Online game addiction: psychological effects among adolescents

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In recent years, online gaming has become an increasingly popular activity among teens. Large online games provide a virtual environment in which they have fun and can freely experiment with different identities, speak other languages, and form new social connections at the same time.

These young people who make online games a part of their life without having it interfere with them socially, emotionally or spiritually. There are a growing number of researchers who are finding benefits in gaming. Some of these findings report, improvement in hand eye coordination, sharpened mental faculties, and problem solving skills. Gaming allows kids the opportunity to interact with others from all over the world. For some kids who are introverted gaming is a way to establish relationships with others. There is also a body of research that explores the harmful effects of gaming. The young people become anxious with gaming, lie about their gaming usage, lose interest in other activities just to game, withdrawal from family and friends to game, and use gaming as a means of psychological escape. This paper reviews the nature of online games, the psychological effects associated with online game addiction[1] and list some advices for parents and teachers A systematic literature research[2] was conducted from many recent studies. These studies provide compelling evidence for the similarities between different types of game addiction, on a variety of levels. The paper shows that understanding the factors associated with the development of gaming addiction will promote future research and will pave the way for the development of addiction treatment approaches.

Key words: *online game, video-game addiction, psychological effects, systematic literature.*

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[1] Is the continued use of a psychoactive drug, or the repetition of a behavior despite adverse consequences, or a neurological impairment leading to such behaviors

[2] Is a literature review focused on a research question that tries to identify, appraise, select and synthesize all high quality research evidence relevant to that question.

1. Introduction

Video game addiction is still a newcomer to the field of psychology and is now taken so seriously by psychologists and psychiatrists. It was inclused in the fifth edition of the Diagnostic and Statistical Manual for Mental Disorders (DSM) as a diagnosable psychiatric disorder and has been lodged in its appendix to encourage further research. It is clear that many adolescents and children play video games at a "pathological"[3] level that causes damage to family, social, school or psychological functioning (Anderson, 2012).

Massive Online gaming is the fastest-growing forms of Internet gaming addiction. This is because they combine customizable characters in a virtual world alongside other live players. This socialization with online characters that others around the world control replaces socialization within the real world. With those who have low self-esteem, social anxieties, or other insecurities, they will find comfort in a new identity.

Playing massively online games has been linked to many negative life outcomes (Brian & Wiemer-Hastings, 2005).

Recent research has demonstrated that online gaming is one of the most likely reasons for problematic Internet use (Ducheneaut & Moore, 2004)[4]. In some studies, negative consequences are part of the operationalizations or diagnosis criteria of addictive or problematic use (Caplan, 2002). In video game study, players of online role-playing games were found to encounter more usage problems than offline video game players, including playing for more than 8 continuous hours, losing sleep, being told that they spend too much time playing, spending less time with offline friends, and valuing less offline social relationships.

Among the medical community and the public, there is also a growing concern for online gamers especially adolescents who spend an excessive amount of time playing online games and consequently give up important real life activities.

The human problem of addiction is nothing new, and copious amounts of research has been conducted on the topic (Gauthier, 1959). Addiction to the immersive new cyber culture of video games is, however, a newfound and pressing issue. Online game addiction is an ever-growing phenomenon, and one that a majority of the information being gathered on it is through sensationalistic media surveys rather than empirical research. Despite the prevalence of video games as a form of electronic entertainment there is a dearth of empirical research on the topic, which has lead to the proliferation of various 'myths'[5] regarding the behaviors surrounding video game usage (Jagodzinski, 2006). Without properly conducted research on the topic, information regarding video game usage, particularly online game addiction, will likely become entangled with myths propagated by poorly conducted research rather than being examined carefully to provide the best foundation upon which society can build an appropriate course of response to the topic.

In this paper, psychological consequences associated with online game addiction are classified into some general types based on prior literature—personal life problems (i.e., conflicts with

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[3] Is considered by the American Psychiatric Association to be an impulse control disorder rather than an addiction.

[4] An examination of the 'third places' of SWG. In J.H. Smith and M. Sicart (eds.), Proceedings of the Other Players conference (http://www.itu.dk/op/proceedings.htm). Copenhagen: IT University of Copenhagen.

[5] Is a sacrednarrative explaining how the world and humankind assumed their present form, although, in a very broad sense, the word can refer to any traditional story.

friends or family, low social engagement, decreased time management skills), professional/academic problems (i.e.,missing work or school, deteriorated performance) (Charlton & Danforth, 2007), emotional problems (i. e preoccupation, excitement, withdrawal), cognitive distortions[6] (attention deficit) and psychological dependency.

2. Literature review

2.1 Psychological dependency

Before we explore whether video game addiction exists and what form it takes, we need to know what it means to be an addict. At its core, addiction is a psychological disorder that affects the way the brain functions by impacting chemical processes related to motivation, decision making, learning, inhibitory control, and pleasure seeking. Behavioural addictions like gambling[7] and sex are forms of psychological dependence; addictions to substances like drugs and alcohol are forms of both psychological and physical dependence.

An addict is defined by his or her psychological compulsion to carry out certain behaviours or consume certain substances that are often detrimental to his or her health or well-being. Although this repeated consumption often leads to other problems in areas of social and mental health, an addict cannot stop him- or herself from recurrent use. The hallmarks of addiction are often an increase in time spent in the consumption of these behaviours or substances at the expense of other activities; recurrent failed attempts to stop; and recurrent preoccupation and intense psychological urges or desires that are difficult to control.

Video gaming addiction, and addictions in general, have biological components as well as psychological ones. The biological components are that game addicts show an increased release of the mood-regulating chemicals dopamine[8] and glutamate[9] in the brain.

It is a highly rewarding, stimulating, and motivating activity. And our brains know it.

Eventually, the release of dopamine and glutamate reach a threshold in the brain where a higher amount is required to experience the rewarding effects. The brain becomes desensitized and the individual will seek more of the addictive source or behavior.

The addiction often becomes life-consuming and can take priority over families, friends, jobs, school, and so on. The addictive source then becomes a *need*[10], and the individual feels it is part of his or her survival, right next to eating or sleeping.

Psychologically, the user escapes reality by immersing herself in the virtual world, similar to how a drug addict will use heroin to escape from an emotionally painful situation. Many modern games offer customizable options and the ability to create your own character, from personality

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[6] Are exaggerated or irrational thought patterns that are believed to perpetuate the effects of psychopathological states, especially depression and anxiety.

[7] Is the wagering of money or something of material value (referred to as "the stakes") on an event with an uncertain outcome with the primary intent of winning additional money and/or material goods

[8] Is a neurotransmitter that helps control the brain's reward, pleasure centers and emotional responses.

[9] Glutamic acid is abundant in the human body, but particularly in the nervous system and is important for neural communication, memory formation, learning, and regulation.

[10] Is something that is necessary for organisms to live a healthy life.

traits to physical traits. This type of control over a character's traits encourages immersion within the virtual world.

2.2 Social effects

Like any other form of addiction, similar patterns will emerge in a video game addict's behavior (Sammis, 2008). They're drawn in by the initial feelings of exhilaration or solitude that are provided by the video game. As their time spent playing increases, the addict's willingness to engage in activities other than their addiction decreases. One of the key factors in any addiction is the ever-escalating proportion of an individual's life spent in pursuit of the addiction, to the point to which they will eschew all other things in life. Video game addiction has significant effects on a compulsive[11] gamer's social life. Some compulsive gamers avoid their friends and family members because they do not want to hear that they play video games too much. Excessive gaming cuts into time that could be spent dating, socializing, and forming new friendships. This activity is extremely isolating, as some video game addicts prefer to play alone. This allows them to maintain a specific gaming routine without having to account for the playing habits of other people. Romantic relationships may not survive video game addiction because the romantic partner may feel neglected or unappreciated.

Poor work performance and poor academic performance can further isolate compulsive gamers from their peers. While classmates are celebrating good grades, gaming addicts are thinking about the next time they can play video games. Adult video game addicts may have difficulty participating in office social activities and performing their duties with an acceptable level of competence. They may even call in sick to work just so they have more time to play their video games. If addiction is not addressed in a timely manner, compulsive gamers may lose their jobs or receive poor performance reviews. This has a significant impact on earning ability and job satisfaction.

As would be expected, this often leads to problems with finances, health, and interpersonal relations that are so severe the individual may abandon attempting to reconcile the issues. In fact, the reality of the situation is that the problems caused by video game addiction are severe enough that a few misguided individuals have turned to suicide, believing it to be the only option left available to them (Addicted: Suicide Over Everquest?[12], 2002).

2.3 Cognition and online gaming

Patricia Greenfield outlined many of the aspects of online video games that could make them interesting in the study of perception and general cognition (Greenfield 1984).

In addition to the obvious point that spatial and sensory motor skills are at a premium in online video games, Greenfield remarks that the level of cognitive complexity (discriminating among the different color "ghosts," learning their behavior and thus developing optimum strategies) was far beyond her expectations. She was therefore among the first researchers to suggest that perhaps video game play is not necessarily a "mindless"[13] activity and that video games could be used to develop both visuo-motor and cognitive skills.

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[11] Is defined as performing an act persistently and repetitively without it leading to an actual reward or pleasure.

[12] Is a 3D fantasy-themed massively multiplayer online role-playing game(MMORPG) that was released on March 16, 1999.

[13] Acting or done without justification and with no concern for the consequences.

On the surface it seems distinctly intuitive that playing a video game would improve hand-eye coordination, or hasten reaction time, or benefit peripheral vision. However, one of the more enduring findings about visual learning is that training on one visual task rarely leads to improvement on anything other than the specific trained task (Fiorentini and Berardi 1980; Karni and Sagi 1991). For instance, if subjects are trained to discriminate between a straight vertical line and one tilted 1° off vertical, they will no doubt improve at that discrimination, but may not show any benefit when trying to discriminate a straight horizontal line and one tilted 1° off horizontal. There are cases where if subjects are trained in one part of the visual field, only this specific area shows a benefit, if subjects are trained with one eye, only that eye shows a benefit, etc. Such specificity of visual learning has been a major obstacle to the development of efficient rehabilitation methods for visually impaired individuals, such as amblyopes.[14] In this context, it is actually quite surprising that playing a video game could affect such widespread aspects of vision and cognition as peripheral localization or the capacity of visual attention, let alone general cognitive ability (Drew and Waters 1986).

2.3.1 Attention deficits
There are some studies linking the amount of time teens spend playing video games to attention deficits, impulsivity and hyperactivity (Bailey et al, 2010; Swing et al, 2010). For example, Gentile (2009) found that adolescents who used video games at pathological levels were nearly three times more likely to be diagnosed with Attention Deficit Disorder[15] or Attention Deficit Hyperactivity Disorder than adolescents who played at non-pathological levels. In a landmark paper, Swing and colleagues (2010) examined the effect of video game playing on attention in elementary school children. They used a longitudinal study that statistically controlled for a range of other factors that could also lead to attention problems and found that amount of time spent playing video games predicted increases in teacher assessments of attention deficits in the children 13 months later. These results suggest that the children's level of video game playing played a causal role in their subsequent loss of attentional capacity. Anderson et al (2012) believe that on theoretical grounds some video games should have less effect on attentional problems (for example, those that require controlled thought and planning) and that those which require constant reactive behaviours from players (a common feature of many violent first person shooting games for example) may be more problematic in terms of children developing attentional difficulties.

3. Emotional effects

The flow of emotions of a gaming addict engaging in the use of video games is similar to the flow of emotions of any other addict engaging in the use of their opiate of choice (Wan & Chiou, 2006). Those playing video games simply as a hobby will do so in order to find some satisfaction from the activity, as is the motivation for many individuals with a hobby. A video game addict, however, will often engage in video game usage not to pursue satisfaction, but rather, to alleviate dissatisfactory feelings already present. Such an emotional trend is in direct concordance with

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[14] Also known as lazy eye, is an eye disorder characterized by an impaired vision in an eye that otherwise appears normal, or out of proportion to associated structural abnormalities of the eye.
[15] Is a psychiatric disorder of the neurodevelopmental disorder in which there are significant problems of attention and/or hyperactivity and acting impulsively that are not appropriate for a person's age.

the concept of addictive 'tolerance'[16] accumulated by drug addicts, which further deepens the argument regarding the severity of video game addiction.

Adolescents may use online games as a way of coping with stressors and gaming can become a dysfunctional media-focused coping[17] strategy (Thalemann, 2009). Similarly, relationships between problematic gaming and the ways in which adolescents cope with stressors and frustrations have been reported (Wölfling, Thalemann, & Grüsser, 2008). For instance, problematic gamers play games significantly more frequently than non problematic gamers as a reaction to anger and frustration. Thus, they appear to use gaming as a strategy for emotion regulation in order to decrease negative feelings. This seems particularly problematic because those adolescents who play online games excessively are likely to get little chance to actually develop healthy ways of coping with stressors because they are constantly occupied with playing online games instead. Therefore, their psychosocial development may be significantly impaired. The consistent blocking out and passive coping with stressful experiences is a strategy that may be successful in the short-term. However, viewed from a long-term perspective, this dysfunctional coping style may limit the adolescents, potential to have fundamental experiences that are necessary for developing a protective way to cope. In this case, it appears more likely that once new stressors appear, some adolescents continue to use escapist and media-focused coping mechanisms.[18] This results in a vicious circle (Wölfling & Müller, 2009). Moreover, adolescents aged 17-19 years treated for their pathological gambling and online gaming addiction at the Outpatient Clinic for Gaming Addictions in Mainz, Germany, have been found to suffer from depressive symptoms, anxiety, and somatization (Wölfling & Müller, 2009). Such clinical observations hint at the importance of assessing excessive and potentially pathological online gaming behavior.

3.1 Online gaming and agressivity
The effects of online video games on emotional aspects are clearer day by day. The studies presented here refer mostly to aggressiveness and hostility changes, but motivational aspects and investment are also to take into account (Yee, 2005).
Should we be concerned about children and adolescents playing violent video games? Can this lead to aggressive behaviour? Over 98 per cent of pediatricians in the United States have considered these questions and believe that excessive violent media exposure has a negative effect on childhood aggression (Gentile et al, 2003). Similarly, there is a consensus amongst the vast majority of violent video game researchers that too much exposure to violent video games increases the likelihood of aggressive thoughts, feelings and behaviours, leads to desensitisation[19] to violence and also leads to decreases in pro-social behaviours and empathy (Anderson et al, 2010; Huesmann, 2010). There are, however, a small number of researchers who dispute this evidence and it seems that the views of this small minority have had a large impact on public perceptions (Anderson & Gentile, 2008; Dill, 2009).
Clearly, violent video games are powerful teachers, but what is the outcome of such learning for the individual teen? In essence, the young person internalises clusters of associated knowledge

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[16] Tolerance is one aspect of physical dependence. A person needs to continue to increase the dose of the medication in order to get the same effect.
[17] Is expending conscious effort to solve personal and interpersonal problems, and seeking to master, minimize or tolerate stress or conflict.
[18] Are the sum total of ways in which people deal with minor to major stress and trauma.
[19] Is defined as the diminished emotional responsiveness to a negative or aversive stimulus after repeated exposure to it

about aggressive behaviour (knowledge structures or "schemas"[20]), as well as attitudes about aggressive behaviour and "scripts"[21] for how to behave in certain circumstances. Schemas and scripts contain knowledge about an aspect of living, mental links to related attitudes, feelings and memories, and a repertoire of associated behaviours. Scripts additionally contain information about how commonly experienced situations "play out" (such as visiting a supermarket) and the typical sequence of behaviours in that situation (entrance at the left of the store, grab a trolley, milk at the back, bread in the second aisle, line up and pay). Schemas and scripts are activated by a trigger (for example, the supermarket logo) and, once active, help to direct our behaviour, often without our being aware of it. Adolescents start to develop schemas about the world as toddlers.[22] (and perhaps earlier) and these can sometimes be aggressive in nature.

In relation to the development of aggressive knowledge structures and attitudes, there is considerable evidence that exposure to violent media (including violent video games):

(a) increases attitudes approving of aggressive behaviour as a "normal" social response (Huesmann, 1998);

(b) increases mental access to scripts for resolving conflict that involve aggressive behaviour and reduces access to conflict solving[23] scripts that are non-aggressive (Bushman & Anderson, 2002; Huesmann, 1998);

(c) underpins the attitude that aggression is (1) exciting and (2) increases one's social status (Groebel, 1998);

(d) increases the belief that the world is a frightening place (Cantor, 2003; Donnerstein et al, 1994);

(e) increases a hostile attributional bias[24] whereby ambiguous but innocent behaviours by others are interpreted as deliberately hurtful (Anderson et al, 2010; Möller & Krahé, 2009); and

(f) increases the likelihood of aggressive behaviour (Anderson et al, 2010).

Regrettably, teens are exposed to a lot of violent media. Heavy playing of violent online games that involve frequently killing of other people or creatures would add greatly to those figures, especially for murders.

4. Conclusions and advice for parents and professionals working with adolescents

The relevant literature of the past thirty year period clearly indicates that expertise with—or occasionally even short exposure to—video games has an impact on a variety of socio-emotional and cognitive functions.

In this paper we have detailed the evidence that video games can be used for a wide array of helpful purposes, but that there can be many negative consequences, especially when played excessively. This raises an important question: "How do we help children to benefit from video games but escape their negative impacts?"

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[20] Describes an organized pattern of thought or behavior. It can also be described as a mental structure of preconceived ideas, a framework representing some aspect of the world, or a system of organizing and perceiving new information.

[21] Artificial Intelligence, a structure for representing procedural knowledge.

[22] A toddler is a child between the ages of one and three. The toddler years are a time of great cognitive, emotional and social development.

[23] Is conceptualized as the methods and processes involved in facilitating the peaceful ending of conflict.

[24] Is a cognitive bias that refers to the systematic errors made when people evaluate and/or try to find reasons for their own and others' behaviors.

"You are what you eat" is a principle applied to the way media exposure affects the way the human neural network "wires up" as well as to food consumption. Using the food metaphor can be helpful for parents and professionals when it comes to advising children on how to use media in a beneficial way. Through school education many adolescents are interested in healthy eating and this can be extended to maintaining a healthy media diet. For example, teens could be told that, as with food, there are media that are good to consume regularly (in moderation), media that are for infrequent consumption and media that teens should avoid. Helping a young person to self-regulate what they watch and hear in the media can be very important to a teen's development in this media saturated world. This may involve:

• educating teens about media effects generally and about video game effects specifically, so that teens can learn to make informed choices;

• helping teens to limit their time playing video games;

• encouraging teens to play pro-social[25] and educational video games in preference to violent games;

• keeping video game consoles in public areas and out of teen's bedrooms; and

• playing video games with your children so that you are aware of their content and can knowledgeably discuss the implications of playing certain types of games and screen out potentially harmful ones.

It is desirable for teens to be able use video games for a range of educational and developmental objectives, but to have less exposure to the more harmful impacts. I hope that this paper has helped to dispel some popular myths about the impact of massively playing with video games and has clarified for readers how positive outcomes might be achieved.

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[25] Voluntary behavior intended to benefit another",consists of actions which "benefit other people or society as a whole," "such as helping, sharing, donating, co-operating, and volunteering.

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