The Social and Psychological Impact of Online Gaming

Thesis Proposal

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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). Having more than doubled since 1996, worldwide gaming revenues, including hardware and software, were roughly $31.37 billion in 2003, compared to $34.2 billion in revenue for the film industry (Kagan, 2004; Zona, 2004). The gaming demographic continues to expand alongside these impressive financials. 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 and revenue continues to mount, 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. Neilsen, 2001). Average weekly video game play is estimated in the 3-10 hour range. 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). Given such a large industry with widening appeal and an expanding rate of use, questions arise about the impact gaming has on the social life and psychological wellbeing of the user.

Despite a lack of hard data, 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 commonly claimed that 10% of online game players are addicted to the activity, an easy extrapolation from the equally questionable statistic that 10% of all users of the internet are addicted to it (Young, 1998; IGDA, 2003). Vague and overly general lists of physical and psychological symptoms from dry-eyes and carpal tunnel syndrome to problems with school or work are offered up as indicative of problem usage behavior (French, 2002; Orzack, 2004). Further, it is claimed 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 which 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. It seems that it is online gaming's turn.

One must be careful to not to be overly dismissive, however. 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).

Using a longitudinal design, the proposed study will 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 personality and environment. Rather than presenting the monolithic view that online games are bad or good, we predict that different motivations and styles of play are likely to yield different consequences for the user.

A model is proposed in which pre-existing player personality and concurrent social factors such as self-regulatory deficits, loneliness, perceived social support, and social network size are more causative of overuse and depression than the "addictive gameplay" decried in the popular media. Here, *problematic use* of online games is 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. Most players, even those spending upwards of 40 hours a week gaming, are simply adaptively engaged in an enjoyable activity that has little or no negative impact on their well being. These players are able to manage their use of entertainment products, ensuring that gaming remains a positive aspect of their lives. Unfortunately, some players are not as successful at this self-regulation, and allow persistent involvement in online games to interfere greatly with their everyday life. Self-regulation is characterized by an individual's management of their own behavior through self-monitoring, evaluation against perceived standards, and self-administration of consequences for their own behavior. This research tests the hypothesis that deficits in self-regulation enable players to become overly engaged in online play, and that these deficits are exacerbated by depression. Another hypothesis is that certain motivational and personality factors distinguish players who are more susceptible to use. Further, the proposed study will inform the design of software and behavioral strategies that will assist users in overcoming their self-regulatory deficits with respect to the consumption of interactive entertainment.

The Domain – Massively 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. Though the true "beginning" is a matter of considerable debate, text based 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. Due to their accessibility and penetration on college campuses with capable computer systems, MUDs became known pejoratively as Multiple Undergrad Destroyers. Phenomenal early online communities like Lambda Moo, Habitat, and The Well grew and flourished around this collaborative communication technology in spite of its no-frills, command line appearance. 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 (MMO) 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, particularly Xbox, are following suit.

Around the world, products like World of Warcraft and EverQuest II command audiences of 200,000 to 1.25 million subscribers who purchase the client software for 30-60USD and pay a monthly fee of around 15USD to play (Woodcock, 2005). In Korea, NCSoft's Lineage has approximately 4 million subscribers, though certain eccentricities of the Korean market (e.g. public availability of games in internet cafes or 'PC baangs' and divergent subscription models) make the numbers difficult to compare to the US. What is clear is that MMOs, or perhaps interactive entertainment product offerings based on MMO design conventions show continuing potential as major sources of entertainment for consumers and income for developers.

Console based online services like Xbox Live and PS2 Online bring the social world of online gaming out of the study and into the living room along with many trappings 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.

Within MMOs like EverQuest Online Adventures for PS2, Phantasy Star Online for Xbox, and Star Wars Galaxies for 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). One can be sure that the further pentration of broadband and voice communication will make these experiences even more collaborative and social. As gamers continue to shift from solitary gaming experiences to online gaming in the Real-time Strategy (RTS), First-person Shooter (FPS), and massively multiplayer online (MMO) game genres one wonders about the impact such an interactive and inherently social medium has on those who participate in it.

As Internet usage continues to grow, so do new ways of relating to other people digitally, through online games, blogs, social network systems like Orkhut 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. Is it the design of the games or personal and environmental factors surrounding the player that lead to problematic use? Is depression a result of "addiction" to online games, a symptom, or perhaps a contributor to its development? Just as science has begun to uncover the personal and environmental correlates of depression, are there parallel factors that relate to the development of gaming addiction? What about the impact of online play on the real-world life of the gamer? These are the questions that the proposed study will address. Project Massive will employ a longitudinal survey design in examining the social and psychological impact of online gaming in terms of three distinct but inter-related research questions.

Research Question I
How do self-regulatory behavior and depression relate to the development of engagement with versus problematic use of an interactive entertainment product?

Research Question II
Just as personality traits and environmental factors seem to predict depression in general, are there player motivation and style factors that predispose individuals to problematic use of online games?

Research Question III
Does time spent playing online games and commitment to the social groups within them displace real-life social activity and involvement?

Method
As suggested above, all three of the research questions driving this research are supported by a single empirical design; a longitudinal survey administered over the World Wide Web. The first wave of the Project Massive web survey was conducted in the Spring and Summer of 2002. The instrument contained 69 items on a number of topics surrounding play and communication in massively multiplayer games. Building on this exploratory effort, a second survey instrument containing 98 items was created and deployed in September of 2004. Table One shows a list of the scales and measures included in the second wave of the survey. Data analysis will be performed using an array of techniques including structural equation modeling, hierarchical growth modeling, ANOVA and multiple regression.

Scales and Measures Contained in Project Massive Wave II	Appendix #
Engagement/Addiction Scale	1
Saucier 7 Factor Personality Inventory	2
Social Network Size	3
Perceived Social Support	4
Loneliness	5
Depression	6
Self-Regulation Scale	7
Adapted Player Type Scale	8
Organizational Commitment Questionnaire	9
Formal and Informal Group Activities	10

Table One. The scale measures to be collected in the proposed study.

In contrast to the exploratory nature of the first wave, this composition reflects a focus on player motivation, player commitment, and the issues of problematic use, engagement and depression. The second round of data collection concluded in December of 2004, and a third wave launched in mid-April of 2005, with subsequent waves planned to follow at three month intervals. Recruitment of users is conducted online via posts to web forums (e.g Slashdot, gamespy.com, and TerraNova) and direct recruiting within a collection of online games. As an inducement, players are told that one in every hundred respondents completing the survey will receive a $25 gift certificate to Amazon.com.
Data analysis will be performed using an array of techniques including structural equation modeling, hierarchical growth modeling, ANOVA and multiple regression.

Research Question One – The Interplay of Addiction, Depression & Self Regulation

In order to examine the relationship between problematic use, depression, and self-regulation, we must first describe each of these constructs individually. In this section, the definition and measurement of each of these constructs is discussed. Following this discussion, a model of the relationship between the constructs is presented. Finally, two hypotheses are advanced that will be central in addressing research question one: How do self-regulatory behavior and depression relate to the development of engagement with versus problematic use of an interactive entertainment product?

Addiction, Engagement, and Problematic Use

In the popular media, addiction to online games has been likened to pathological gambling, eating disorders and drug dependency (O' Dwyer, 2002). In addition, both marketing departments and the critical media within the games industry also talk about their games' addictive qualities; with pride! 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 "addictive" 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 producer 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.

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", we have chosen to refer to self-described pre-occupation with and inability to withdraw from gaming as problematic use of online games. We do this not to refer to addiction euphemistically, but to dissociate the phenomenon of 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.

Problematic use of video games would seem to be a special case of what is commonly referred to as Computer and Internet Addiction. Given a more clinically precise title, Pathological Internet Use was formally recognized by the American Psychological Association in the late 1990s and has become the focus of much interest in recent years. The most popular definitions and metrics of Internet Addiction are adapted directly from clinical definitions of substance abuse/dependency and impulse control disorders found in the Diagnostic and Statistical Manual of Mental Disorders or DSM-III and DSM-III-R. It is evident that the DSM criteria share a theoretical basis with Goodman's criteria for addictive behavior, found in Table Two, 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: 1. Frequent preoccupation with the behavior or with activity that is preparatory to the behavior. 2. Frequent engaging in the behavior to a greater extent or over a longer period than intended. 3. Repeated efforts to reduce, control, or stop the behavior. 4. A great deal to time spent in activities necessary for the behavior, engaging in the behavior, or recovering from its effects. 5. Frequent engaging in the behavior when expected to fulfill occupational, academic, domestic or social obligations. 6. Important social, occupational, or recreational activities given up or reduced because of the behavior. 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. 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. 9. Restlessness or irritability if unable to engage in the behavior.
Symptoms have persisted for at least 1 month, or occurred repeatedly over a longer period of time.

Table Two. 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). Though many have evolved to include more items and employ five to seven stem, Likert-type response sets, rather than yes/no dichotomies, 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 (Bessier et. al, in press). 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.

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. 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, the very same *engagement* discussed earlier. This bifurcation in Brown's six factor model suggested by Charlton's results is shown in Figure One.

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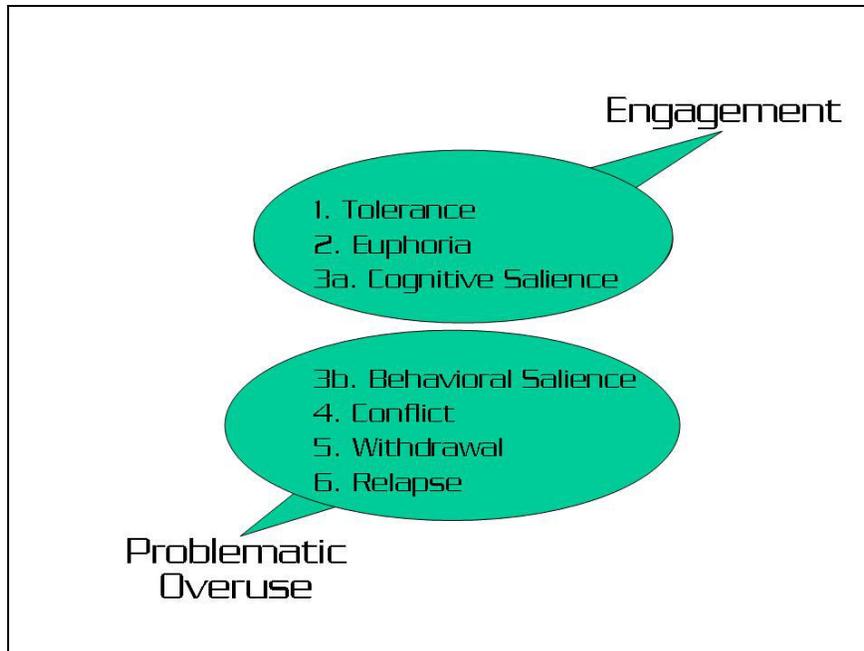
Figure One. The Bifurcation of Brown's Diagnostic Criteria for Behavioral Addiction.

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 29 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 14 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).

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 comparative measurement of problematic use and engagement will be a major focus of the proposed study. Repeatedly measuring changes in addiction,

engagement, and their social and psychological correlates over time will cast further light on the interplay of these phenomena.

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 of 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).

Social integration hypotheses hold that the 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 it 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. Further, the positive effects of social support and negative effects of a dearth of it extend beyond depression to general psychological 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).

In a longitudinal study of the effects of internet use on depression Bessier et. al. identified differential effects based on class of use and certain personal factors within and about the user (in press). 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 Bessier 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 compensation 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. 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. Bessier et. al. found support for both the social compensation and mood enhancement / affect regulation hypotheses. Specifically, it was 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 (Bessier et. al, in press). These results underscore the predictive importance 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, participation in an online group, or both.

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, which we will rely on in the proposed study.

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).

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. Cohen employed the ISEL in demonstrating that perceived social support 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.

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.

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

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 their own behavior through observation, evaluation, and consequation. Arguments about the insidious 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. The proposed study will examine the role of an individual's self-regulatory abilities in managing gaming behavior and the effect that depression may have on self-regulatory activity and the outcomes of use.

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 fellow guild members, 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 more difficult for the player to control.

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 generated 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).

Applying this framework to gaming we can examine how self-regulation fits into a personal 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 long 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 one might notice that they are online twice as often as their in-game friends, suggesting that they may play twice as much as these other people. This kind of self-evaluation through the comparison of one's activities to external standards utilizes 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.

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 the amount of time one spends playing online games. 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, we refer to self-regulation in the present study as the individual's behavior level regulation of their time spent playing and interacting 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.

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, at less than half the size of the original, provides a more workable footprint for a web survey application. 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.

Though the comorbidity of deficient self-regulation and depression have been established and it has been suggested that depression could moderate the effect of self-regulatory mechanisms on an individual's behavior, the causal/temporal linkage of the three constructs has not been determined (Kocovski and Endler, 2000). The hypotheses that support research question one seek to a) establish the comorbidity of self-regulatory deficits and problematic use in the online gaming population and b) address the gap in the literature with respect to the causal relationships between self-regulation, depression and behavior by examining problematic use and engagement outcomes.

Hypothesis I - Players who become overly engaged in online play will display concomitant deficits in self-regulation.

Hypothesis I makes the simple claim that deficits in self-regulation are a necessary element in the development of addiction to online games. The current cross-sectional data show a moderate negative correlation between addiction and self-regulation $(r(1274)= -.380, p<.01)$. By measuring this relationship longitudinally, we expect to be able to provide evidence of the temporal relationship of these factors. Further, the demonstration that this relationship is persistent across gaming genres will serve to weaken the claim that the design of certain products, principally multiplayer role-playing games, is to blame for associated usage problems. If first person shooter players show the same level of problematic use as MMO players in the presence of similar self-regulatory deficits, it becomes difficult to make claims about the sinister design of MMOs being responsible for usage issues.

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

Hypothesis II 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. Using structural equation modeling we will examine the relationship of the factors presented in Figure Two as an auto-catalytic linkage. It should be noted that this depiction of the model is not intended to suggest that depression is a necessary precursor of usage issues. Instead, the blunting effects of depression on self-regulation make such issues more likely and could serve to deepen and accelerate an individual's descent into problematic use. Completing the cycle, problematic use can then enhance detachment and depression which would then further serve to blunt the individual's ability to effectively self-manage their play. While a significant main effect of self-regulation is predicted on problematic use and engagement scores, a significant depression x self-regulation interaction is also predicted supporting the claim that the effect of self-regulatory deficits on problematic use may be moderated by depression. Simply, depression is not a necessary precursor of problematic use, but we believe that its presence may catalyze and accelerate the effects of deficient self-regulation on the development of problematic use.
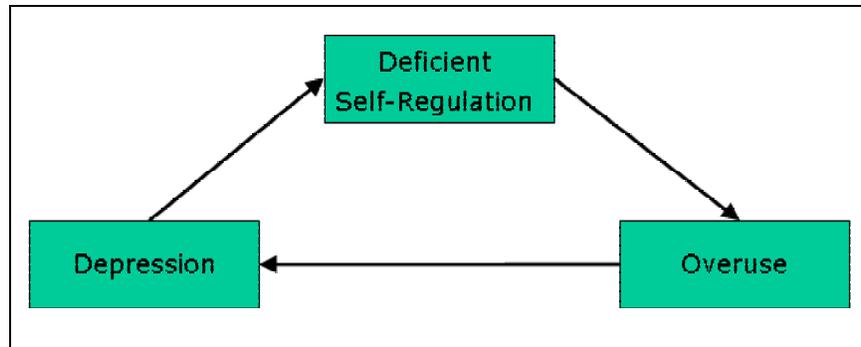
Deficient Self-Regulation

Depression

Overuse

Figure Two. The proposed tricyclic causative relationship between .

In general, depressive affect is related to self-imposed lower 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-consequation 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 time spent playing may be reduced for depressed individuals. Here we propose a structural model in which depressive affect interacts with self-regulatory deficits to give rise to problematic play behavior. Without question, deficient self-regulatory behavior can logically lead to problematic use. 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.

A Susceptible Population

Given our discussion of problematic use and depression as they relate to online games, it seems clear that there is one population that stands out in its susceptibility to lapse into unregulated consumption of interactive entertainment. Due to finding themselves in new surroundings with initially smaller social groups, lower social support, little supervision, and hours of uninterrupted access to high fidelity computing hardware and infrastructure,

college students appear to be very much at risk, given the current model. Members of the faculty and administration of major educational institutions have pointed to overuse of the Internet in general, and online gaming specifically, as a growing problem on their campuses Unfortunately, such observations are all too often concomitant with blaming the pernicious and "sinister" design of massively multiplayer games for the behavioral excesses of the student body (Messerly, 2004). Comparison of the problematic use, depression levels, and other outcomes in players of various genres of games will enable the proposed study to answer these claims.

Research Question Two – Player Motivation and Problematic Use

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. However, as we saw in Danforth's work above, even a seven-factor model, including the Big Five plus Attractiveness and Negative Valence, showed little predictive value with respect to the development of addiction to gaming. Here we postulate that player motivation (why a person plays a game), though perhaps related to personality, may be more predictive of problematic use than personality traits themselves. In addition to advancing a confirmatory hypothesis about the endogenous and exogenous correlates of depression, the following section examines the measurement of player motivation and lays out a second hypothesis linking player motivation to the development of problematic use.

The Player Scale

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 how they go 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 Three.

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 Three. Bartle's Types as described in "Hearts, Clubs, Diamonds, Spades: Players who suit MUDs".

Though not based on data, per se, but primarily on his extensive experience as a designer and user of MUDs, Bartle presents a classically 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. 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 facets are presented in Table Four.

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 Four. Yee's Motivational Facets.

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.

In collaboration with Yee, the proposed study utilizes a modified version of the Facets scale based on some refinement and further analysis. The to-be-named motivation scale (see Appendix 8) is very similar to the Facets instrument in that it maintains the Relationship, Immersion, and Achievement categories. Due to inconsistent results and a small number of associated items, the Leadership factor has been dropped from the scale. An Escapism factor has been added and is likely to be a useful addition given its intuitive link to affect regulation based models of media consumption. As the waves of data collection in this study go forward, the player scale will be re-analyzed, augmented and refined in order to establish a wide reaching class of motivational categories that are useful to designers and researchers alike. In addition, it is expected that this play motivation typology will be as useful in modeling addiction as the personality inventories are in modeling depression.

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

In keeping with numerous findings in the literature on depression, Hypothesis III suggests that individuals with high levels of depression will report low levels of perceived social support, small social networks, and high levels of loneliness. 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. Due to its blunting effect on self-regulatory activity, it is also hypothesized that depressed individuals will show lower levels of self-regulation. Obtained results from the Project Massive survey provide initial support for Hypothesis III. Table Five displays the zero order correlations between the personality and environmental factors mentioned here and depression.

Social and Personality Correlates of Depression	Correlation w/ Depression
Perceived Social Support	-.494
Social Network Size	-.348
Loneliness	.633
Extraversion	-.351
Emotional Stability	-.615
Self-Regulation	-.560

Table Five. The relationship of certain personality and social resource metrics with depression.

A multiple regression model including all of these elements (except social network size) as predictors accounts for over 53% of the variance in depression for the current sample (adjusted $R^2 = .536$). The failure of social network size to contribute to the model may have resulted from an administration error within the survey instrument that will be corrected for the remaining rounds of data collection.

Hypothesis IV - 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, Hypothesis IV suggests that player motivation factors will predict susceptibility to addiction. The zero order correlations of addiction with three of the five player scale factors are shown in Table Six. In addition, the correlation with self-regulation and hours of play per week are also shown. A multiple regression model using these factors as predictors accounts for 32% of the variance in problematic use (adjusted $R^2 = .318$).
'

Player Motivation and Other Correlates of Problematic Use	Correlation w/ Problematic Use
Escapism	.371
Achievement	.288
Manipulation	.201
Hours of play per week	.303
Self-Regulation	-.380

Table Six. The relationship of certain metrics with addiction as measured by the EAS-II.

In combination, these factors can be thought to underlie a problematic play style that makes an individual susceptible to problematic use. Using structural equation modeling on the data from the second wave of the study, the model presented in Figure Three was created. This structural model suggests that those individuals who play many hours per week, are motivated to play for the purposes of escapism and achievement, and report little practice of self-regulatory activity are very likely to also report problematic use. Preliminary analysis shows that, given the large sample size, the data fit this model relatively well (X^2(4, N=1503)=13.6, p=.009; TLI = .966; RMSEA = .040)
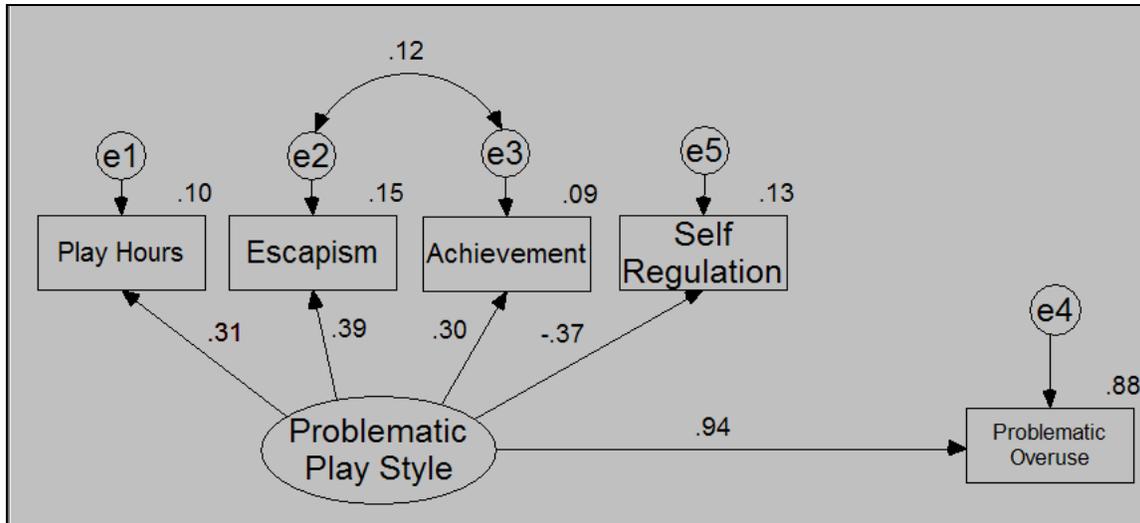

Figure Three. The relationship of certain personality and social resource metrics with depression.

Research Question Three – Displacement of Real Life Activities

Recall that our previous discussion of studies of internet use and depression included examination of both the social compensation hypothesis and the mood enhancement hypothesis. A third hypothesis of interest, the social 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. 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 dismissing either outright, results like those found by Bessier 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 mood enhancement 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. In this section we discuss the definition and measurement of organizational commitment as it applies to persistent online gaming groups called guilds or clans. Following this, a hypothesis that applies a displacement model to participation in online gaming is advanced.

Organizational Commitment

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.

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 Questionnaire (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 will be used in the proposed 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.

Hypothesis V - Over time as play hours and guild commitment rise, real life informal group activity will decrease.

In order to test the applicability of the displacement hypothesis to the online gaming domain, Hypothesis V predicts the longitudinal result that players who show increasing levels of weekly play and commitment to their guild will show declines in real life social activity in informal groups (see Appendix 10 for measurement of group activity). Increases or maintenance in hours played over time, while unassociated with depression, may result in decreases in informal and formal group activities. This proposition is based on the assumption that participation in real life group activities will suffer over time as an

individual spends more time gaming online and becomes more committed to the group relationships he/she has made there. There is the additional assumption that only informal group activity will be affected since formal group activities are arguably more regimented, durable, and resistant to displacement.

It is our current belief that, if it is obtained at all, this model will only apply to certain classes of individuals, like those with limited leisure time. In the general case, we believe that online gaming will be shown not to interfere with the social lives of the great majority of those who participate in it. The current cross-sectional data show only a weak negative correlation between hours played per week and informal and formal group activities ($r(1456)= -.172$ and $r(1469)= -.148$, $p<.01$ respectively). It should be noted here that a metric of available leisure time was added to the third wave of the survey, so no cross sectional analysis of this measure is available at present.

Discussion & Conclusion

This document has laid out a three-pronged investigation of the social and psychological impact of online gaming that uses as its framework the research questions and supporting hypotheses displayed in Table Seven.

Research Question I	How do self-regulatory behavior and depression relate to the development of engagement with versus addiction to an interactive entertainment product?
Hypothesis I	Players who become overly engaged in online play will display concomitant deficits in self-regulation.
Hypothesis II	The effect of these self-regulatory deficits on problematic use will interact with depression.
Research Question II	Just as personality traits and environmental factors seem to predict depression in general, are there player motivation and style factors that predispose individuals to problematic use of online games?
Hypothesis III	Certain social and personality factors distinguish players who are more susceptible to depression.
Hypothesis IV	Certain play motivation factors will distinguish players who are more susceptible to addiction.
Research Question III	Does time spent playing online games and commitment to the social groups within them displace real-life social activity and involvement?
Hypothesis V	Over time as play hours and guild commitment rise, real life informal group activity will decrease.

Table Seven. Project Massive's three principal research questions and their supporting hypotheses.

Putting it all together

Once the data collection and analyses described in this document have been performed, a fair amount of light will have been shed on the causal structures surrounding the development of problematic use. We will be able to speak with confidence about the endogenous and exogenous predictors of use, leveraging this information to explain why

some players describe themselves as "addicted" while others remain adaptively engaged. The results of Project Massive will inform the design of informal personal strategies and formal software systems aimed at helping players and developers alike manage play behavior and protect against use. Further, these findings and their implications are likely to be applicable to the more general case of internet dependency.

There will also be answers to the concerns expressed in the popular media about the effect of play on the user. Does play lead to detachment and depression? Instead, might online games be a therapeutic outlet for people already dealing with gaps in their social and emotional lives, gaps that might just as easily be filled by television, alcohol, gambling, and the like? Is it not reasonable to believe that who you are and why you are playing have more to do with your social and psychological state than what type of game you have chosen to play? This work shows promise in helping to answer these questions.

If they are not already an important part of our present, online communities 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.

Contributions
The unique contributions of this work to the field of Human Computer Interaction are outlined in Table Eight.

Contributions
Empirical examination of the role of self-regulation and depression in the development of problematic use of interactive entertainment.
Identification and examination of socio-environmental and motivational "risk factors" that could make an individual susceptible to problematic use.
Empirical examination of the effect that participation in online communities has on the real-life activities of the individual.
Application of longitudinal multilevel growth modeling to study of gaming communities
Testing and further development of a player motivation inventory for online gaming.
Adaptation of Organizational Commitment Questionnaire to the study of online social groups.

Table Eight. The unique contributions of the proposed work to the field of HCI.

Future Work
At the earliest opportunity, the results of the Project Massive survey will be used to inform the design of a lightweight desktop application that will empower the user to observe and manage their own online behavior. This application, given the working title MassiveMon, will 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 can 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 back to us in any way. The application is intended as a self-management tool that will be designed based on the findings of this project and is not an instrument of data collection.

The addition of networked information sharing to the application will provide the ability for the user to share their information with other selected users. This functionality will 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.

Schedule
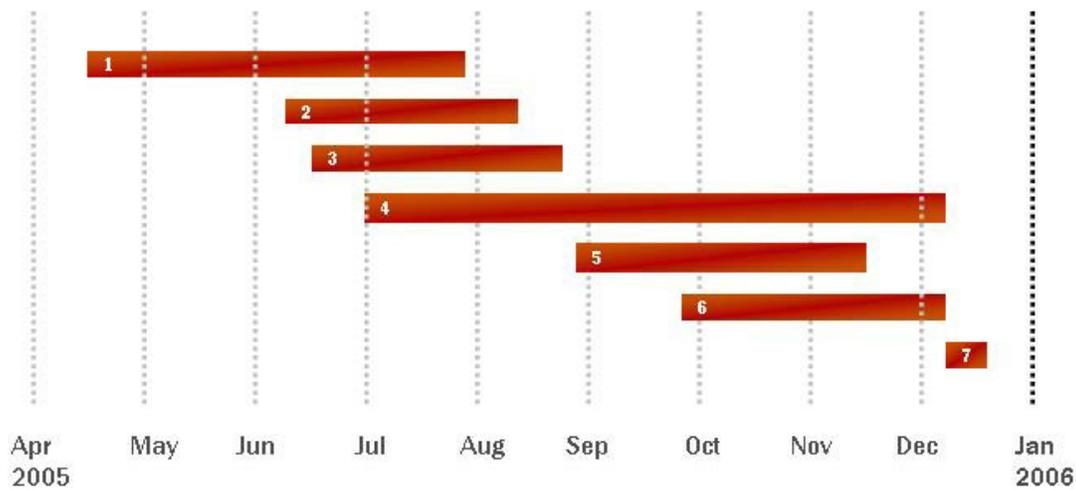
1 Wave 3 of Data Collection   5 Wave 4 of Data Collection
2 Paper on Research Question III 6 4th Wave Data Analysis
3 3rd Wave Data Analysis   7 Defense
4 Write Dissertation

Acknowledgements

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Appendix 1

Engagement Addiction Scale

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).

StronglyAgree/Agree/SomewhatAgree/Neutral/SomewhatDisagree/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

It is important to me to be good at the online game I play.
I like the challenge that learning to play the online game I play presents
I can't understand why people like the online game I play
The less I have to do with the online game I play, the better
It would not matter to me if I never played the online game I play again
I tend to want to spend increasing amounts of time playing the online game I play
I feel happy at the thought of playing the online game I play
When I see the online game I play, I feel drawn towards it
I pay little attention when people talk about the online game I play
the online game I play is unimportant in my life
I would hate to go without playing the online game I play for more than a few days
I feel a sense of power when I am playing the online game I play
I often experience a buzz of excitement while playing the online game I play
I rarely think about playing the online game I play when I am not using a computer
The jargon in the online game I play sounds stupid to me
I am sometimes late for engagements because I am playing the online game I play
I often fail to get enough sleep because of playing the online game I play
My social life has sometimes suffered because of me playing the online game I play
I sometimes neglect important things because of an interest in the online game I play
I think that I am addicted to the online game I play
Arguments have sometimes arisen at home because of the time I spend on the online game I play
Playing the online game I play has sometimes interfered with my work
I often feel that I spend more money than I can afford on the online game I play
I have made unsuccessful attempts to reduce the time I spend playing the online game I play
I never miss meals because of playing the online game I play
When I am not playing the online game I play I often feel agitated
I have never used the online game I play as an escape from socializing
I try to make my the online game I play play sessions last as long as possible
I spend little of my spare time playing the online game I play

Appendix 2

<p align="center">Saucier 7 Factor Personality Scale</p>

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

<div align="center">

Social Network Index

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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 only   ____ (2) father only   ____ (3) both   ____ (4) not applicable

4a. Do you see or talk on the phone to either of your partner's parents
at least once every 2 weeks?
_____ (0) neither   _____ (1) mother   _____ (2) father   ____ (3) both
                                 only   only

5. How many other relatives (other than your spouse, parents & children) do you feel
close to? (If '0', check that space and skip to question 6.)
____0   ____1   ____2   ____3   ____4   ____5   ____6   ____7 or more

5a. How many of these relatives 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

6. How many close friends do you have? (meaning people that you feel at ease with, can
talk to about private matters, and can call on for help)
____0   ____1   ____2   ____3   ____4   ____5   ____6   ____7 or more

6a. How many of these friends do you see or talk to at least once every 2 weeks?
____0   ____1   ____2   ____3   ____4   ____5   ____6   ____7 or
more

7. Do you belong to a church, temple, or other religious group? (If not, check 'no' and
skip to question 8.)
_____ no   _____ yes

7a. How many members of your church or religious group do you talk to
at least once every 2 weeks? (This includes at group meetings and services.)
____0   ____1   ____2   ____3   ____4   ____5   ____6   ____7 or more

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

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

<div align="center">

UCLA-L

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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

<div align="center">

CES-D

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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.

<div align="center">

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

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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

How important are the following things to you in the game?

Not Important At All/Slightly Important/Moderately Important/Very Important/Tremendously Important

Leveling up your character as fast as possible.
Acquiring rare items that most players will never have.
Becoming powerful.
Accumulating resources, items or money.
Knowing as much about the game mechanics and rules as possible.
Having a self-sufficient character.
Being immersed in a fantasy world.
Escaping from the real world.
Optimizing your character as much as possible for their profession / role.
Being able to solo well.
Being well-known in the game.
Having your character's armor / outfit match in color and style.
Having your character look different from other characters.

How enjoyable are the following things to you in the game?

Not Enjoyable At All/Slightly Enjoyable/Moderately Enjoyable/Very Enjoyable/Tremendously Enjoyable

Helping other players.
Getting to know other players.
Chatting with other players.
Competing with other players.
Dominating/killing other players.
Exploring every map or zone in the world.
Being part of a friendly, casual guild.
Being part of a serious, raid/loot-oriented guild.
Trying out new roles and personalities with your characters.
Doing things that annoy other players.
Exploring the world just for the sake of exploring it.
Finding quests, NPCs or locations that most people do not know about.
Collecting distinctive objects or clothing that have no functional value in the game.
Working with others in a group.
Leading a group.

How often do you do the following things in the game?

Never/Seldom/Sometimes/Often/Always

Find yourself having meaningful conversations with other players.
Talk to your online friends about your personal issues.
You are offered support by online friends when you had a real life problem.
Make up stories and histories for your characters.
Role-play your character.
Play so you can avoid thinking about some of your real-life problems or worries.
Play to relax from the day's work.
Purposefully try to provoke or irritate other players.
Take charge of things when grouped.
Use a character builder or a template to plan out your character's advancement at an early level.
Play video games instead of other things I "should" be doing.

How much time do you spend customizing your character during character creation?

Not Much At All/A Little/Some/A Lot/A Great Deal

How interested are you in the precise numbers and percentages underlying the game mechanics?
(i.e, chance of dodging an attack, the math comparing dual-wield to two-handed weapons, etc.)
Not Interested At All/Slightly Interested/Somewhat Interested/Very Interested/Extremely Interested

Would you rather be grouped or soloing?

Much Rather Group/Rather Group/In-Between/Rather Solo/Much Rather Solo

Playing allows me to press the "pause button" on the real world and take a break.

Strongly Disagree/Disagree/Neutral/Agree/Strongly Agree

Appendix 9

Organizational Commitment Questionnaire

Please answer the following questions with regards to your guild:

Strongly Agree/Agree/SomewhatAgree/Neutral/SomewhatDisagree/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

Informal Group Activities Index

Approximately, how frequently do you do the following activities?

Never/Less often/Every few weeks/1-2 days a week/3-5 days a week/About once a day/Several times a day

Spend time with friends
Talk on the phone with friends or relatives
Entertain at home
Visit a friend or relative
Go out to dinner with others
Do volunteer work
Attend a club meeting

Formal Group Activities Index

Here are 4 statements about activities you may participate in. Please indicate the degree to which each statement is true about you.

Strongly disagree/Moderately disagree/Neutral/Moderately agree/Strongly agree

In the past three months, I have spent a lot of time working with others in my local community to solve problems of importance to us
I belong to many organizations
I spend a lot of time with my friends
I frequently participate in community activities