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Computer Game Addiction and Emotional Dependence

Amy Poon

Trinity College

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I would like to thank Professor Lee for allowing me to conduct my research on Computer Game Addiction, even when it seemed like such a laughable subject. He helped me get IRB approval, conduct the study, and write a thesis, all the while believing that I could finish it all. I am happy to report that he was right. I would also like to thank Professor Chapman, her long hours with me in the library culminated in my results section. Without her patience and guidance, completing this paper would have been impossible. Finally, I would like to acknowledge Jonathan Handali for proofreading my paper.

Abstract

As computer games grow in popularity, the negative effects of usage should be studied. Computer games (games played on a computer, tablet, or any web-enabled device) have salient qualities, especially MMORPGs, that cause addictive symptoms. I investigated computer game addiction and usage in Trinity College students. A sample of 114 students ($M = 20.4$ years of age, 61% female) was divided into a non-addicted, social player, and computer-addicted group based on Young's Diagnostic Questionnaire. My results showed that there is no significant correlation between day quality and computer game usage, and no significant correlation between emotional dependence and group. Not enough computer-game addicted subjects participated ($n=4$), so it was unable to be concluded that computer game addicts have lower GPA, or prefer a certain type of game. However, the large number of social players ($n=57$) shows that more research needs to be conducted to analyze the prevalence of addictive symptoms.

Introduction

Significance

In an increasingly technology-dependent based society, people will continue to use computers not only for business but also for pleasure. Computers have become a social and economic necessity that permeates every part of our lives; it is feasible that in the future, every person in the world may own or use a computer. Therefore, necessary precaution must be taken in exploring all the uses of computers, and the negative and consequences of using them on a daily basis.

A particular aspect of computing that is fascinating to the public is computer gaming. This aspect of computer usage is recreational and lacks practicality in the majority of people's daily life. Three different types of computer players have emerged. The first are pro-gamers, competitive and skilled players that play in tournaments and earn money. Depending on the popularity and renown of the game, a player may be sponsored and earn a salary. StarCraft, a real time strategy game, is a popular spectator sport in South Korea where there are at least three television networks dedicated to analysis and watching of games, a draft, and salaried players with the top players being paid in the hundred thousand range (Mars(ATWithMePls), 2008). Only a small percentage of gamers in America can win tournaments and earn enough money to support them financially. The second are social players, who play recreationally and for no monetary gain. They may play socially, to spend time with friends while doing a particular activity, enjoyment of the game itself, or to relieve stress. The third are computer addicts, who dedicate a large portion of their time to playing a computer game, and display behaviors that are common to addiction. The percentage of addicted gamers is estimated to be at least 4.6-12%

(Thomas and Martin, 2010; Grüsser, Thalemann, & Griffiths, 2007); although this number may be inflated due to the usage of problematic gaming criterion (Charlton, 2002).

The number of addicted players continues to grow as gaming gains more influence. If computer game addiction is a serious disorder, then it should be entered into the Diagnostic and Statistical Manual for Mental Disorders V (DSM-V). With its inclusion, there will be credence to its validity, and therapeutic programs can be created to find and treat those with serious computer game addiction. More research will become focused on this phenomenon, as there is little attention on this subject. Also, perhaps computer game companies will take up social responsibility and decrease factors that target potential computer game addicts.

Problematic Gambling

In 1964, the World Health Organization (WHO) began to use the term dependence to replace 'addiction' and 'habituation' due to negative associations with these words (WHO, 2011). They named a range of symptoms that are common across various drug dependencies as dependence syndrome. However, these criteria can easily be adapted to behavioral actions and is outlined by the following: a compulsion to engage in activity, trouble controlling intake, a physical withdrawal, tolerance, neglect of other activities and interests in favor of activity that causes addiction, and persistent activity despite overtly harmful consequences (WHO, 2011).

Three or more symptoms must be shown together in the course of a year to qualify.

For problematic gambling (also known as gambling addiction), the Diagnostic and Statistical Manual for Mental Disorders IV (DSM-IV) states that a person must show 5 out of 10 symptoms and may not be caused by a manic episode (Medic8, 2011). First there is preoccupation, which is when one has thoughts that center on gambling, whether it is how to get to a casino to gamble or just thinking about a game one played in the past. Second is tolerance,

which is when one has to play larger bets or make higher risks to feel the rush of pleasure when one placed smaller bets when starting out. Third is withdrawal, or irritability or other negative experiences associated with attempting to reduce or stop playing. Fourth is escape, wherein a player may attempt to improve mood or escape problems by concentrating on gambling instead of the problem. Fifth is chasing, where the player repeatedly attempts to win back gambling losses by gambling more. Sixth is lying, the player attempts to hide their gameplay from close ones. Seventh, there is a loss of control; the player is unable to stop gambling. An eighth symptom is illegal acts; the player has resorted to crime to obtain money or recover losses. Ninth is risked significant relationship, when the gambling has created a wedge between oneself and one's loved ones, job, other relationships, or other significant opportunities. Continued gambling may also result in the loss of all these relationships. Tenth, the player has resorted to others for money in order to assist with the debt accumulated from gambling. Problematic gaming, in itself, is not classified under addictive disorders but rather as an impulse control disorder, and has entered into the DSM-IV due to these similarities to addiction as well as well as the negative effects gamblers display (APA, 2000).

The symptoms for dependence syndrome often overlap with the DSM-IV's criteria for pathological gambling. That is because the checklist for pathological gambling was based off of addictive symptoms demonstrated by substance abusers and also by pathological gamblers. Yet, if behavior that is caused by addiction to an activity is already listed in the DSM-IV and computer-addicted gamers have symptoms similar to Dependence Syndrome, then it should reasonably be entered into the DSM-V. However, video-game addiction and similar addictions were not entered into the DSM-IV due to lack of evidence. Research into computer game

addiction has only recently gained volume due to the rise of computer gaming in the past two decades as well as the availability of computers to the general public.

Assessments for Problematic Gambling are often used to create tests for Computer/Internet Addiction due to similarities between the two; both are behavioral based addiction. For instance, Thomas and Martin (2010) note that their assessment for Computer Game and Internet addiction were adapted from pathological gambling as “no empirically tested measure for behavior addiction was available in 2004 at the time of data collection,”.

Computer Game Addiction

There are five aspects of internet addiction noted by Shaw and Black (2008): Cyber sexual addiction, cyber-relational addiction, net compulsions, information overload, and computer addiction. The main subtype we will be looking at is computer addiction, as it is described as “Many computers come equipped with pre-programmed games and people become addicted to playing them at the cost of work performance or family obligations”. There is a lot of controversy over the overlap of devices in gaming, which has resulted in an ambiguous definition for computer games and computer game addiction. For instance, a game that was made for a video game console now has an internet version, a computer game has moved onto the tablet, gambling has also moved to the internet, etc. We will extend their definition to include all computer games playable on a web-enabled device that is not a video-game console, as computer games are recreational activities that are meant to be enjoyed, and outside of educational games have little productive value.

The following are in depth examinations of computer-game addiction symptoms as studied by researchers as well as real life-examples.

Persistence

Persistence, or behavioral salience, is an activity that dominates a person's behavior to the point that self-maintenance is neglected. In 1938, Skinner created a device that allowed rats to push a lever that would release a pellet into their cage. Once the rats realized that the action of pressing the lever resulted in a reward, they continued to press the lever until exhaustion. Doing so demonstrated an aspect of operant conditioning called positive reinforcement, in which a reward stimulus will result in the continuation or increased frequency of a behavior. In Loftus and Loftus' (1983) study, they found similar behavior in humans, except with video arcade games such as Pac-man and Invaders. The reward stimulus is often a higher score, accomplishing a task, or defeating a virtual enemy which causes a feeling of achievement. People would gain injuries by standing in front of a machine for hours and repeatedly moving a joystick or pushing buttons, resulting in blisters, callouses, etc. These injuries were given humorous names, such as Pac-man's Elbow which refers to a mild form of tendinitis. These injuries have become more varied across different platforms for gaming and computing usage. Commonly cited injuries include tired eyes, carpal tunnel syndrome, etc. due to staring at a computer screen and repeating the same keystrokes when playing.

Besides repeating an action to the point of self-harm, computer game addiction is more associated with ignoring bodily needs in favor of playing. The BBC (2005) posted an article about a man in South Korea who played for 50 hours straight in an internet café, and eventually collapsed from exhaustion. He died in the hospital from heart failure. There are several reports of gamers refusing to use the bathroom or using a bottle to release their urine, and eating little food or snacks to nourish themselves; all to remain in front of the computer for a while longer (Chappell et al., 2006). Many of these stories usually stem from developed countries in Asia such

as China, South Korea, and Japan where computer gaming is more accepted and popular than in the United States. For instance in South Korea, StarCraft is a popular spectator sport and one needs a license in order to qualify to play as a pro-gamer. Computer Game Addiction has been recognized as a formal disorder in these countries, and the government has taken steps against it by creating programs and clinics to battle against it. In South Korea, after repeated incidents of self-neglect leading to death, and the death of a child that was neglected by its parents, they have enacted policies to fight against computer addiction(Cho, 2010). These policies include opening several counseling centers, boot camps for addicted children and teenagers during summer and winter break, and people under eighteen being prohibited from playing in internet cafes between midnight and 8 am (Bosker, 2010; Cain, 2010). China has also enacted policies that include opening treatment centers and requiring minors to use their government IDs to track and shorten usage (Sung, 2009). The government targets the young, as they are under the care of their parents and are also at risk for computer game addiction (Thomas and Martin, 2010). The popularity and acceptance of computer games in developed Asia, as well as their policies against computer game addiction could be a possible future for America.

Risked Relationships

In addiction, one may drift away or alienate one's close relations in favor of the substance or activity. In a two case study by Griffiths (2010), he examined two different sides of the social aspects of computer gaming. The first case featured Dave who began to play World of Warcraft for ten to fourteen hours a day after finishing his degree and before getting his first job. Although he played excessively, he was able to gain and maintain new friends through the game, only played because he was in a situation with a lot of time, and eventually dropped out of playing when he formed new commitments in real life. In the second case, a married man with two

children named Jeremy, was interviewed. He claimed that he played in order to escape from his problems. In the midst of his addiction he played up to fourteen hours a day, began to lose his close connection with his wife, and called in sick at work in order to play more. He eventually lost his job and his wife. He has since been referred to a clinical psychologist. Although Dave played as excessively as Jeremy, he was able to stop playing and it did not ruin his life. Jeremy's gaming ended up being both the solution and problem that caused a vicious cycle of abuse which resulted in him losing his family and his work.

It has also been reported that several parents have neglected their children in favor of computer and/or internet games. In the case of the Kims, they played a game named *Prius*, a fantasy, Massive Multiplayer Online Role-playing game (MMORPG). They raised a virtual child named Animus in the game, while only feeding and changing their child in between gaming sessions. The child died due to malnourishment, and they were sentenced to jail. Another parent, a single mother, played a social game named Small Worlds, and neglected her small children and two dogs. The children fed themselves from bean cans every day, and the two dogs died from malnourishment.

Gamers often become too invested and immersed in their games, and as they play longer hours they begin to lose contact with their real world relationships. Although in Dave's experience, in which he displayed excessive behavior, he did not display this addictive symptom. For some gamers, it is possible to play long hours and not be considered addicted, and there are varying levels of risked relationships. In young teenagers, they may simply pass up on family engagement in order to play games (Thomas & Martin, 2010). In the situations of the Kims, Jeremy, and the single mother, they all played excessively and ignored their social responsibilities.

Violence

The basis of any addiction is the negative consequences that come with using a substance or doing an activity. With pathological gaming, the criteria for it includes resorting to crimes to fund one's own activity or pay off debts one has accumulated. However, articles in the media indicate a trend that many crimes may occur either due to frustration surrounding the game, or to copycat violent acts from the game. One man in China stabbed his friend because the friend had sold a virtual sword on eBay for money (BBC, 2005). In another case, a mother in Florida shook her 3-month baby to death for crying when she was playing Farmville (CBSNews, 2010). In the instance of grand theft auto, there have been copycats who have set out to repeat the crimes they committed in game; one group of teenagers in Garden City, New York decided to live out the popular action-adventure, crime game named grand theft auto. They committed burglary, beat some men, attempted to steal a car, and even punched a police officer in the face. Their only motivation was that they were bored (Crowley, 2008).

There is a media stereotype that violent games will increase a child's propensity for violence. Markey and Markey (2010) attempted to predict certain personality types that would be most affected by violent video games. They found that those high in neuroticism and low in agreeableness and conscientiousness are susceptible to violent games, but only a few individuals truly act on these impulses in a manner that is noticeable. The individuals that are noted above may have had other disorders which caused them to act in this violent manner.

Tolerance

Weinstein (2010) conducted a study that looked at levels of Dopamine in both a control group and a group of former ecstasy users. They allowed both groups to play a motorbike-riding computer game and monitored brain chemistry using single-photon emission computed

tomography (SPECT) before and after game play. They found that there were increased levels of dopamine in the ventral striatum, which is comparable to amounts produced by amphetamines. Former ecstasy users had little change in brain chemistry, which may be due to tolerance from previous ecstasy usage. The researcher also found that males had greater activation and functional connectivity in the meso-cortico-limbic system than in females. Weinstein (2010) suggests that gaming usage/craving may use the same neurological reward system as substance dependence, that gender differences explain why there are more males playing and addicted to games, and that computer game addicted players may also show reduced dopamine levels after playing computer games due to sensitization. This study may not be very valid concerning the ex-ecstasy group, as they only recruited users and the sample size was small. Thaleman et al. (2007) confirmed these results by examining male computer players of different playing intensities, and seeing how they reacted to computer cues. Using Electroencephalography, they found that the excessive computer game players had stronger cue-reactivity to computer scenes than casual players. They also came to the conclusion that sensitization of the mesolimbic dopaminergic system caused greater computer salience in a similar manner of substance abusers to drugs.

Debt

In the case of many computer games, you purchase a single game and then you hand out no more money. However, game companies have changed their model to increase profits, and now offer money options to buy more in-game weapons or power-ups, gain advantages within the game, or to renew a subscription to a game. In the case of buying in-game items, children who do not understand money and have access to their parents' credit card may accidentally rack

up a debt (Insley, 2010). They may not understand that money purchased for the game translates into real world money.

Furthermore, internet gambling has become increasingly popular and may soon be legal (Jonsson, 2011). It is possible to bid real money and earn money, as well as lose money. The same problems of gambling addiction occur without a casino, and with the convenient use of the computer. Internet gambling may be even worse as it is a solitary activity and it is possible to play for hours or days without anyone seeing or stopping oneself. Furthermore, virtual money that has been converted from real money no longer seems like having monetary value, and thereby creating an inhibiting effect which would cause greater spending. It is harder to determine the difference between 100 dollars and a thousand dollars when it is on the screen, and there is nothing physical within one's hands.

Emotional Dependence.

Emotional stability is dependent on a secure attachment to a person or thing (Arntz, 2006). In Griffiths (2010), the case study of the Jeremy demonstrated one of the motives for playing computer games: escape. Computer players may use computer games as a way to solve emotional problems, and to get away from reality. This may create a self-repeating cycle, as the problem is not solved and only delayed which creates more conflict for the individual and cause them to play more. Stetina et al. (2011) looked at male MMORPG game users and found that they tend to have low self-esteem that use gaming as a way to interact socially. In this manner, some or perhaps many gamers are more emotionally and socially invested in their gameplay than someone who does not need computer games to interact. In Hussain and Griffiths' (2009) study, they gave an online questionnaire to online gamers of MMORPGs, and found that they displayed behavioral and psychological dependence to gaming.

This attachment to computer games may negatively impact one's work. Thomas and Martin (2010) looked at Tasmanian secondary and college students and split them into groups depending on game play hours. They found that students preferred playing over spending time with friends and family and doing homework which negatively impacted their Grade Point Average. The researchers also found that the college populations used games to escape their problems or unpleasant feelings as well as to chase a higher score. Emotional dependence may be either symptomatic of addiction, or a cause of computer game addiction.

MMORPG

There are currently 2.5-5% of Americans that have or can be diagnosed with pathological gambling addiction. Of this number, The National Opinion Research Center (NORC) found that "the availability of a casino within 50 miles (versus 50 to 250 miles) [was] associated with about double the prevalence of problem and pathological gamblers" (1999, p. ix). Therefore, the number of gambling addicts increases with each year, and especially with the building of a casino. There are several tactics that casinos employ that may cause this pattern of development. First, they create marketing strategies to draw in and keep customers that are at risk for gambling addiction. For example, Bjelde, Chromy, and Pankow (2008) looked at North Dakota casinos and how older adults gambled. They found that North Dakota casinos employed techniques such as giving special discounts, free beverages and/or buffet meals, providing free transportation to and from casino, offering special rewards for signing up for card membership, sending advertisements through the mail, etc. in order to draw in the elderly crowd. The researchers had already determined that the elderly are more likely to be escape gamblers; that is they use gambling as a means to escape boredom or loneliness. In other casinos, it has been noted that the buildings have been constructed in a way to encourage long hours within the casino: there are no

clocks alongside no windows within the casino to throw off one's sense of time, the carpets are designed to overwhelm the senses and draw attention away from other stimuli, the exits are hard to locate, and tend to be located away from the cashiers to encourage gamblers to pass by other games before leaving which ensures that they will inevitably play another game (Feng, 2011). Just by being within a casino setting, and passing by gambling stimuli, it has been found that gambling addicts feel an urge to gamble, more so than someone who is playing recreationally (Kushner, Donahue, and Frost, 2007). Many casinos employ these strategies in order to increase profit, and there are few restrictions or self-regulation to stop or aid these problematic gambling addicts.

There are some cases in which casinos have stopped gambling addicts from continuing. First, in the state of Nevada, by law casino employees must stop a person from playing if they are noticeably drunk. Second, casinos such as the Wynn Las Vegas and MGM Resorts properties have recently instituted programs to train their employees to identify extreme gambling addicts and ban them from their casinos. However, it should also be noted that employees may not always attempt this approach in fear they will be fired for losing revenue for the casino, or they will not be able to do anything at all except watch if they are unable to ban a customer.

Just as casinos create strategies to draw customers in and prey on the vulnerable to gambling addiction, computer game companies also attempt to make the most engaging and interesting games in order to gain and keep customers. Perhaps, the most addictive is Massive Multiplayer Online Role Playing Games (MMORPG). Lee et al. (2007) looked at South Korean gamers and found that while simulation games were the most preferred, role playing games were more preferred by high-risk internet users. These games allow for thousands to millions of users to enter a virtual world where they can interact with each other while developing their character;

the most notable MMORPG is World of WarCraft to the extent it has been nicknamed WarCrack. The company that runs it, Blizzard Entertainment, reported in the first quarter of 2011 a \$170 million profit alone (Lefebvre, 2011). World of Warcraft and Evercraft are two major games that have been researched by psychologists when studying computer game addiction due to its salient qualities. Chan and Vorderer (2006) described general characteristics of MMORPGs:

- *Persistence*-this is split between world persistence and avatar persistence. World persistence refers to how the player knows that the world continues to exist with or without him playing. It is accessible at all times, during the whole week. This continuity allows for social structures to emerge, and creates the sense of a parallel reality. Avatar persistence refers to a created identity that has consistency in its representation of itself to others.
- *Physicality*- MMORPG worlds are grounded in the physical. That is, they have laws of nature, that are consistent in how all characters within the game must abide by. There are usually some consistent time and space factors, but they may be sped up or decreased to increase the effect of the game.
- *Social interaction*-social interaction is encouraged or integral to the game play of MMORPGs. Whether it be teaming up to accomplish a goal, fighting against each other, or offering real life information to communicate about topics other than the game, MMORPGs definitely have a social factor that make it appealing to the general public.
- *Avatar-mediated play*-The player is represented by a character or created avatar, with which they may create a new identity online. This is another appeal of MMORPGs, as it

offers anonymity which increases their freedom to play as they like without social boundaries.

- *Vertical game play*-Game play is entirely focused on achievements and may include increasing character levels, equipment quality, and wealth.
- *Perpetuity*-MMORPGs do not have an ending in the traditional sense. Rather, the game only ends for the player when they choose not to play. This leads to the concentration of the game being on the player, who can choose how they want to play the game, rather than forcing the player on a single pathway.

These qualities make MMORPGs very hard to quit, and several studies have noticed participants who have had these difficulties or have demonstrated addictive symptoms (Griffiths, 2010; Chappell et al. (2006). Another common feature of studies researching MMORPGs, is a high participation rate by males (Hussain and Griffiths, 2009; Lee et al., 2007). They see a higher gaming usage among males, possibly due to the goal-oriented nature of the game genre; as there are an unlimited number of tasks/quests to complete within the game, one can never feel done even after logging off (Chappell et al., 2006; Griffiths, 2009). Surprisingly enough, females are a significant percentage of game players in this genre; they have historically been underrepresented as a target audience (Jenkins & Cassell, 2008). Yee (2001) sent out a link to a study on his website looking at demographics, and found that 16% of gamers in *EverQuest* were female; *The Sims* boasts a 65 percent female audience (Boyes, 2007). Krotoski (2005) claims that this may be due to the social components of this game, as females are drawn to the communication side of the internet and in computer games.

Hypotheses

The American Psychology Association had once considered entrance of Computer Addiction into the DSM-IV, but chose not to due to lack of evidence. Therefore, the aims of this paper are to increase the amount of evidence for computer game addiction's entrance into the DSM-V and to increase knowledge of computer usage among Trinity college students.

I hypothesize that:

1. Those addicted to computer games will have symptoms of addiction, such as tolerance, emotional dependence, and withdrawal.
2. The computer addicted group will demonstrate an emotional attachment to computer games. If they are having a bad day, they will be more likely to play more hours of computer games.
3. The computer addicted and social player groups will be more likely to play MMORPGs.
4. Females will play more social games, while males will play more goal-oriented games.
5. Computer addicted group will have lower GPAs.

Methods

Participants

A total of 400 Trinity College students ranging from 18-24 years of age ($M = 20.4$ years, $SD = 1.4$) were asked to join in this study. Only 117 participants (29.3%) finished the online questionnaires to completion, consisting of 61% females and 39% males.

Materials

Addiction. An adapted version of Young's Diagnostic Questionnaire (Young, 1998) was used (Appendix A). The original tested Internet addiction, while the modified version replaced

references to the Internet with computer games. Such as replacing “Do you feel preoccupied with the Internet (think about previous online activity or anticipate next online sessions)?” with “Do you feel preoccupied with playing computer games (think about previous gaming activity or anticipate next gaming sessions)?” This 8 item questionnaire was composed of yes or no question that tested components of addiction such as preoccupation, tolerance, loss of control, withdrawal, salience, conflict, escape, relapse, and mood modification (Appendix A). Each yes answer was considered a point, and a combined total of 5 or more points indicated computer game addiction on a range of 0-8. Thus, a computer game addicted group, a social player group (1-3 points), and a non-addicted group were created from this portion.

In addition to Young’s Diagnostic Questionnaire, a question asking GPA was asked in the demographic information. As addiction is rated in relation to negative consequences, this will help determine if lower GPA is related to computer game addiction (Appendix B).

Emotional Dependence. A created question was put on the survey that asked “When you are near your device do you feel more comfortable and secure, and when you are away from your device do you feel less comfortable and secure”. Participants answered on a Likert scale, with 1 being true, 3 being doesn't matter, and 5 being false. Furthermore, two other created questions asked “How would you rate your day?” and “How many hours did you spend playing computer games?” They were included in order to link emotional mood with total hours of game play. The former question was answered using a Likert scale, with 1 being absolutely terrible and 10 being a really great day. The latter was answered with a positive number between 0-24 (Appendix B).

Computer Usage. A number of questions were asked to learn more about computer game usage in both the computer addicted group and non-addicted group (Appendix B). First, participants were asked how many hours of the day they played today. This is under the

assumption that the day they are answering the survey is an average day where they are playing their normal number of hours as usual. Second, they were asked what type of game; this was to determine if a specific type of game was more addictive or salient to play than another one. Third, a question asking what type of device was used to play computer games was asked. This was to determine if computer games are limited to simply computers, or if participants playing games on these other devices as computer games, such as on ipods or phones. Fourth, participants were asked what major games they have played in the past 3 months. This is similar to the question, what type of game they enjoy, and can check consistency; it can also show if there is a game that is more addictive or popular than others. Finally, a question was asked if the participant did any other activities while playing computer games, with a follow up of what kinds of activities. This will determine if they are engaged by the computer game, or are capable of multitasking and being productive.

Withdrawal. In addition to a question in Young's Diagnostic Questionnaire (1998) asking "Do you feel restless, moody, depressed, or irritable when attempting to cut down or stop gaming usage?", a second question asked about symptoms of Withdrawal, "When refraining/controlling your computer game usage, have you ever felt any of the following?" (Appendix B). This is a checklist based off of the DSM-IV's criteria for addiction, and it includes: anxiety, restlessness, irritability, insomnia, headaches, poor concentration, depression, social isolation, sweating, racing heart, palpitations, muscle tension, tightness in the chest, difficulty breathing, tremor, nausea, vomiting, or diarrhea, and non-applicable. It ensures that people who are taking the survey are answering consistently and also to extrapolate on the type of symptoms people have when undergoing withdrawal from computer game usage.

Procedure

After receiving IRB approval, surveys were sent out over e-mail to approved students using survey monkey. It asked some demographic information such as age, gender, class year as well as questions about computer game addiction and computer usage. Participants were divided into 3 groups, computer-addicted, social players, and non-addicted depending on the results of the Young's Diagnostic Questionnaire answers. Chi-square Analysis as well as cross-tabs were done on the data to prove or disprove the hypotheses.

Results

I hypothesized that a group of individuals would demonstrate symptoms of addiction that would qualify them as addicted to computer games. I also expected that this group will have lower GPAs than the social player and non-addicted group. Additionally, computer addicted and social player groups will be more likely to play MMORPGs, and females will orient towards social games while males will orient towards goal-oriented games.

Out of the participants who answered, 3.4 % were in the computer-addicted group (n=4), 48.7% were in the social player group (n=57), and 47.9% were in the non-addicted group (n=56) (Table 1).

Table 1-distribution of males and females, as well as groups within the study, Trinity College, and Thomas and Martin's (2010) study.

	respondent sample	Trinity College	Thomas and Martin (2010)
male	39%	51%	27.3%
female	62%	49%	72.7
computer-game addicted	3.4%		4.2%
social player	48.7%		22.4%
non-addicted	47.9%		73.2%

The social-player group demonstrated several symptoms of withdrawal, as well as the non-addicted group (See Figure 1). Although a computer-addicted group was formed, there were only four participants; my results concerning this group are non-significant. Therefore, I was unable to find if the computer addicted groups mean GPA, $M = 2.70$ ($SD = 1.57$), was significantly lower than the social player group or the non-addicted group, $M = 3.21$ ($SD = .62$), $M = 3.32$ ($SD = .44$). There was also no significant correlation between grouping and emotional dependence, $r(92) = .32, ns$.

The social player group reported withdrawal symptoms such as restlessness (n=9) and poor concentration (n=12), but none of them answered yes to the withdrawal question in Young’s Diagnostic Questionnaire.

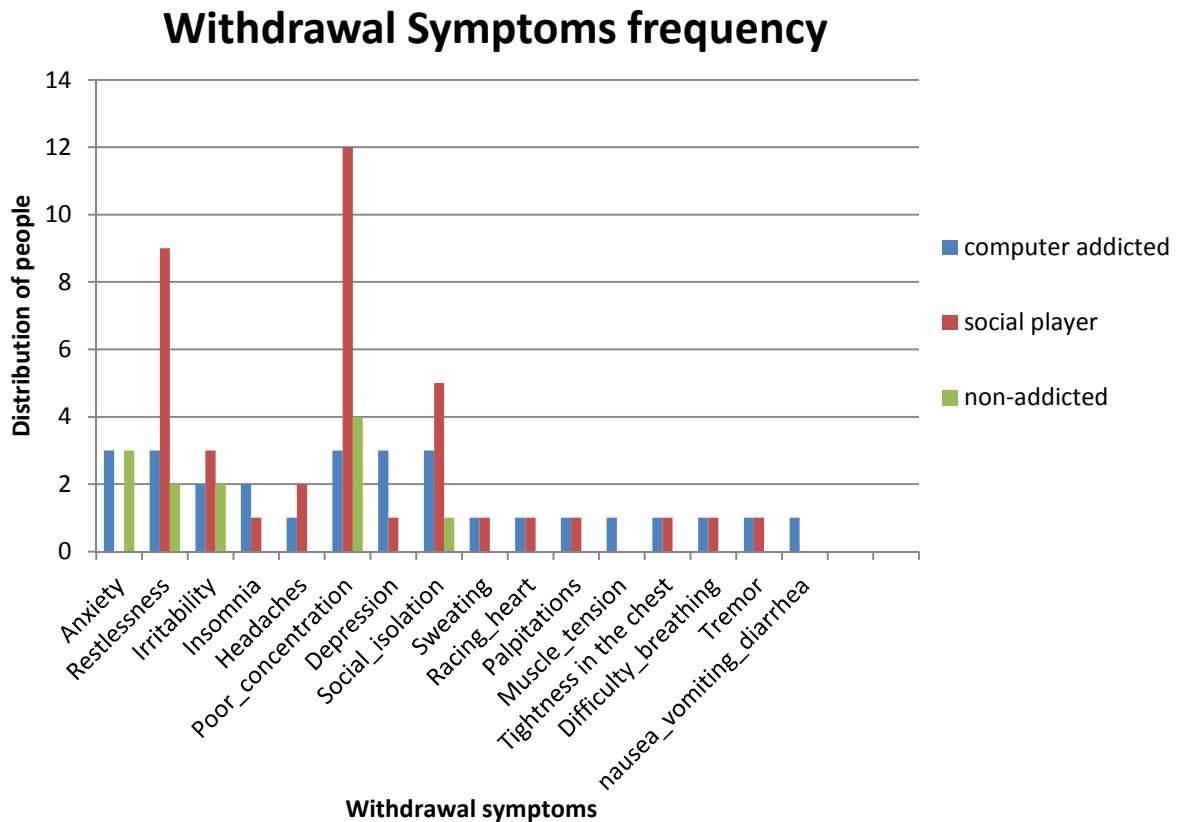


Figure 1-Withdrawal symptoms among each group.

There was a significant gender difference in interest in first-person shooter games, $X^2 (n = 117, 1) = 31.58, p < .001$. Fewer women were interested than would be expected by chance, as well as more men playing by chance (see Table 2). There were also fewer women interested in adventure games ($X^2 (n = 117, 1) = 4.78, p < .05$) and in rpg games ($X^2 (n = 117, 1) = 8.659, p < .05$). More females and fewer males were interested in social ($X^2 (n = 117, 1) = 3.9644, p < .05$) and trivia games ($X^2 (n = 117, 1) = 4.93, p < .05$).

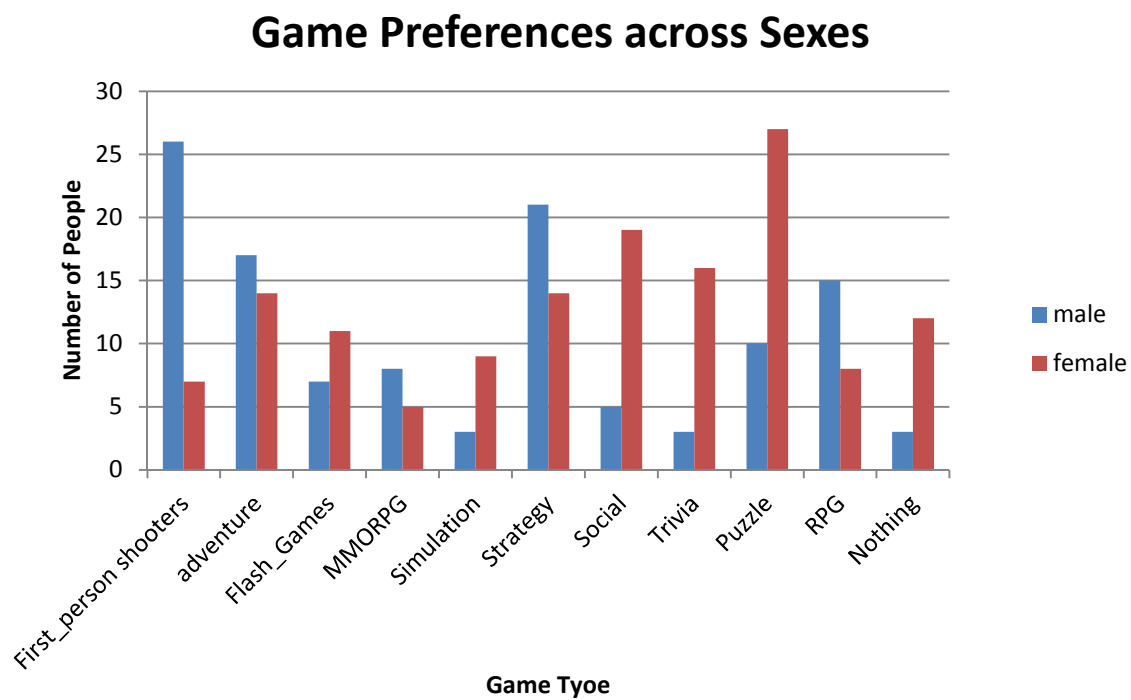


Figure 1-Game types preferred by males and females.

Experiment 2 Methods

Participants

Students who had completed the previous survey.

Procedure

From the participants who completed the first survey, another e-mail recruited students to complete a 4-question survey each day for seven days (Appendix C). Those who finished to completion were entered into a lottery with a monetary reward. Afterwards, data was analyzed using SPSS; Factor analysis and ANOVA were used.

Results

I had hypothesized that the computer-addicted group would have greater emotional dependence than the social-player group and non-addicted group. The computer addicted group showed no correlation between quality of day and number of hours played, $r(93) = .142$, ns.

Table 2-Frequency of hours each group played over the course of a week.

Total hours played during a week	computer-addicted	social-player	non-addicted
0	1	9	8
1-2	1	3	2
3 to 4		3	2
5 to 6		2	
7 to 8		2	
9 to 10		1	
11		2	

Interestingly, the non-addicted group showed a significant negative correlation between quality of day and game play time on the first day, $X^2 = 10.74$, $p < .05$. Table 2 demonstrates that some social players play up to 11 hours per week.

Discussion

Findings

My study attempted to validate computer game addiction's entry into the DSM-V, as well as explore more in depth about computer game addiction criteria, specifically emotional dependence. First, I found that there was a computer addicted group, whose total percentage in comparison to the rest of the student body was consistent with Thomas and Martin's (2010) findings but not the social player's or the non-addicted (see Table 1). However, only four people replied that were computer game addicted so all my hypotheses concerning that group were non-significant. There might be several reasons for the low respondent rate from computer addicts: They might have dropped out in freshman year, they might be too concentrated on computer games to answer my study, they might be too embarrassed or bothered to answer a survey about computer game addiction, etc. Or perhaps, my criteria for computer game addiction were too strict. When I used Young's Diagnostic Questionnaire, the cut off for being entered into the computer-addicted group was five or more addictive symptoms based on the DSM-IV's criteria for problematic gambling. However, ICD-10's criteria for dependence syndrome is only 3 symptoms or more; under these conditions fourteen more participants would have been entered into the computer-addicted study. Regardless, the computer-addicted group sample size was too small and I was unable to determine if the computer addicted group truly had lower GPAs, or if they preferred MMORPGs.

Second, I found that there was no correlation between emotional dependence and grouping, as well as no correlation between quality of day and number of hours played. Besides having more participants in the computer-addicted group to make these result more valid and reliable, a possibility may be that if a computer game addict is truly addicted, they will be unable

to control their game play behavior and will play regardless of mood. Also, non-addicted participants would be able to control their behavior in accordance to how much free time they have (Thomas and Martin, 2010). Table 2 does show that there was a low amount of games played during the week I sent out a survey every day. This might have been an unusual week, as I sent it out after spring break. Students may have been readjusting back to school life, and been more involved in their studies. It was also curious to note that the social player group had the highest rates of game play, and that on the first day that I sent out the second part of my survey, there was a significant correlation between quality of day and number of hours played for the non-addicted group.

Third, my hypothesis that there would be more females playing social games was disproven, but my hypothesis that males would play more goal-oriented games was proven (Table 1). Males were far more interested in games such as Strategy, First-person shooters, adventure; all of these games involve a goal that can be accomplished within set parameters. Weinstein (2010) had shown that males had greater activation in the reward system when playing games and it may be because of this biological response that males played more games overall than females. Females did not enjoy social games the most as predicted, they also enjoyed puzzle and trivia games as well. A combination of the two, such as the popular facebook game/app *Words with Friends*, was also frequently reported by females. There are not many studies looking at what components of games females may enjoy as females have been universally shunned by computer game companies in developing games that may appeal to them (Jenkins & Cassell, 2008). Because they enjoy puzzle and trivia games, this may indicate that females enjoy cognitive stimulation more than social aspects of games, although the social aspect is also appealing to this demographic.

Fourth, I found that when playing computer games, participants used laptops the most, followed by phones, web-enabled devices (such as iphones), tablets, and then desktops. They frequently reported that they used their laptop and phones in conjunction with each other or one other device. Trinity College students seem to be continuously 'connected' to some sort of technological device; they then use these devices to both contact friends as well as play games or to do their studies.

Fifth, I also found that 38.3% of participants multitasked when playing computer games. This demonstrates that people are not completely immersed or focused on computer games, and are able to do constructive activities such as socializing with friends, doing homework, eating, etc. As the majority of participants were social players, this might mean that they do not play immersive, 'hard-core' games such as MMORPGs, or they do not feel the same draw as computer-addicts do.

Limitations

There were several limitations to my study. First of all, there were not enough respondents to my surveys. A larger sample size would increase the validity and reliability of my results. Also, my computer-addicted group was not big enough as only four people were classified as having five or more symptoms. Although the percentage of computer addicts to the overall population fits in with what Thomas and Martin (2010) found, it is still not a large enough population to have significant results. Second of all, my results were not representative of Trinity College (see Table 1). I found that there were a smaller proportion of males to females than what is actually at Trinity College. This is because more females responded. Third of all, my results are not generalizable to the general public. This study only applies to Trinity College. If I could expand my population to include other campuses, then perhaps I could apply my

results to the average college student. Fourth of all, I had neglected to add a Non/applicable option in my withdrawal symptoms question. This may have caused an overestimation of withdrawal symptoms, as only two people had responded to the previous withdrawal question in Young's Diagnostic Questionnaire. Fifth of all, I had adapted Young's Diagnostic Questionnaire, which was about Internet Addiction (Appendix A), to apply it to Computer Game Addiction (Appendix B). It is unknown if this survey is reliable and valid when applied to computer game addiction.

Future Research

For future research, I would attempt to find why social players demonstrate addictive symptoms. There were social players who played for long periods of time but did not demonstrate addictive symptoms, and social players who played for short periods of time by demonstrated addictive symptoms. It would be interesting to find why symptoms of addiction appear after playing computer games. To do so, I would create a reliable and valid measurement of computer game addiction. I would also attempt to strengthen the definitions of computer game addiction. Computer game addiction is only a subcategory of computer addiction, and can also cross over with internet addiction as well as video-game addiction. Also, with the advent of internet gambling, computer game addiction may also be interconnected with problematic gambling. The DSM-V may not enter computer game addiction, but rather computer addiction to encompass all of the above. I would also attempt to reject other disorders as the cause of computer game addiction, such as having an addictive personality, depression, anxiety, etc. The argument against computer game addiction is that is symptomatic of another disorder. Future research can conclusively prove that playing on the computer for long periods of time can cause addictive symptoms and that it is no comorbid with any other disorder. Finally, I would also

attempt to find other treatment options for computer game addiction. Young (2009) already suggests treatment options for children such as family therapy, setting limits on children's game play and what they can play with, restructuring their environment, finding the source of turmoil and help them deal with it in a healthy manner, etc.

Conclusion

There are far fewer computer-addicts than predicted on Trinity College campus, but the majority of participants demonstrated one or more symptoms of addiction. They do not show emotional dependence as one of the components. Computer game play seems to cause symptoms of addiction which may be due to computer games having salient qualities. Game types seem to be composed of different features that are more attractive to different sexes; Males enjoy Strategy, first-person shooters, and adventure games while females enjoy puzzle, social, and trivia games. In addition, students play computer games on a wide variety of devices, including phone, laptop, electronic devices with web-enabled activities, tablets, and desktops. Students tend to play while multi-tasking, so their time is not solely spent on one activity. Overall, computer gaming seems to be a recreational past time in Trinity College, and does not seem to have detrimental effects on the student body.

The wide-reaching implication of this study is if computer game companies should take social responsibility for the extreme computer game usage of its customers. They deliberately create games in order to draw in and create a user base to gain money. In Asia, the government has already taken steps to counteract the ill effects of game play by limiting usage (Bosker, 2010; Cain, 2010; Cho, 2010). If computer game companies refuse to create restraints for its players, and computer games grow in greater popularity than the U.S. government may have no choice but to follow in the steps of its Asian counterparts (Van Rooij et al., 2010).

Research already indicates that computer games can be a destructive presence in a game player's life, but it can also have a positive impact. Gaming allows players to communicate with others they may not ordinarily meet, gives self-confidence, and develops skills that may be used in real life. As demonstrated above, there is a small portion of computer game users who are at risk for computer game addiction. Hopefully, computer game addiction can enter common knowledge, so that computer game addicted users can get the care and treatment that they may need. Also, more studies need to be dedicated into the salient qualities of each computer game type to find what causes addictive symptoms as well as to prove the existence of computer game addiction so that it may be entered into the DSM-V.

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Appendix A

Young's Diagnostic Questionnaire for Internet addiction (Young, 1998)

All questions are answered with yes or no.

- 1. Do you feel preoccupied with the internet (think about previous online activity or anticipate next online sessions)?**
- 2. Do you feel the need to use the internet with increasing amounts of time in order to achieve satisfaction or for it to be enjoyable?**
- 3. Have you repeatedly made unsuccessful efforts to control, cut back, or stop Internet use?**
- 4. Do you feel restless, moody, depressed, or irritable when attempting to cut down or stop Internet use?**
- 5. Do you stay online longer than originally intended?**
- 6. Have you jeopardized or risked the loss of a significant relationship, educational, or career opportunity because of your internet use?**
- 7. Have you lied to family members, a therapist, or others to conceal how much you use the internet?**
- 8. Do you use the internet as a way of escaping from problems or relieving feelings of helplessness, guilt, anxiety, or depression?**

Appendix B

1. Informed Consent

IN ORDER TO PROCEED TO THE SURVEY, PLEASE READ THE FOLLOWING PARAGRAPH. IF YOU AGREE WITH THE FOLLOWING, PLEASE CLICK YES, CONTINUE. IF NOT, PLEASE CLICK NO, AND YOU WILL BE EXITED FROM THE SURVEY.

I am Amy Poon, a Senior Psychology Major conducting my thesis on Computer Game Addiction. This extends to games played on computers and games played with internet connections on mobile devices. There is not much research done on Computer Game Addiction, and I hope that my research will contribute to the growing number of papers dedicated to this subject. I also hope that my study will demonstrate the nature and importance of Computer Game Addiction, that will dispel many stereotypes and myths that are common in today's media. You do not have to participate in this research if you do not feel comfortable with the topic or are uncomfortable sharing personal information. If you do decide to participate, I will take measures such as using password protected computers and files to protect your information. I will also destroy all data once I am finished with my study. You are free to stop the survey at any point in time or withdraw from the study. If you are confused about anything in this study, about this study, or have any questions at all then feel free to contact me at amypoonthesis@gmail.com

-Yes

-No

2. What is your Sex?

-Male

-Female

What is your

Age?

GPA?

4. What is your grade?

-Freshman

-Sophomore

-Junior

-Senior

-5-year or more

-IDP

Questions 5-12 will be answered with yes or no.

5. Do you feel preoccupied with playing computer games (think about previous gaming activity or anticipate next gaming sessions)?

6. Do you feel the need to play computer games with increasing amounts of time in order to achieve satisfaction or for it to be enjoyable?

7. Have you repeatedly made unsuccessful efforts to control, cut back, or stop gaming activities?

8. Do you feel restless, moody, depressed, or irritable when attempting to cut down or stop gaming usage?

9. Do you play longer than originally intended?

10. Have you jeopardized or risked the loss of a significant relationship, educational, or career opportunity because of your gaming use?

11. Have you lied to family members, a therapist, or others to conceal how much you play computer games?

12. Do you play computer games as a way of escaping from problems or relieving feelings of helplessness, guilt, anxiety, or depression?

13. When refraining/controlling your computer game usage, have you ever felt any of the following?

-Anxiety

-Restlessness

-Irritability

-Insomnia

-Headaches

-Poor concentration

-Depression

-Social isolation

-Sweating

-Racing heart

-Palpitations

-Muscle tension

-Tightness in the chest

-Difficulty breathing

-Tremor

-Nausea, vomiting, or diarrhea

-N/A

14. How would you rate your day?(1 being absolutely terrible, 10 being one really great day)

15. How many hours did you spend playing computer games today?

16. Please choose what types of computer game you are interested in.

- First Person Shooters
- Adventure
- First Person Shooters
- Flash Games
- Massive Multiplayer Role Playing Games
- Simulation (such as Sims Social, Farmville)
- Strategy
- Social (found on websites such as Facebook and played with friends)
- Trivia
- Puzzle
- Role Playing Games (single player)
- N/A
- Other (please specify)

17. What do you play games on?

- Desktop Computer

- Laptop

- Mobile Phone

- Tablet

- Web-enabled media player (such as ipod)

- N/A

- Other (please specify)

18. When you are near your device do you feel more comfortable and secure, and when you are away from your device do you feel less comfortable and secure (on a scale of 1-5, 1 being true, 3 being doesn't matter, and 5 being false)

- Very true
- True
- not really
- false
- extremely false
- N/A

19. Please type in the major computer games (by title) you enjoy playing or enjoyed playing in the past 3 months.

Appendix C

1. What is today's date?

- Sunday
- Monday
- Tuesday
- Wednesday
- Thursday
- Friday
- Saturday

2. What are the last four numbers of your ID?

3. How would you rate your day? (1 being absolutely terrible, 10 being one really great day)

4. How many hours did you spend playing computer games today?