Comparison of game addiction prevalence rates between MMOFPS players and MMORPG players.

A case of EVE Online and DUST 514

Guðmundur Helgason & Ólafur Hrafn Steinarsson
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Ritgerð þessi er lokaverkefni til BS-gráðu í sálfræði og er óheimilt að afrita ritgerðina á nokkurn hátt nema með leyfi rétthafa.

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Prentun: Háskólaprent
Reykjavík, Ísland 2013
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To our instructor Daniel Þór Ólason, many thanks and appreciation for taking this project on and assisting whenever needed. Special thanks to our contact in CCP, Pétur Jóhannes Óskarsson, for being readily available to answer all our questions and for making the data collection period hindrance free. Also we would like to thank Dr. Mark Griffiths for willingly answering all our questions and for providing us with unlimited access to all of his works. Finally we would like to thank our families and girlfriends, Yrsa and Jóhanna, especially for being there for us and supporting us through the entire research period.
Abstract

The main aim of this research project was to explore the prevalence of gaming addiction among players of different genres of video games. Additionally, the potential risks of structural characteristics of games were also examined. The sample consisted of 445 participants, aged 13 to 67, with 96.6% being male and 3.4% being female. To assess video game addiction the short version of the GAS-7 (Lemmens et al., 2009) was employed. The results showed that no significant differences were found between prevalence rates of video game addiction, between players that played, the MMORPG *EVE Online*, the MMOFPS *DUST 514* or both types of games. Further, ratings of importance or enjoyment for 13 out of 14 structural characteristics were the same between players diagnosed with gaming addiction and those not. Additionally, education level was contrasted with addiction and structural characteristic preferences were contrasted with game preference. The findings suggest that gaming addiction is not specifically linked to the genre of the video games studied but perhaps rather to a shared element of these games. In this case the immersive persistent world and social interaction featured in both games. The results from the current study and further studies like it could assist in diagnosing and preventing video game addiction by identifying potential risk factors. Further comparison research is needed to create a wider context for the current findings and explore further the potential risk factors for gaming addiction across different types of computer games.
Another visitor! Stay a while. Stay, FOREVER!!!

-Dr. Elvin Atombender, Impossible mission (1984)

The above quote is the first line from the wildly popular platform game Impossible mission released for the Commodore 64 in 1984. Even though this was long before any talks of game addiction were taken seriously it is surprisingly relevant in the discussion of game addiction today. Dr. Elvin Atombender says this legendary line to the protagonist at the beginning of the game as he traps him in his maze-like complex full of deadly robots and dangerous pitfalls. As gamer “Coyotek” puts it, “From the beginning, upon hearing the (not-so) good doctor Elvin Atombender’s voice (“Another visitor! Stay a while. Staaaaay FOREVER!!!”), you get sucked into the game (Classicgaming, 2011). Even though Coyotek was not talking about game addiction it seems as though players get “sucked in” is exactly what happens in cases of game addiction. An example is the case of Jeremy, a 38-year old financial accountant with a wife and two kids. His playing of Everquest and subsequently Everquest 2 (a popular Massively Multiplayer Online Role Playing Game or MMORPG for short) evolved from three to four hour sessions in the evenings to playing the game 14 hours each day. He said his relationship was falling apart due to his gaming as well as he spent a limited amount of time with his children and constantly called in sick to work in order to spend the day playing online games. Over the following months after making these statements, Jeremy lost his job and subsequently his wife left him (Griffiths, 2010b). Even though the consequences in Jeremy’s case were unfortunate there have been reports of gaming addiction having even more tragic consequences. In 2010 the world witnessed a South Korean couple being sentenced to two years in prison for neglecting their daughter, ultimately leading to her death from malnutrition. Although reports of parental neglect are not uncommon, the particular
nature of this case had never been heard of. The couple in question had become addicted to an online video game called *Prius Online* where they main objective is, rather ironically, to protect, feed and raise a virtual child (Daily Mail, 2010). This case dramatically demonstrates that addiction to video games can become harmful if left untreated or unrecognized as a clinical disorder. This recognition of game addiction as a clinical problem is becoming more important as the popularity of video games has been exponentially increasing for the past decades. The world famous *Grand Theft Auto* brand for example grossed over 310 million dollars within 24 hours of it’s release of the game *Grand Theft Auto IV* in 2008, making it not only the most sold computer game at the time but the most successful entertainment release in history. As a comparison the bestselling book of the time, *Harry Potter and the Deadly Hollows*, grossed 220 million in 24 hours, and the highest grossing movie of the time, *Spiderman 3*, grossed 117 million in 24 hours (The Guardian, 2009).

Cases of video game overuse have been reported all over the world in many different forms and severities. In line with this a growing body of scientific literature has been forming; in an attempt to build a foundation for a formal clinical diagnostic method of game addiction, in order to pin down possible risk factors, and to create effective treatments. As of yet the *American Psychiatric Association* (APA) has not included a clinical diagnosis for game addiction in their *Diagnostic and Statistics Manual IV-TR*, or DSM (American Psychiatric Association, 2000). A debate has been on going as to whether gaming addiction should be included in the next version of the manual, *DSM V*, to be released in May of this year (Block, 2008). This will unfortunately not happen as of yet, it will only be mentioned in the appendixes as a possible disorder requiring more research. This manual will however, unlike its predecessors, have the ability to include
diagnosis of new disorders as soon as the research literature warrants it (DSM-5 Development, 2013).

Like in gambling, certain structural elements of video games are specifically designed to get players hooked and to keep them playing (Griffiths, 1993b; King et al., 2010). With ever growing virtual environments, in both scale and complexity, an easy escape route has been laid out for people who wish to avoid the troubles of real life and immerse themselves into worlds of wonder. It however varies greatly between game genres what elements help initiate and maintain game playing. Another factor that separates games is the nature of their game play. One of the major distinctions made here is whether the games are played online or not. Playing an offline game where the player can save his game and turn off his computer without losing any progress made is understandably a lot different than playing in a real time online environment where your absence can cause a world of trouble within the game. MMORPGs, vast, real time virtual environments, where player interaction and character development are key features, have numerous times been reported to be the most likely to include addicted players or players who spend immense amounts of time playing (Lee et al., 2006; Rehbein et al., 2010; Yee, 2006a; Yee, 2006b). Other genres such as First Person Shooters (FPS) have not yielded the same number of addicted or dependent players as MMORPGs, judging by the tools that have thus far been used, and also they are played for much shorter intervals (Guhman & Griffiths, 2012). This raises the question whether it is the structural elements of Role Playing Games (RPGs) that are so enticing, or whether it is the online massive multiplayer element that immerses players so extensively. As important as it is to diagnose all those at possible risk of developing a gaming addiction, it is equally important not to overestimate the prevalence rates of addicted gamers and to make false positive diagnosis. For this reason the researchers embarked upon a mission to see
wheather it was this MMO (Massively Multiplayer Online) factor that increases the risk of game addiction, or whether specific game genres attract more immersive and possibly addicted players then others. A few years ago a new breed of computer games emerged, so called MMOFPS or Massive Multiplayer Online First Person Shooters. These games give us an excellent opportunity to compare MMORPGS with another genre which also has the MMO element to them, but are despite this played in a very different fashion, with different goals, ways to improve and so on. CCP Games, a game developer who luckily has their main offices in Iceland and so happens to employ both the researchers, fortunately has two very suitable games for this endavour. The MMORPG *EVE Online* and the MMOFPS *DUST 514*.

**History of MMORPGs**

While most people might be baffled by the acronym MMORPG or the concept of massively multiplayer online role-playing games it is a different story when it comes to gamers. When you mention MMORPGs to them they visualize an entire online world filled with beautiful landscapes, challenging tasks and tens or even hundred of thousands other players. However, MMORPGs have not always been “massive” and are in fact a relatively new phenomenon (Van Geel, 2012). The term was coined by Richard Garriott to describe one of the most successful games of the genre, *Ultima Online* (Indvik, 2012). The history of MMORPGs didn’t start there though, the root of the genre reaches to the early days of table top board games such as *Dungeons & Dragons* and to text-based role-playing games played on local networks, often by college students. The similarities between the structure of modern day MMORPGs and the tabletop game *Dungeons & Dragons* are drastic. Both revolve around creating a character and gaining experience points over time in order to level up the character while picking up increasingly powerful
weapons. This is accomplished by embarking on an adventure with your character and completing quests and missions. The earliest versions of online multiplayer games were so called multi user dungeons or MUDs for short (Bartle, n.d.). These were adventures, based in text or simple graphics that emerged around the 1970s. Due to lack of graphics, the games relied heavily on the players’ imagination and text descriptions. Movement was done through predetermined commands the player typed in, such as “attack” to fight. Despite the lacking graphics, many claim that MUDs feel as real as the world itself highlighting the big role immersion plays in these games (Turkle, 1995). Although these games attracted a lot of attention, they weren’t really “massive” yet. But with the evolution of the Internet these games started to grow and more players found their way into these virtual worlds. Playing these early versions of online multiplayer games was not cheap, for instance it cost 12$ per hour to play the game Island of Kesmai through the CompuServe network in 1988. The late 90’s finally added the “massive” factor to these multiplayer online role-playing games with the emergence of best sellers like Ultima Online, Everquest and Asheron’s Call (Indvik, 2012). Additionally the lifting of the NSFNET (National Science Foundation Network) restrictions in 1995 meant that the Internet was no longer intended for educational purposes only but was open to everyone (Floyd, 2006), which played another giant role in the growth of the genre. As the genre developed and Internet connections became faster, better and more accessible, these games grew in size and at the turn of the millennium the first modern giants came to the market. This includes EVE Online, released in 2003, and the most successful MMORPG of all time World of Warcraft, released in 2004, that had over 10 million subscribers at its peak (Van Geel, 2012). With that the genre was here to stay.
EVE Online

*EVE Online* is a massively multiplayer online role-playing game (MMORPG), created by CCP Games in 2003, that is set in the fictional universe of New Eden in the distant future. Players take control of a spaceship pilot that has gained eternal life through cloning technology. The players must then fight for their survival in the harsh world of New Eden, forming corporations and alliances along the way to aid them in their quest for money and power. Players start out by creating their immortal pilot, customizing its features and choosing one of four races. Once the pilot has been created, the players start training various skills in order to develop it and have it fit their play style, be it combat, trading, mining or running a corporation. The unique thing about *EVE Online* compared to other MMORPGs is that *EVE Online* is a single shard game, meaning that the entire player base lives on a single server instead of being run on multiple servers with limited capacity like other MMORPGs, for instance *World of Warcraft* (MMORPG, 2012). This means that the entire *EVE Online* community remains intact and each member has the opportunity to influence and communicate with all other players in the game. As a result, reputation, history and affiliations become increasingly important, and should a player do something to alter the balance of the universe he is bound to make a lot of enemies within the game while potentially gaining some allies at the same time. With just over 500,000 subscribers worldwide, *EVE Online* is the largest single server MMORPG in the world (CCP Games, 2013) and is renowned for being one of the most immersive games in the world. This makes it an excellent representative for MMORPGs in this research project.

History of First Person Shooters

First person shooters or first person shooter games are extremely popular amongst video game players all around the world. Established franchises such as the *Call of Duty* series
have a massive amount of followers waiting full of excitement for the next game to provide better graphics, physics simulation and complex game play as can be seen by the continuous success of the franchise (Richmond, 2011). Despite the fact that monumental strides have been made in improving graphics since the origin of the genre the core concept has remained the same. First person shooters are defined as a three-dimensional shooter game that features a first person point of view where the player sees the world through the eyes of the protagonist (Adams, 2010). The first person perspective in a three-dimensional space was originally seen in the games Maze War, exact release date not known, and Spasim, released 1974 (Garmon & Jay, 2005). Following these games a stream of first person perspective video games followed such as; Battlezone, released for home computers in 1983 (Shahrani, 2006), MIDI Maze, released for the Atari ST in 1987 (MIDI Maze: Atari ST, n.d.) which was the first game to introduce multiplayer death matches through a network connection, and Golgo 13: Top Secret Episode, released in 1988 which was the first game to emphasize accurate shooting (Ragan & Jess, 2006). The development continued in the years following the releases mentioned above up until the release of the game Wolfenstein 3D in 1992. Wolfenstein 3D is widely agreed to be the game that truly established the first-person shooter genre (Cifaldi & Frank, 2006; Garmon & Jay, 2005; Slaven, 2002). Even though the game was not the first to include shooting from a first person perspective it has been used as a benchmark for the game format of every first person shooter since its release (Cifaldi & Frank, 2006; Garmon & Jay, 2005, Hasselberger & Cheese, n.d.). Following the success of Wolfenstein 3D, its creators, id Software, released the now-classic game Doom. With improved three-dimensional effects and the ability for players to participate in competitive multiplayer matches through a network (Shoemaker, n.d.) the popularity of the game skyrocketed, causing problems for some companies hosting the networks where the multiplayer
matches were played, as the networks simply couldn’t handle the amount of traffic the games produced (Hasselberger & Cheese, n.d.). In the following years the genre grew in popularity with benchmark titles such as *Quake*, *Half-life* and *Half-life 2* along with the multiplayer game mod for *Half-life*, *Counterstrike*, drawing in more players and creating more fans of the genre on the PC platform (Hasselberger & Cheese, n.d.; King & Borland, 2003). For consoles, the first major FPS released was *GoldenEye 007* in 1997 (Hollis, 2004) and, despite further FPS releases, the next big success for consoles didn’t come until the release of *Halo* alongside the Xbox console from Microsoft in the year 2000. It proved to be a huge commercial success, as did its sequel *Halo 2* released in 2004 (Hasselberger & Cheese, n.d.). With an established following both on the PC and console platforms, first person shooters saw increasing growth in popularity, with dozens of FPS titles released every year. The gaming magazine *GamaSutra* even titled FPS “the most attractive genre for publishers” due to it being one of the biggest and fastest growing genres, providing substantial revenue for successful titles (Shahrani, 2006).

**DUST 514**

*DUST 514* is a new first person shooter game created by CCP Games for the PlayStation 3 platform. It is also set in New Eden, the same online world as *EVE Online*. In the game players take control of a mercenary soldier that, like the pilots of *EVE Online*, has gained eternal life through cloning technology. The players then fight wars on the planets of New Eden on behalf of corporations or alliances in *EVE Online*, choosing either to join a corporation or to remain free agents that do mercenary work. Like in *EVE Online*, *DUST 514* players advance and develop their characters through training certain skills that allows players to create a character that perfectly fits their style of play. *DUST 514* follows the traditional first person shooter formula in most ways, it has a match based
play where one match is played at a time with differing game modes such as skirmish, where one team must capture and hold certain points on the map to win the match. Another type of play is called team death match where each team has a limited re-supply of clones and the first team to run out of clones, looses. These game modes are well known and have proven successful in games such as Call of Duty and Battlefield. Like EVE Online, DUST 514 is set on a single server. In fact DUST 514 is played on the same server as EVE Online and players in both worlds have the ability to interact with each other. This range from shared in-game chat through a shared market all the way to the ability for EVE Online players to provide air support in DUST 514 battles. No official numbers have been released stating the amount of people currently playing DUST 514 but estimates range from 500,000-1,000,000 players (EVE News 24, 2013). With its MMORPG like elements such as a persistent character that gains experience and skills through participating in battles, DUST 514 is one of the first games released belonging to a new FPS sub-genre called MMOFPS. Games belonging to the sub-genre are different from standard FPS games due to them taking place in a persistent world, featuring character development and game play that revolves around more than instance matches. As DUST 514 shares these MMORPG features with EVE Online as well as it is set in the same universe, DUST 514 provides a unique opportunity for a comparison of game addiction prevalence between MMORPGs and FPS games sharing some common elements.

**Game Addiction**

Although various substance addictions have been widely recognized for many years, some behavioral addictions like game addiction are far more recent in the literature (Griffiths, 1993a; 1996b; 1997). The term game addiction or video game addiction has
undergone considerable scrutiny and many other terms have been coined (Griffiths, 2008; Wood, 2008). The ones most often used besides game addiction are problematic video-game play, Internet gaming addiction, videogame dependence and pathological gaming (Charlton & Danforth, 2007; Lemmens et al., 2009; Rehben et al., 2010; Salguero & Morán, 2002; Van Rooij et al, 2010). Regardless of these various terms a general consensus has been established among researchers that excessive video game play can lead to a behavioral addiction (Griffith, 2005). According to researchers such as Griffiths (1996a) and Brown (1993), all types of addictions have certain common elements to them. Not only do all addictions, whether related to chemicals or behaviors, revolve around constant rewards and reinforcements, they also have common symptoms such as salience, mood modification, tolerance, withdrawal, conflict, problems and relapse (Griffiths, 2010a). Since these elements are what are generally looked for when screening for game addiction and since they are central to the measurement tool used in this research paper, a brief insight will be given into each one.

Salience:
Video game play starts to dominate the person’s life and becomes the most important activity of all. It takes control of the person’s thoughts (preoccupation), feelings (cravings) and behavior (excessive use and simultaneous decrease in other activities).

Mood modification:
This refers to the subjective experiences that people report as direct consequences of their game play (this can either be a euphoric “high” or a tranquilizing “numbness” and all in between). Often linked to coping or escape behavior.

Tolerance:
When a player gradually increases the amount of time spent playing due to it taking longer to reproduce the aforementioned mood changes.
Withdrawal:
Symptoms that appear when playing time is reduced or discontinued. These are mostly psychological such as irritability or moodiness but may also include physical symptoms such as shaking.

Conflict:
Interpersonal conflicts that are the direct result of excessive video game play. The player might argue, neglect and even lie to and deceive those around him in order to maintain the gaming behavior.

Problems:
Like interpersonal conflicts, other issues in the player’s environment arise. These come about since the gaming behavior holds prevalence over other activities, such as school, work and socializing. Problems inside the individual can also appear, like feelings of loss of control.

Relapse:
The tendency for players to revert back to their previous patterns of gaming behavior following abstinence or a period of control (Griffiths, 2010a; Lemmens et al., 2009).

Assessment Tools – GAS 7
A number of different terms have been used to describe what is referred to in this paper as game addiction or Internet gaming addiction. Different approaches to identifying the problem, whether named game addiction or not, have also been used. Firstly there is the so called “interference approach”, which dictates that the extent of game addiction should be measured by how many negative effects it has on the individual in reference to other aspects of his life (Liu & Peng, 2009; Van Rooij et al., 2011). Secondly there is the “pathological gambling approach”, which utilizes the already established symptoms of
gambling addiction; salience, mood modification, tolerance, withdrawal, conflict, problems and relapse, in order to estimate the level of game addiction (Gentile et al., 2011; Lemmens et al., 2011). Coinciding with varying terminology and approaches being used, there are also various assessment tools.

Meerkerk et al. (2009) devised the Compulsive Internet Use Scale (CIUS), which is more intended to target extensive Internet use in general, such as browsing. This scale produced a Cronbach’s Alpha of .89 in it’s initial psychometric evaluation and was validated by a correlation of .70 between its total scores and outcomes on the Online Cognition Scale (OCS) (Davis, 2002), which screens for loneliness and depression, lack of social comfort, diminished impulse control and distraction. The CIUS scale also showed a moderate correlation with time spent on the Internet (Meerkerk et al., 2009). King et al. (2011b), building on the work of Young (1998), created the Problematic Video Game Playing Test (PVGT), a 20 items questionnaire using 5-point Likert scales. The scale internal reliability was found satisfactory with Cronbach’s Alpha of .92 in its initial assessment and moderate to strong correlations with the number of game sessions per week and length of each session were believed to establish its construct validity. It also showed moderate to low correlations with the Depression Anxiety Stress Scales (King et al., 2011b; Lovibond & Lovibond, 1995). Built on the principles of gambling addiction and Internet addiction the PVGT scale looks to identify the classic addiction symptoms also found in gambling; salience, mood modification, tolerance, withdrawal, conflict, problems and relapse. Salguero and Moran (2002) similarly built their screening tool, the Problem Video Game Playing Scale, on the assumption that the symptoms of other known addictions can be found in problematic video game playing. The scale produced a mean Cronbach’s Alpha of .69 across the two samples used in its preliminary evaluation process. The scales convergent validity was deemed satisfactory with low to
strong correlations with life satisfaction, academic self-efficacy, anxiety and loneliness (Salguer & Moran, 2002; Quinnipiac University, 2013). The POGU scale (Problematic Online Game Use Scale) devised by Kim and Kim (2010) takes a slightly different approach then those mentioned above. It assumes that game addiction can be predicted by time and energy that is invested into game play, euphoria, tolerance, denial, and a preference for online relationships. The scale was validated using correlations between its totals scores and; amount of game play, the Severity of Dependence Scale, and self-report questions on whether participants believed to have problems with their game playing. The scale’s reliability was deemed satisfactory with a Cronbach’s Alpha of .69, which the researchers believed it to be adequate due to the scale only including 9 items (Kim & Kim, 2010). A study utilizing factor-analysis has however shown that tolerance, euphoria and cognitive salience are more related to high engagement rather than addiction. While conflict, withdrawal symptoms, relapse, reinstatement and behavior salience relate closely to addiction (Charlton, 2002).

It has been proposed that problematic video game playing lies on a continuum, ranging from high engagement to a full-blown addiction. The importance of context when making a differentiation between the two is also essential (Griffiths, 2010b; Skoric et al., 2009). These two facets of addiction, that it rather lies on a continuum and the importance of context when making clinical diagnosis, are emphasized in the last assessment tool under review here. This screening tool is the Game Addiction Scale (GAS), constructed by Lemmens, Valkenburg and Peter (2009). It consists of 21 items that are equally divided among seven separate factors. These seven factors represent the aforementioned addiction symptoms found in all addictions; salience, tolerance, mood modification, withdrawal, relapse, conflict and problems. Each element is assessed using three distinct questions. A shorter 7 items version was also created, where each factor
only relies on one question. These questions were chosen due to them having the highest factor loadings out of the three that were used on the 21 item scale. Each question employs a 5-point continuum scale ranging from “never” to “very often”, these relate to how often an individual has experienced what the question refers to in the last 6 months. Correlations between total scores derived from the questionnaire and usage, loneliness, life satisfaction, social competence and aggression have established the scales concurrent validity. The scale’s reliability was deemed satisfactory with a Cronbach’s alpha of .92 and .94 for the two samples used for the 21 item version, and a Cronbach’s alpha of .86 and .81 for the two samples used for the 7 item version. When estimating the prevalence rate of game addiction using this scale, Lemmens et al. adapted both monothetic and polythetic formats. In the monothetic format, an individual is deemed addicted if he answers all items with 3 (sometimes) or higher, on a 5-point scale ranging from 1 (never) to 5 (very often). When this format was applied the mean prevalence rate of game addiction between the two samples was 2.1%. When the polythetic format was used, where players had to respond to at least 4 of the 7 items with an answer of 3 (sometimes) or higher, a mean prevalence rate of 9.35% emerged. Lemmens et al. (2009) believe that the monothetic approach is more suited when screening for game addiction in order to prevent overestimation and possible false diagnoses.

This scale was mainly chosen due to the 7 item version being especially psychometrically sound compared to other short length scales like the POGU scale discussed above. A short length scale was needed for this study in order to minimize participant fatigue, as measures on preferences for certain structural characteristics of games were also included. The fact that two different diagnostic formats, polythetic and monothetic, can be applied also provides the possibility to place addiction along a continuum, using different cut off points. This feature also gives a certain contextual
insight as either some addiction symptoms can be included, or all.

**Prevalence**

The prevalence rate for game addiction varies substantially in the literature. This is mostly because no single standard assessment tool has yet been agreed upon and because the samples assessed are more often than not very different. However, these two factors can then be divided into further specifications. Assessment tools, for example, can differ on the overall approach being used, their cut off points, and their general terminology. The samples under assessment can be drawn from differing populations and could have been reached using different methods. One of the largest meta-analysis conducted on the prevalence of game addictions produced a mean rate of 6% from 33 published studies, this figure should however be interpreted with extreme caution and is probably rather uninformative due to the vast heterogeneity between the studies. For example studies that employed the “pathological gambling” approach produced a mean prevalence rate of 8.9%. Studies using the “interference” approach however, only showed a prevalence rate of 3.1%. A similar difference was found between studies using online samples (9.6%) and studies using offline samples (4.4%), regardless of which measurement method was used. Also, a higher prevalence rate appears for adult samples (8.9%) then for samples consisting of only children and adolescents (4.2%) (Ferguson et al., 2011).

A systemic review article of the existing literature of game addiction, summing up the findings of 58 empirical studies, revealed 10 studies that were specifically conducted to assess prevalence rates. Percentages ranging from 0.5 to 50 are a testament to how many different methods have been used and how many samples researched (Kuss & Griffiths, 2012). According to a nationwide survey from Germany, using 44.910 9th graders, 3% of boys and 0.3% of girls could be diagnosed as being dependent on video
games, while another 5% and 0.5% of boys and girls respectively were at risk of developing dependence for games (Rehbein et al., 2010). From a group of 91 MMORPG players, 12% preferred to communicate with people in game rather then in real life and were happier in game then outside it (Ng & Wiemer-Hastings, 2005). A sample of 40,000 MMORPG players drawn over a three year period revealed that 8% of MMORPG players spent at least 40 hours playing per week, 61% played continuously for at least 10 hours, 30% kept on playing although they did not enjoy it, 18% reported problems in school, their relationships, health or finance and 50% considered themselves to be addicted to gaming (Yee, 2006a; 2006b). Understandably, the prevalence rate of game addiction is generally higher for samples that are drawn from gamer populations than, for example, those drawn from student populations. Also, as previously mentioned, until a “gold standard” assessment tool has been agreed upon and a single cut-off point established, discrepancy between studies will continue to exist.

**Risk Factors**

A number of different risk factors for game addiction have been researched in the past decade. These include internal factors such as certain personality traits and motivational factors for playing, but also external factors such as the structural characteristics of the games played (Kuss & Griffiths, 2012). Looking first at personality factors linked with game addiction, these have been researched using a variety of samples, methods and tools. For example, a study including a sample of 4,000 MMORPG players revealed that loneliness and introversion were significant positive predictors of problematic Internet use or PIU. The same study also showed that aggression, verbal or physical along with general hostility can likewise predict higher levels of PIU (Caplan et al, 2009). This finding has been replicated in many other studies which have also found that boredom
inclination, sensation-seeking, diminished self-control and narcissistic personality traits and neuroticism, along with state and trait anxiety can be significant predictors of game addiction (Chiu et al., 2004; Kim et al, 2008; Mehroof & Griffiths, 2010). Kuss and Griffiths (2012) sum this variety of personality factors into three key characteristics: neuroticism, impulsivity and introversion. Although it is clear that certain personality traits can influence game addiction, other internal factors, such as motivations for playing can also, and perhaps more obviously, affect game play behavior. Escaping real life situations or coping with negative emotions, along with stress and fear have all been reported to coincide with game addiction (Hussain & Griffiths, 2009; King & Delfabbro, 2009a; Ng & Wiemer-Hastings, 2005; Wan & Chiou, 2006). With ever growing virtual environments, based more often than not on cooperation and a joint effort of players in groups, a social factor has also been proposed to relate to game addiction. This intrinsic motivation to maintain virtual friendships and relationships has been shown to correlate with game addiction (Caplan et al., 2009; Hsu et al., 2009; King & Delfabbro, 2009a). Along with coping behaviors and social factors, a variety of elements related to personal satisfaction and enjoyment have been shown to predict game addiction. These include playfulness and loyalty (Lu & Wang, 2008), to be challenged and exited while playing, controlling gaming situations, mastering the game, completing every level and being recognized for your mastery (King & Delfabbro, 2009b; King et al., 2011a; Wan & Chiou, 2006). Immersion with the game environment has also been shown to correlate with game addiction (Caplan et al., 2009), along with a need for rewards, constant curiosity and a sense of obligation (Hsu et al., 2009).

The final risk factor to be addressed here are the structural characteristics of online video games. The addictive elements of slot machine games and other gambling activities has been well documented in the past and many of the features existing in those
forms of game play are also evident in online video games (Parke & Griffiths, 2007). King et al. (2010), building on the framework set forth by Wood et al. (2004), divided the structural characteristics of online games into 5 separate categories. These are social features, manipulation and control features, narrative and identity features, reward and punishment features, and presentation features. Since a subset of these structural features was used in the questionnaire created for this research, a brief insight will be given in to each one used. These features were selected as they portray the greatest difference between groups of addicted players versus groups of non-addicted players, according to the Problematic Video Game Playing Test (King et al., 2011a). Some features were also included due to their specific importance to the games under investigation in this study, *EVE Online* and *DUST 514*.

**Social features**

Four social features were investigated in this research. These were in game communication (e.g. voice and text chat), group participation (belonging to a dedicated in game group such as a corporation or a clan), competitive aspects (going head-to-head against other players, e.g. for leader board rankings or other form of recognition), and cooperative aspects (working with other players to reach a common goal). Due to the nature of online game play and the ever-growing social element in these virtual environments, this was believed to be an extremely important factor, and perhaps one of the factors that could shed some light on why MMORPG players generally tend to score higher on screening tests for game addiction. It has been argued that the need to belong is a powerful, fundamental and extremely pervasive motivation and this appears evident in MMORPGs as well as many other online games (Baumeister & Leary, 1995; Cole & Griffiths, 2007). According to Ducheneaut et al. (2006), 66% of all *World of Warcraft*...
players belong to an in game social group or guild and the rate jumps to 90% for advanced players. He also reported that only an approximate quarter of players in these groups know other members personally, but still all players feel a certain obligation to their group and to play when the group meets. Similarly 80% of FPS players are involved in an in game social group and this social factor is according to Jansz and Tanis (2007) the best predictor of excessive game play. Online relationships in general have however become a large part of our culture. It has been established that within a year, 25% of Internet users form a casual friendship and 14% a close relationship or online romance (Wolak et al., 2002). A comparable ratio (10%) has been found with MMORPG players (Cole & Griffiths, 2007).

**Manipulation and control features**

Two separate manipulation and control features were also used in this research project, managing in game resources (e.g. controlling your inventory and personal assets), and customizing in game features (e.g. being able to effect rules and the game environment directly). According to positive psychology research into well being and life satisfaction, which dictates that people should not just abstain from the dysfunctional but strive for the positive, a number of factors can increase your psychological well being. One of these is feelings of continuous growth and development, which ultimately results in mastery (complete knowledge and control of your environment) (Ryff, 1995). It has been suggested that the need to master in game controls, user interfaces and game mechanics in this manner can lead to excessive game playing (Chappell et al., 2006).

**Narrative and identity features**

Three narrative and identity features were selected in this research. The first being a
complex game story, involving dialogue and narration. This is essential to establish a sense of immersion for the player and possible escape “into” the game (King et al., 2010). The second was the possibility of different story outcomes based on player action. This can be a powerful incentive for extensive game play, both because it enhances the player’s sense of control and it can encourage the player to finish the game multiple times. The third and final structural characteristic in this category was an emotional investment in an in-game character. According to Smahel et al. (2008), it appears that players more prone to game addiction rate their characters as being more superior and more often wish to be like them in real life then players showing no signs of addiction.

**Reward and punishment features**

Four reward and punishment features were selected in this study. Two related features are earning XP (experience points), in-game currency or other rewards, and “leveling up” or developing a game character (including non human characters). These are built upon the principles of operant conditioning theory (Ferster & Skinner, 1957). More specifically, continuous reinforcement (XP or points), where all responses of a specific kind lead to a reward, and fixed ratio/interval reinforcement, where a certain amount of playing time or points boost your character onto the next level (providing further abilities and opportunities). This set up is meant to give starting players an easy opportunity to upgrade quickly, but to then exponentially increase the playing time necessary to advance in the game. Another reinforcement schedule is evident in the third structural feature in this category, which is being rewarded with rare and unique items for skill full play or playing for a long time. Here a variable ratio/interval reinforcement schedule is in place, which is known to elicit the highest possible response rate, or in this case produce the longest periods of game play. This reinforcement schedule is also the most resilient to
extinction (Chumbley & Griffiths, 2006; King et al., 2010). According to Yee (2006c), it has in some cases become so much work to obtain rewards in MMORPGs that a distinction between a hobby and a second job has been hard to make. The final structural feature under the rewards and punishment feature is fast loading times between levels and matches, along with instant respawning, or coming back to life when your character dies. These elements, known as event frequency features, event duration features and payout interval features in the current literature, are meant to achieve three separate things. Firstly, it has been argued that the more you can play, the more you can be reinforced for playing and therefore the more you will play (Parke & Griffiths, 2007). Secondly how long you will play the game depends on how long it takes to finish. This is very important for MMORPGs, which have no end point and usually provide a very unstable availability to save your progress. This may decrease the likelihood of players only playing within some previously intended timeframe (King et al., 2010). Thirdly it depends on how quickly a player receives a reward for his game playing. It has been shown that immediate reward payouts and rapid restarts, which give players limited time to reflect on their losses, increases gambling behavior, which can be extended to video game play due to structural similarities (Delfabbro & Winefield, 1999).

**Presentation features**

The final category of structural characteristics used in this study was presentation features, which includes; graphics, or visual aspects, such as high-resolution textures and lighting effects. Keeping in line with previous discussion regarding conditioning, it has been suggested that the graphical and auditory elements of video games can become conditioned with the rewards of playing and therefore can start to function as reinforcement in the absence of actual in game rewards (King et al., 2010). Furthermore
it has been established that music in video games can significantly increase player’s excitement and arousal (King et al., 2011b), even more substantially if the music is high tempo (Dixon et al., 2007).

**Comorbidities**

When screening for or treating problematic behaviors such as game addiction, it is very important to be aware of any possibly accompanying comorbidity. This is also essential to better understand the underpinnings of the addiction. According to the available literature, game addiction has been found to be associated with ADHD, anxiety disorder, panic disorder, depression, social- and school phobia, and even psychosomatic symptoms (Allison et al., 2006; Batthyany et al., 2009; Chan & Rabionwitz, 2006).

**Negative Consequences and Treatments**

Like any addiction or problematic behavioral pattern, game addiction can have severely adverse consequences. These have been quite extensively researched, through qualitative and quantitative studies, including samples ranging from children to adult MMORPG players, and using a variety of methods (Kuss & Griffiths, 2011). These include for example a number of different psychological tests, clinical interviews, academic achievement tests, EEG and MRI. A long list of negative consequences has emerged from these studies. To name a few, game addiction has been associated with: Inattention, stress and maladaptive coping (Batthyany et al., 2009); Oppositional/aggressive behavior and hostility, along with decreased academic achievement (Chiu et al., 2004); along with lower psychosocial well-being and loneliness (Lemmens et al., 2011). Game addiction has also been found to make people give up on hobbies, sleep, work, school, social life and personal relationships (Griffiths et al., 2004; Liu & Peng, 2009; Peng & Liu, 2010;
Peters & Malesky, 2008). Additionally it has been linked with an increase in suicidal thoughts (Rehbein et al., 2010). Despite quite a few studies accounting for the prevalence and consequences of game addiction, relatively few attest to possible treatments. However the available research seems to indicate that the symptoms accompanying game addiction are quite similar to those portrayed in various substance addictions (Beranuy et al., 2013). It has been shown that psychopharmacological treatments of six to eight weeks can alleviate a variety of symptoms, such as cravings and playing time and at the same time increase daily life functioning (Han 2009; 2010) In many cases however individuals that could be considered as Internet gaming addicts are instead treated for other afflictions, such as anxiety disorder or depression (Allison et al., 2006)

**Research Hypothesis**

This research project was in many ways exploratory since a direct comparison between two specific game genres, in this case MMORPGs and MMOFPSs, has never been conducted before as far as the researchers could tell. However, three formal research hypotheses were put forward in this study. The first hypothesis set forth was that the prevalence rate of game addiction would be higher for those who played MMORPGs compared to those who played MMOFPSs. This was believed to be the case as past research has indicated that MMORPG players are more immersed into their game environment and generally spend more time playing then players of other genres (Ghuman & Griffiths, 2012; Nagygyörgy et al., 2013).

Another distinction between these two groups was also predicted in the second hypothesis, that a significant difference in perceived importance and enjoyment on certain structural characteristics between addicted and non-addicted players would be evident. This is very much in line with previous research which indicates that addicted
players prefer adult content in games, finding rare and unique items in game, and watching video game cut scenes, more than non addicted players (King et al., 2011a). Addicted players have also reported a greater level of emotional investment in their in game characters (Smahel et al., 2008). Similarly the third hypothesis predicted a difference between MMORPG players and MMOFPS players in relation to what in game structural characteristics they perceived as more enjoyable and more important. No specific ideas were formed on where these differences would lie since this comparison of preferences for structural characteristics has in the past mostly been done between addicted versus non-addicted players.
Method

Participants and Sampling

The sample was a convenience sample of the players that frequent the *EVE Online* and *DUST 514* forums during the data collection period. Planned data collection period was 2-3 weeks or until 500 replies (or more) had been submitted. The survey was posted on the *EVE Online* and *DUST 514* forums and endorsed by CCP in order to provide reassurance of the legitimacy of the survey. The sample pool was not restricted in any way, players visiting either forum during the data gathering period were free to participate in the survey. Frequenting the forums may however indicate deeper involvement in the game compared to players who do not visit these sites. This might result in a sample of players that is not entirely representative of the general populations of these games. Customer data obtained from CCP (which is unfortunately restricted from public view) was however comparable to the data on the sample used in this research in relation to gender and age distribution. The total amount of responses was 601, but 142 were excluded due to not completing the survey properly and 14 because they played neither game under investigation, resulting in a final sample of 445 participants which data was analyzed. This was judged as a sufficient amount of data to provide statistically sound results. Of the sample, 96.6% of respondents were male (N = 430) and 3.4% of respondents were female (N = 15). The age of the sample ranged from 13 to 67 with the mean 29.84 (SD = 9.58) and a median of 28.

Research Design and Materials

The survey was administered in English as both *EVE Online* and *DUST 514* have international player bases where English is the primary language. Participants were first asked for their age, gender, educational level, marital- and employment status. Secondly
they were asked if they played *EVE Online*, *DUST 514* or other games. The number of days per week and number of hours spent playing each time were also recorded. If players claimed to play other games than *EVE Online* or *DUST 514* a table containing the most common game genres was included. From it participants could select on average how often they played games within each genre on a 6-point scale ranging from “Never” to “Very Often” (See Appendix A). Two tables containing preferences for the structural characteristics of video games were then presented. One was aimed at estimating player’s perceived importance of certain structural elements of games, regardless of their personal use of these elements and the other the enjoyment they received from them. Each included 14 structural characteristics which could be rated on a 5-point scale ranging from “Not at all important” to “Extremely important” or “Not at all enjoyable” and “Extremely enjoyable” (See Appendix B).

The 7 items version of the Game Addiction Scale (GAS-7) was then administered. The first question, *did you think about playing games all day long*, is intended to assess salience, or if game playing has become the most important part of the persons life. The second question, *did you spend increasing amounts of time on games*, measures tolerance for game play, where increased amounts of playing is required to bring about the mood changes that accompany game playing. The third question, *did you play games to forget about real life*, is aimed at the mood changes mentioned above. These can be a euphoric high or a tranquilizing numbness and all in between. The fourth question, *have others unsuccessfully tried to reduce your game use*, is meant to assess the probability of relapse after a period of abstinence. The fifth question, *have you felt bad when you were unable to play*, refers to withdrawal symptoms when game play is seized or limited. The sixth question, *did you have fights with others (e.g. family, friends) over your time spent on games*, is intended to measure the amount of conflict
gaming in the individual’s life as a result of his game play. The seventh and final question, *have you neglected other important activities (e.g. school, work, sports) to play games*, aims to assess how problematic the gaming behavior has become in relation to other activities or obligations. The table were these questions were presented was headed by the prefix, *how often during the last 6 months…*, and each question could be replied to on a 5-point continuum scale containing the following options; never, rarely, sometimes, often, very often. The shorter 7-item version was preferred over the longer 21-item version in order to minimize participant fatigue. The psychometric qualities of this shorter version were deemed adequate and can be seen in the Assessment Tools – GAS 7 chapter in the introduction.

The final two questions asked players if they personally believed that their gaming behavior was problematic and whether their family or friends believed that their gaming behavior was problematic. All in all the survey consisted of 62 questions and took according to pre-testing approximately 7-8 minutes to complete. It was hosted on the online survey site *SurveyCrest*.

**Procedure**

The survey was created, activated and posted on the official *EVE Online* and *DUST 514* forums. The forum post included an anonymity clause (See Appendix C), survey instructions and a general statement from the researchers regarding usage of data and purpose of the research (See Appendix D). The forum posts linking to the survey were endorsed by CCP employees and pinned to the first page of the forums in order to keep them visible to those frequenting the sites. Being an online survey the researchers had very limited control over any possible environmental factors that could affect the response process. However all participants received identical instructions and
questionnaires. No rewards were offered for responding to the survey and by participating players agreed to having their answers analyzed and published in this student research paper. As both researchers are currently employed with CCP no personal information regarding them or their CCP affiliation was provided. This was done in an attempt to preserve the integrity of the data collection (See Appendix E). No major adjustments were made to the survey after pre-testing since participants reported no difficulties or complications when filing their answers. Some participants from the analyzed sample reported minor difficulties with the survey in the comment section where the survey link was provided. However these were not deemed detrimental in any way or likely to affect the final results of the thesis.
Results

General Respondent Statistics

As was previously stated the mean age of the analyzed sample was 29.84 years (SD = 9.58) and 96.6% (N = 430) were male. Nearly a third of the sample (29.7%, N = 132) reported being unemployed, however this may be quite inaccurate as a student option was not included in the survey and 33.3% (N = 148) said to have some college education but not a degree. Indicating that many of those who registered as unemployed might currently be undertaking an undergraduate education. The percentage of participants who marked themselves as being employed or retired were 68.1% (N = 303) and 2.2% (N = 10) respectively. The sample proved to be quite educated as 38.6% (N = 172) had completed a college degree either at the graduate or post-graduate level. Only 28.1% (N = 125) had not started a college education. Almost half of the sample marked themselves as single (50.6%, N = 225) and a near quarter to be married (23.6%, N = 105). A small portion reported being separated, widowed or divorced (3.4%, N = 15) and the rest was in a relationship, either cohabiting (12.4%, N = 55) or not (10.1%, N = 45).

Game Preference and Time Spent Playing

Descriptive analysis showed that 56.9% (N = 253) of the sample only played *EVE Online* and that 24% (N = 107) only played *DUST 514*. A near fifth (19.1%, N = 85) played both games. Those who claimed to only play *EVE Online* (N = 318) spent an average of 5.08 days a week playing it and for 3.76 hours on average each time they played. Those who only played *DUST 514* (N = 184) reported a similar gaming pattern, playing 4.84 days a week and for 3.82 hours on average each time they played. Those who reported playing both games played *EVE Online* for 4.30 days a week on average and for 3.69 hours each time they played, and *DUST 514* for 3.43 days a week on
average and for 2.89 hours each time they played. A vast majority of the sample (89.7%, N = 399) also reported playing other games. The game genres most reported by players who played other games were MMORPGs, FPSs and RPGs, although players also reported some playing of RTS games. Other game genres were significantly less popular amongst the sample (See Appendix A). For those reporting the time spent playing other games (N = 370) played on an average of 4.10 days per week and for 3.53 hours each time playing occurred.

**Prevalence Rates**

When assessing the prevalence rate of game addiction for the sample at hand both the monothetic and polythetic formats were used (See Assessment Tools – GAS 7 chapter of the introduction). According to the polythetic approach 35.1% (N = 156) of the total sample could be considered addicted to playing games. According to the more conservative monothetic approach 3.1% (N = 14) would be screened positive for game addiction. Using the polythetic cut off point, 66.4% (N=168) of the *EVE Online* players were not diagnosed with game addiction while 33.6% (N=85) were diagnosed with game addiction. For players that only play *DUST 514* the percentages were exactly the same 66.4% (N=71) and 33.6% (N=36) respectively. For players that play both games there was a slight difference where 58.8% (N=50) were not diagnosed with game addiction while 41.2% (N=35) were. There was not a statistically significant difference in the prevalence rates of gaming addiction across the three groups of players when the polythetic format was applied, $\chi^2(2, N = 445) = 1.73, p > 0.05$. It is important to note that the polythetic cut off point has been shown to grossly overestimate prevalence rates of game addiction and that the monothetic cut off point gave a game addiction prevalence rate of 2.4% (N=6) for *EVE Online* players, 2.8% (N=3) for *DUST 514*.
players and 5.9% (N=5) for players that play both games. However, statistical comparison between groups was not possible as this violated the assumptions of the Chi square test with 33.3% of the cells containing an expected count of less than 5.

In order to evaluate differences in the total score obtained on the GAS-7 scale between educational levels, 3 groups had to be created out of the existing 6. All those who had a high school degree or less were grouped together, those with some college education remained in a separate group, and those with a college degree or further education were grouped together. A one-way ANOVA revealed a significant difference in the mean total score on the GAS-7 scale between these 3 groups, $F(2, 444) = 7.66, p < 0.01$. Three Bonferroni post hoc comparisons were conducted in order to locate these differences, using adjusted alpha levels of 0.016 per test (0.5/3). This revealed that those with a college degree or further education had a significantly lower average total score on the GAS-7 ($M = 15.56, SD = 4.62$) compared to those who only had some college education ($M = 17.46, SD = 4.73$), $F(1, 443) = -1.90, p < 0.01$, or a high school degree or less ($M = 17.26, SD = 4.98$), $F(1, 443) = -1.70, p < 0.01$. Only two significant differences were found on the ratings of structural game elements between those who were screened with game addiction and those not according to the polythetic format. This was how addicted players rated their perceived importance for a complex game story ($M = 3.50, SD = 1.16$) compared to those not addicted ($M = 3.73, SD = 1.15$), $t(443) = 2.08, p < 0.05$. And also how much addicted players enjoyed a complex game story ($M = 3.85, SD = 1.14$) compared to those not addicted ($M = 4.09, SD = 1.03$), $t(443) = 2.29, p < 0.05$. 

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Contrasts in Structural Element Preferences

A oneway ANOVA revealed a statistically significant difference (p < 0.05) in the mean ratings of the importance of seven out of 14 structural elements, and the enjoyment of eight out of 14 structural elements, asked about in the survey between players that either solely played *EVE Online* or *DUST 514* or who played both. Table 1. shows a oneway ANOVA comparing the mean ratings between players that solely play *EVE Online* or *DUST 514* or both, of structural elements that had a significant difference in ratings between the groups and on what dimension they were rated.

Table 1. Average ratings of *EVE Online*, *DUST 514* players and those that play both games on structural elements.

<table>
<thead>
<tr>
<th>Structural Characteristic</th>
<th><em>EVE Online M(SD)</em></th>
<th><em>DUST 514 M(SD)</em></th>
<th><em>Both Games M(SD)</em></th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance - Rewarded with rare/unique items</td>
<td>2.98 (1.18)</td>
<td>3.52 (1.18)</td>
<td>3.55 (1.20)</td>
<td>12.04***</td>
</tr>
<tr>
<td>Importance - Managing resources</td>
<td>3.43 (1.07)</td>
<td>3.60 (1.00)</td>
<td>3.82 (1.10)</td>
<td>4.65*</td>
</tr>
<tr>
<td>Importance - Customizing in game features</td>
<td>3.25 (1.20)</td>
<td>3.79 (1.10)</td>
<td>3.71 (1.29)</td>
<td>9.86***</td>
</tr>
<tr>
<td>Importance - Earning points and XP</td>
<td>3.02 (1.12)</td>
<td>3.93 (1.07)</td>
<td>3.45 (1.31)</td>
<td>24.78***</td>
</tr>
<tr>
<td>Importance - Levelling up and character development</td>
<td>3.52 (1.14)</td>
<td>4.02 (1.08)</td>
<td>3.93 (1.08)</td>
<td>9.35***</td>
</tr>
<tr>
<td>Importance - Fast loading times</td>
<td>3.09 (1.24)</td>
<td>3.65 (1.14)</td>
<td>3.61 (1.23)</td>
<td>10.84***</td>
</tr>
<tr>
<td>Importance - Cooperation</td>
<td>3.30 (1.08)</td>
<td>3.27 (1.14)</td>
<td>3.32 (1.22)</td>
<td>8.82***</td>
</tr>
<tr>
<td>Importance - Social interaction</td>
<td>3.50 (1.17)</td>
<td>3.79 (1.19)</td>
<td>3.74 (1.08)</td>
<td>2.86</td>
</tr>
<tr>
<td>Importance - Belonging to a guild</td>
<td>3.04 (1.19)</td>
<td>3.31 (1.21)</td>
<td>3.26 (1.23)</td>
<td>2.27</td>
</tr>
<tr>
<td>Importance - Competitive aspects</td>
<td>2.98 (1.22)</td>
<td>3.28 (1.19)</td>
<td>3.31 (1.18)</td>
<td>3.65*</td>
</tr>
<tr>
<td>Importance - Visual aspects/good graphics</td>
<td>3.30 (1.08)</td>
<td>3.27 (1.14)</td>
<td>3.32 (1.22)</td>
<td>0.05</td>
</tr>
<tr>
<td>Importance - Complex game story</td>
<td>3.57 (1.11)</td>
<td>3.71 (1.25)</td>
<td>3.82 (1.16)</td>
<td>1.72</td>
</tr>
<tr>
<td>Importance - Different story outcomes</td>
<td>3.84 (1.02)</td>
<td>3.78 (1.15)</td>
<td>3.93 (1.16)</td>
<td>0.48</td>
</tr>
<tr>
<td>Importance - Emotional investment in a character</td>
<td>3.61 (1.19)</td>
<td>3.85 (1.14)</td>
<td>3.82 (1.19)</td>
<td>2.02</td>
</tr>
<tr>
<td>Enjoyment - Rewarded with rare/unique items</td>
<td>3.50 (1.10)</td>
<td>3.93 (1.13)</td>
<td>3.80 (1.09)</td>
<td>6.58**</td>
</tr>
<tr>
<td>Enjoyment - Managing resources</td>
<td>3.04 (1.14)</td>
<td>3.54 (1.08)</td>
<td>3.47 (1.10)</td>
<td>9.94***</td>
</tr>
<tr>
<td>Enjoyment - Customizing in game features</td>
<td>2.75 (1.23)</td>
<td>3.34 (1.25)</td>
<td>3.28 (1.21)</td>
<td>11.36***</td>
</tr>
</tbody>
</table>

*Table 1. continues on the next page*
Structural Characteristic | EVE Online M(SD) | DUST 514 M(SD) | Both Games M(SD) | F
--- | --- | --- | --- | ---
Enjoyment - Earning points and XP | 3.11 (1.09) | 3.93 (0.98) | 3.68 (1.08) | 25.92***
Enjoyment - Levelling up and character development | 3.56 (1.14) | 4.16 (0.98) | 4.01 (0.99) | 13.76***
Enjoyment - Fast loading times | 3.32 (1.12) | 3.93 (1.06) | 3.72 (1.19) | 12.57***
Enjoyment - Cooperation | 3.85 (1.00) | 4.20 (1.00) | 3.96 (1.12) | 4.44*
Enjoyment - Social interaction | 3.61 (1.01) | 3.77 (1.13) | 3.71 (1.14) | 12.04***
Enjoyment - Belonging to a guild | 3.47 (1.06) | 3.64 (1.14) | 3.73 (1.17) | 4.65*
Enjoyment - Competitive aspects | 3.09 (1.20) | 3.52 (1.23) | 3.47 (1.17) | 6.48**
Enjoyment - Visual aspects/good graphics | 3.69 (1.09) | 3.97 (1.02) | 3.96 (0.94) | 3.81*
Enjoyment - Complex game story | 3.91 (1.07) | 4.20 (0.99) | 4.04 (1.18) | 2.67
Enjoyment - Different story outcomes | 3.97 (1.04) | 4.07 (1.08) | 3.94 (1.27) | 0.46
Enjoyment - Emotional investment in a character | 3.77 (1.18) | 4.15 (1.04) | 3.78 (1.27) | 4.24*

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

A total of 15 Bonferroni post hoc comparisons using adjusted alpha levels of 0.0033 per test (0.5/15) revealed that in all cases but one where significant between-group differences ($p < 0.05$) found, EVE Online players rated the structural characteristics lower on importance and enjoyment then both the DUST 514 players and those who play both games. The only exception was on perceived importance of “Earning points and XP” where DUST 514 players had a higher average rating than those who played EVE Online and those who played both games. Ratings from players who either played DUST 514 or both games were similar in all of the 15 cases with no significant difference ($p < 0.05$) between the groups. These differences indicate that the samples from each game differ in their game preferences. Interestingly 56% (N=85) of those that reported they played DUST 514, also played EVE Online. Additionally 79.1% (N = 57) of those who claimed to play other games reported playing other MMORPGs fairly often or very often, compared to only 47.2% (N = 34) who reported playing other FPSs fairly often or
very often. This could mean that the average *DUST 514* player leans towards favouring games with MMO aspects more than traditional FPS games minimizing the difference between the two groups on some variables.


Discussion

The main research hypothesis was not supported by the data. That is, there was no
difference found in the prevalence rate of gaming addiction in the sample between those
that played either *EVE Online* or *DUST 514* exclusively, or those that played both. This
is contrary to previous research, for instance the study by Ghuman and Griffiths (2012)
on motivation for play, social interaction and player demographics between genres in
online gaming. The second hypothesis, that a significant difference in perceived
importance and enjoyment on certain structural characteristics between addicted and
non-addicted players would be evident, received very limited support. With there only
being a significant difference between the perceived importance and enjoyment on one
of the structural characteristics asked about in the survey. Namely the perceived
importance and enjoyment of a complex game story where addicted players rated a
complex game story as being less enjoyable and less important than non addicted
players. This lack of difference is also contrary to previous research, namely the study
by King, Delfabbro & Griffiths (2010) from where the list of structural characteristics
was retrieved, where a significant difference was found between players showing
problematic gaming behavior and non-problematic players on several of the structural
characteristics asked about in the current study. The third hypothesis was supported,
with a significant difference found between the ratings of enjoyment and perceived
importance on several structural characteristics between the players of *DUST 514* and
the players of *EVE Online*. Unsurprisingly, ratings from players that play both games
fell between the other two ratings in all cases. This indicates that structural
characteristics play an important role when it comes to attracting a certain type of video
game player to play a certain game and that it is possible for players to be more
centralized in their opinions and enjoy a wider range of games than others. Additionally
a significant difference was found on the average GAS-7 total score for players at different educational levels, with players who had completed a bachelor’s degree or higher education showing lower total scores. Indicating that players with a lower level of education are at more risk for developing gaming addiction. This is in line with previous research done in the field of gambling addiction (Volberg, 1996).

Even though the lack of a significant difference between the prevalence of gaming addiction between the two games was not what was expected it can potentially provide valuable insight into gaming addiction and what factors contribute to it. When coupled with the results that there was no significant difference found between enjoyment and importance ratings for players that were diagnosed as addicted and those that were not, apart from the perceived importance and enjoyment of a complex game story, these results indicate that the game being an MMOFPS or an MMORPG is not the deciding factor when it comes to addiction. Instead it appears that there is a common element that serves as a risk factor for gaming addiction. From the data in this study it is not possible to assert what that factor is, however, the unique contrast that was obtained through comparing these two games could serve as a basis for further research into this common element. Namely the online and persistent world features these two games share. These results do not conform to earlier research results in this field but it is important to note that this is the first time, from what the researchers could tell, that two games from distinct genres with common elements are compared so extensively. With this lack of previous research come various pitfalls. For instance; there is no way of knowing if these results can be generalized over to other games that reside in different genres but share common elements, if the common elements shared in this case are truly the risk factors for addiction or if that this is a unique case for these two games that take place in such an immersive one world environment, or if the lack of difference is
isolated to the sample obtained in this research paper.

The lack of a significant difference on enjoyment and importance ratings for structural elements between those addicted and those not was also unexpected. This lack of a difference indicates that gaming addiction is not tied to certain characteristics of the game. Meaning that players that are more drawn to certain characteristics should not be more likely to get addicted to a game than others. However, as previously stated, these results are not in line with previous research done in this area. This inconsistency makes it difficult to draw any conclusions from the data gathered in this study. It is important to note that these structural characteristic ratings have not been studied extensively, so these results might indicate that the current literature is not telling the whole story. It is also important to note that no existing research was found where a comparison has been made between an MMORPG and an MMOFPS or two games that are both staged in the same highly immersive world. This leaves open the possibility of the results that are obtained in this research paper being unique and not comparable to existing results.

As expected, a difference was found between the ratings by players of *EVE Online* or *DUST 514* or players that play both games on the perceived importance and enjoyment of many of the structural characteristics asked about in the survey. This indicates, not surprisingly, that players who play games of different genres have different opinions when it comes to structural elements of the games. Interestingly, there were no elements that *EVE Online* players preferred and *DUST 514* players didn’t or the opposite. In all cases where there was a significant difference, *EVE Online* players rated the characteristic lower. This indicates that the demands MMORPG players place on the elements asked about in the survey are lower than those made by MMOFPS players. If you look at the play style for these two genres these results shouldn’t be surprising. In MMORPGs players usually play the game at a relatively constant pace and the main
focus is on immersion in the virtual world.

Interestingly those players who had completed higher educational levels, a bachelor’s degree or higher, displayed significantly lower total scores on the GAS-7 scale. This is in line with previous research on both game addiction (Chiu et al., 2004), and other addictions such as gambling addiction (Volberg, 1996). This supports the view that there are similarities between video game addiction and other addictions. As to why people with lower education are more vulnerable to becoming addicts there is no clear answer as of yet. Possibly it has to do with the self-control and discipline needed to stay in school and advance through higher levels of education. Another possibility could be that people with a higher level of education are more likely to be employed which might restrict the opportunities to get addicted or promote a higher sense of having to behave in a responsible way. Additionally, a correlation has previously been found between education level and life satisfaction (Meeks & Murrell, 2001), so people with higher levels of education might not have the same need to enhance their life through thrill seeking behavior.

There are a few limitations to this study. First is that the sample was a convenience sample, obtained by posting a link to an online survey on the public forums for each game and having that forum post endorsed by CCP to prove its legitimacy. Since visiting the forum is not an integral part of playing both games, and the forums are used as a venue to interact with the community outside of the game and to discuss the game in depth. It wouldn’t therefore be surprising if the group of players that frequented the forums for each game are more immersed in the game and have a deeper involvement in it then the general player. It is also not possible to exclude the possibility that the results of this research paper can be attributed to the samples of players from each game consisting of a similar sub group of players that frequent the forums and are
not as diverse as the general player population. Another limitation of the study is the sample size. Even though the entire sample consisted of 445 participants the sizes of the groups that either solely played *DUST 514* or played both games were rather small. Due to the small sizes of the groups it was not possible to use the more conservative monothetic cut off point for the GAS-7 scale during processing of the data due to the assumptions of the chi square test not being met. Instead the polythetic cutoff point was used. A strong emphasis should however be made that for the purpose of estimating game addiction for the sample as a whole, the more conservative monothetic format would of course be used (Lemmens et al., 2009). Many other researchers have underlined the risks of over estimating the prevalence rate of game addiction and therefore recommended strict criteria for diagnosis (Ferguson et al., 2011; Choi, 2007; Rehbein et al., 2010). This is essential in order to make a distinction between high engagement and addiction (Charlton & Danforth, 2007). Although the ratio of players who were screened positive for addiction according to the polythetic format was quite high, it’s not that surprising when the sample is reviewed. It was an online convenience sample from an adult population of gamers who frequent forum sites. This would in all probably provide a highly immersive player base that is likely to agree with at least some questions linked to addiction. Such as thinking constantly about games, experiencing a change in mood while playing and playing extensively. Also previous research has indicated that samples drawn from adult populations of gamers, which are surveyed using online methods, produce higher game addiction prevalence rates then samples drawn from standard youth populations using paper and pencil tests for example (Ferguson et al., 2011). The GAS 7 however seems to be a quite useful tool when differentiating between high engagement players and those who are addicted, judging by the extreme difference in prevalence rates between the monothetic and polythetic
formats when applied to this sample.

Even though the literature surrounding gaming addiction is rapidly growing, there is still a lot yet to be discovered. The results from the current study indicate that for at least *DUST 514* and *EVE Online* the game genre or structural characteristic preferences are not the risk factors for addiction. Rather there is a common element that both games share that creates the risk of addiction. This sets the stage for further comparisons between individual games from different genres. This type of research might shed light on the common factor between the games creating the risk of addiction. A comparison between two role-playing games where one features online multiplayer while the other doesn’t might be especially interesting and could give valuable insight into whether or not the online and social factor is contributing to the risk of addiction. A similar comparison might be conducted with online versus offline games of different genres. The current study also reinforces previous results that a lower education level increases the risk of addiction. Further research into why this relationship exists could give a clearer picture of the benefits of advanced education. Additionally it would be interesting to see further research on the preferences of addicted and non-addicted players across different genres for the structural characteristics of video games. Even though there was no difference found in the current study we strongly believe that using a sample consisting of more divergent groups would yield a noticeable difference in the ratings of importance and enjoyment of these structural characteristics. Lastly, the current study just scratches the surface of the comparison research that can be done in this field with the comparison of two games that both reside on a niche in their respective genres. It would be highly interesting to see further and more extensive comparisons made between benchmark games from the wide range of video game genres out there and this could fulfill the intended role of the current study, which was to
shed light on whether or not video game addiction was structurally the same between all game genres. Alternatively further comparison research could also bring, if any, non-genre specific addiction risk factors into light and further our understanding of video game addiction. Comparing populations of players from Facebook and browser based games, a rapidly growing population of players, with players from non browser based games could be particularly interesting due to the vastly different demographics playing these games (DataGenetics, 2012).

The current study provides some interesting theoretical implications. The results of this study do not match the results from previous studies on which the definition of game addiction is being formed. It is possible, as discussed earlier, that this is due to the unique samples obtained in this study but there is also a possibility that the results indicate that there is still a lot to be studied. Considering how new the phenomena video game addiction is and that this study was the first of its kind in this area of research the second option could very well hold true. Future research could shed more light on the theoretical implications of the current study. Should they find significant differences between gaming addiction prevalence rates and structural characteristic preferences, the basis on which the definition of video game addiction is built might have to be revisited and the definition be changed. As for practical implications of the current study and further research modeled on it, the results could assist in screening for video game addiction through further understanding of structural characteristic preferences and prevalence rates between video game genres. It could also play an important role in prevention of video game addiction by identifying risk factors amongst the structural elements of video games and working with video game developers to move these elements out of the spotlight and replacing them with other elements that players give a high rating that are not risk factors for addiction.
The current study has just scratched the surface of what has yet to be discovered about video game addiction and any differences that might be found across genres. The results analyzed above point to a shared element between *EVE Online* and *DUST 514* that is distinct from the characteristic elements of each genre, MMORPGs and MMOFPSs respectively. Identifying this shared element from the current data is difficult due to the lack of similar studies on this topic to place the current results into context. This lack of context also makes it difficult to fully interpret the findings and draw any conclusions from them. Despite these difficulties the study provides a good basis for future research that ultimately could deepen our understanding video game addiction and improve our ability to diagnose and prevent it.
References


Appendices

Appendix A: Other games played by genre

Table 2. Average time spent playing other games by genre

<table>
<thead>
<tr>
<th>Genre</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Every so often</th>
<th>Fairly often</th>
<th>Very often</th>
<th>N*</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPS</td>
<td>8.0%</td>
<td>17.8%</td>
<td>23.1%</td>
<td>14.3%</td>
<td>23.3%</td>
<td>13.5%</td>
<td>377</td>
</tr>
<tr>
<td>RTS</td>
<td>14.8%</td>
<td>22.0%</td>
<td>16.9%</td>
<td>20.6%</td>
<td>18.3%</td>
<td>7.4%</td>
<td>378</td>
</tr>
<tr>
<td>RPG</td>
<td>6.2%</td>
<td>9.7%</td>
<td>21.3%</td>
<td>21.3%</td>
<td>28.3%</td>
<td>13.2%</td>
<td>371</td>
</tr>
<tr>
<td>Managerial</td>
<td>70.2%</td>
<td>15.9%</td>
<td>7.0%</td>
<td>2.7%</td>
<td>3.0%</td>
<td>1.3%</td>
<td>372</td>
</tr>
<tr>
<td>Business</td>
<td>54.1%</td>
<td>19.3%</td>
<td>13.7%</td>
<td>8.2%</td>
<td>2.6%</td>
<td>2.1%</td>
<td>379</td>
</tr>
<tr>
<td>MMORPG</td>
<td>5.8%</td>
<td>8.2%</td>
<td>8.8%</td>
<td>11.4%</td>
<td>25.2%</td>
<td>40.6%</td>
<td>377</td>
</tr>
<tr>
<td>Sports</td>
<td>67.7%</td>
<td>16.9%</td>
<td>7.1%</td>
<td>4.5%</td>
<td>1.9%</td>
<td>1.9%</td>
<td>378</td>
</tr>
<tr>
<td>Music/Party</td>
<td>64.6%</td>
<td>19.0%</td>
<td>8.2%</td>
<td>6.3%</td>
<td>1.6%</td>
<td>0.3%</td>
<td>379</td>
</tr>
<tr>
<td>Racing</td>
<td>37.8%</td>
<td>29.9%</td>
<td>14.0%</td>
<td>10.8%</td>
<td>6.1%</td>
<td>1.3%</td>
<td>378</td>
</tr>
<tr>
<td>Browser</td>
<td>61.5%</td>
<td>21.4%</td>
<td>10.3%</td>
<td>4.0%</td>
<td>1.6%</td>
<td>1.3%</td>
<td>379</td>
</tr>
<tr>
<td>Platform</td>
<td>44.8%</td>
<td>24.5%</td>
<td>16.8%</td>
<td>7.7%</td>
<td>5.6%</td>
<td>0.5%</td>
<td>375</td>
</tr>
</tbody>
</table>

* N is the number responses per genre out of 445 total responses.
### Appendix B: List of structural characteristics

<table>
<thead>
<tr>
<th>Structural Characteristic</th>
<th>Feature Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social interaction, communicating with other players</td>
<td>Social</td>
</tr>
<tr>
<td>Belonging to a guild, corporation or dedicated group</td>
<td>Social</td>
</tr>
<tr>
<td>Competitive aspects, playing against other people, leader board rankings</td>
<td>Social</td>
</tr>
<tr>
<td>Cooperation, working together to reach goals</td>
<td>Social</td>
</tr>
<tr>
<td>Customizing in-game features such as controls, rules, etc.</td>
<td>Manipulation and control</td>
</tr>
<tr>
<td>Managing resources in the game, such as items in your inventory</td>
<td>Manipulation and control</td>
</tr>
<tr>
<td>Being rewarded with rare, unique items for skillful play or playing for a long time</td>
<td>Reward and punishment</td>
</tr>
<tr>
<td>&quot;Leveling up&quot; or developing a game character (including non human characters, like a racing car)</td>
<td>Reward and punishment</td>
</tr>
<tr>
<td>Fast loading times between levels or multiplayer matches, and instant respawning when your character</td>
<td>Reward and punishment</td>
</tr>
<tr>
<td>Earning points, XP or other rewards</td>
<td>Reward and punishment</td>
</tr>
<tr>
<td>Visual aspects, such as high resolution textures and lighting effects</td>
<td>Presentation</td>
</tr>
<tr>
<td>A complex game story, involving dialogue and narration</td>
<td>Narrative and identity</td>
</tr>
<tr>
<td>Different story outcomes based on your player actions</td>
<td>Narrative and identity</td>
</tr>
<tr>
<td>An emotional investment in an in-game character</td>
<td>Narrative and identity</td>
</tr>
</tbody>
</table>

### Appendix C: Anonymity clause

Note that the survey is anonymous. No questions require personally identifiable information to be provided and it is not possible to use any records kept to trace an answer back to a specific person.
Appendix D: General statement and instructions

We are two students at the psychology department of the University of Iceland. We are currently working on our final thesis revolving around gaming behavior. The above link leads to a survey designed to assess your gaming behavior and preferences and should take around 5-10 minutes to complete. Your participation would be greatly appreciated and is a valuable contribution for further psychological research into video games. Please answer all the questions to the best of your knowledge and truthfully, it is greatly appreciated. By participating in this survey you allow us to process your replies and use them for our paper. Note that you are free to seize participation in the survey at any time. Once again thank you for your help!

Appendix E: Conflict of interest clause

Both researchers were employed by CCP Games during the research period. The study was however only meant as an academic endeavor with no special interest governing it. CCP only provided support in data gathering and access to restricted customer statistics, which made the project possible. The choice of CCP and their games was merely highly convenient and of great interest to the researchers due to the nature of the games under investigation, *EVE Online* and *DUST 514*. 