

### Player Motivation Scale with Factor Loadings

Item	RELATIONSHIP	MANIPULATION	ACHIEVEMENT	ESCAPISM	ROLEPLAYING
I find myself having meaningful conversations with others	0.704	0.038	-0.004	-0.120	0.036
I have made some good friends in the game.	0.713	-0.071	0.056	0.017	0.076
I talk to my friends in the game about personal issues.	0.840	0.059	0.051	-0.047	-0.096
Friends in the game have offered me support when I had a RL problem or crisis	0.797	-0.031	-0.038	-0.020	0.054
I like to taunt or annoy other players.	0.111	0.712	-0.031	-0.032	-0.067
I beg for money or items in the game.	-0.084	0.676	0.027	-0.088	0.021
I like to dominate other characters/players.	0.095	0.583	0.195	-0.018	0.127
I like to manipulate other people so they do what I want them to.	-0.039	0.641	0.049	0.130	0.012
I scam other people out of their money or equipment	-0.061	0.786	-0.048	-0.054	-0.040
It's very important to me to get the best gear available.	-0.073	0.061	0.667	-0.007	-0.059
I try to optimize my XP gain as much as possible.	0.036	-0.021	0.673	-0.081	-0.032
I can't stand those people who only care about leveling.	0.033	-0.107	0.458	-0.067	-0.165
I like to feel powerful in the game.	-0.018	0.073	0.629	0.149	0.001
Doing massive amounts of damage is very satisfying.	0.038	0.006	0.647	0.110	-0.053



### Appendix 8 (continued)

Item	RELATIONSHIP	MANIPULATION	ACHIEVEMENT	ESCAPISM	IMMERSION
I like the escapism aspect of the game.	-0.157	-0.047	0.089	0.733	-0.002
Playing the game lets me forget some of the real-life problems I have.	0.001	0.012	0.028	0.807	-0.104
I have learned things about myself from playing the game.	0.261	0.008	-0.120	0.404	0.065
Playing the game lets me vent and relieve stress from the day.	-0.024	-0.025	0.013	0.708	0.062
I like to try out new roles and personalities with my characters	-0.018	0.016	-0.011	-0.006	0.694
The way I am in the game is the way I am in real life.	-0.107	0.097	0.098	-0.157	0.569
People who role-play extensively bother me	-0.073	-0.163	-0.185	0.009	0.589
I like the feeling of being part of a story.	0.045	0.005	0.110	0.221	0.456
I make up stories and histories for my characters.	0.148	0.048	-0.109	-0.042	0.724
I like to be immersed in a fantasy world.	-0.085	-0.040	0.171	0.221	0.329

## Appendix 9

### Organizational Commitment Questionnaire

Please answer the following questions with regards to your guild:

Strongly Agree/Agree/Somewhat Agree/Neutral/Somewhat Disagree/Disagree/Strongly Disagree

I am willing to put in a great deal of effort beyond that normally expected in order to help this organization succeed

I talk up this organization to my friends as a great organization to be a member of

I feel very little loyalty to this organization

I would accept almost any type of assignment in order to stay a member of this organization

I find that my values and this organization's values are very similar

I am proud to tell others that I am part of this organization

I could just as well be a member of a different organization as long as my role was similar

This organization really inspires the very best in me in the way of performance

It wouldn't take much to cause me to leave this organization

I am extremely glad I chose to be a member of this organization over others I was considering at the time I joined.

There's not much to be gained from sticking with this organization indefinitely

Often I disagree with this organization's policies on important matters relating to its members

I really care about the fate of this organization

For me this organization is the best of all possible organizations to be a member of

Deciding to be a member of this organization was a definite mistake on my part

## Appendix 10

### Zero Order Correlations with Outcome Measures by Predictor Block

<b>Block 1</b>	Problematic Use	Engaged Use	Loneliness	Perceived Social Support	Social Network Size	Depression
Gender	-0.041	0.046	-0.058	0.084	0.087	-0.031
	0.032	0.017	0.003	0.000	0.000	0.114
	2690	2659	2688	2680	2774	2639
Age	-0.130	-0.020	-0.167	0.143	0.167	-0.157
	0.000	0.296	0.000	0.000	0.000	0.000
	2683	2654	2682	2675	2767	2633
Extraversion	-0.140	0.017	-0.488	0.483	0.321	-0.293
	0.000	0.389	0.000	0.000	0.000	0.000
	2664	2635	2678	2671	2733	2605
Agreeableness	-0.058	0.065	-0.078	0.321	0.159	-0.028
	0.003	0.001	0.000	0.000	0.000	0.154
	2655	2627	2666	2658	2720	2593
Conscientiousness	-0.061	0.072	0.023	0.122	0.060	-0.035
	0.002	0.000	0.238	0.000	0.002	0.077
	2662	2631	2674	2664	2727	2601
Emotional Stability	-0.211	-0.006	-0.453	0.417	0.246	-0.540
	0.000	0.758	0.000	0.000	0.000	0.000
	2638	2612	2648	2643	2702	2578
Intelligence	-0.096	0.041	-0.071	0.330	0.113	-0.103
	0.000	0.036	0.000	0.000	0.000	0.000
	2656	2628	2669	2661	2723	2595
Attractiveness	-0.211	-0.006	-0.326	0.406	0.302	-0.343
	0.000	0.746	0.000	0.000	0.000	0.000
	2655	2628	2671	2662	2724	2602
Negative Valence	0.240	0.131	0.204	0.002	-0.024	0.192
	0.000	0.000	0.000	0.918	0.206	0.000
	2642	2612	2657	2645	2707	2582

## Appendix 10 (continued)

<b>Block 2</b>	Problematic Use	Engaged Use	Loneliness	Perceived Social Support	Social Network Size	Depression
Achievement	0.297 0.000 2657	0.288 0.000 2628	0.103 0.000 2654	-0.083 0.000 2645	-0.099 0.000 2727	0.118 0.000 2595
Escapism	0.370 0.000 2669	0.345 0.000 2639	0.221 0.000 2667	-0.133 0.000 2658	-0.047 0.015 2738	0.283 0.000 2605
Roleplaying	-0.006 0.757 2648	0.063 0.001 2617	0.069 0.000 2653	-0.022 0.269 2641	0.017 0.386 2727	0.063 0.001 2586
Manipulation	0.228 0.000 2656	0.062 0.001 2624	0.081 0.000 2656	-0.153 0.000 2648	-0.038 0.045 2737	0.115 0.000 2594
Relationship	0.102 0.000 2663	0.129 0.000 2637	-0.016 0.420 2665	0.021 0.270 2656	0.068 0.000 2744	0.035 0.077 2601
Hours	0.318 0.000 2677	0.263 0.000 2645	0.099 0.000 2674	-0.174 0.000 2666	-0.170 0.000 2748	0.144 0.000 2624
Affinity	0.086 0.000 2693	0.404 0.000 2661	-0.083 0.000 2690	0.097 0.000 2681	0.076 0.000 2765	-0.077 0.000 2630

<b>Block 3</b>	Problematic Use	Engaged Use	Loneliness	Perceived Social Support	Social Network Size	Depression
Problematic Use	1.000 0.000 2701	0.442 0.000 2617	0.284 0.000 2635	-0.250 0.000 2626	-0.126 0.000 2701	0.380 0.000 2577
Engaged Use	0.442 0.000 2617	1.000 0.000 2669	0.076 0.000 2603	-0.012 0.554 2602	-0.044 0.023 2669	0.085 0.000 2551
Self Regulation	-0.345 0.000 2489	-0.014 0.499 2471	-0.337 0.000 2499	0.484 0.000 2494	0.251 0.000 2544	-0.429 0.000 2450

### Appendix 10 (continued)

<b>Blocks 4 &amp; 5</b>	Problematic Use	Engaged Use	Loneliness	Perceived Social Support	Social Network Size	Depression
Play w/ RL Friends & Relatives	-0.094 0.000 2701	-0.008 0.663 2669	-0.169 0.000 2699	0.182 0.000 2690	0.071 0.000 2774	-0.079 0.000 2638
OL Friendships from Gaming	0.163 0.000 2701	0.177 0.000 2669	-0.005 0.793 2699	0.003 0.893 2690	-0.009 0.619 2774	0.008 0.685 2638
OL Friends met in real life	-0.059 0.004 2354	-0.053 0.011 2323	-0.088 0.000 2352	0.056 0.007 2342	0.073 0.000 2414	-0.052 0.012 2293
Organizational Commitment	0.076 0.001 1857	0.250 0.000 1840	-0.046 0.048 1855	0.078 0.001 1854	0.027 0.237 1898	-0.014 0.560 1812
Loneliness	0.284 0.000 2635	0.076 0.000 2603	1.000 0.000 2699	-0.516 0.000 2646	-0.427 0.000 2699	0.608 0.000 2577
Perceived Social Support	-0.250 0.000 2626	-0.012 0.554 2602	-0.516 0.000 2646	1.000 0.000 2690	0.400 0.000 2690	-0.362 0.000 2572
Social Net Size	-0.126 0.000 2701	-0.044 0.023 2669	-0.427 0.000 2699	0.400 0.000 2690	1.000 0.000 2790	-0.290 0.000 2638
Depression	0.380 0.000 2577	0.085 0.000 2551	0.608 0.000 2577	-0.362 0.000 2572	-0.290 0.000 2638	1.000 0.000 2649