

Game Addiction: A Brief Review

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Abstract: During recent years gaming addiction has received increased attention from psychologist, psychiatrist, parents, teachers, media, and mental health organizations, to some extent, by gamers all over the world. Some researchers use the terminology of problematic or excessive game usage instead of disorder to denote the harmful use of video game playing. Based on published empirical studies, most of them from early 2000 to date, it appears that excessive game play or game addiction have potentially damaging effects on individuals, in the same way as other traditional addictions, including substance use addictions. Moreover, there are no uniform, psychological or physiological screening criteria available and field has been hindered by use of inconsistent and non-standardized criteria to detect mobile game addiction. Most of the recruitment methods have serious sampling biases with over reliance on self-selected samples. Clearly there exists a gap in current established understanding of gaming addiction. There is a need of epidemiological research to determine the occurrence and prevalence of clinically significant problems that are associated with gaming addiction, to ensure recovery and treatment in a better way briefly discussed in this review.

Keywords: Game Addiction, Psychophysiology, Flow, Behavioral Addiction

1. Introduction

The origin of game addiction started with evolution and ease in access of technology. By definition, "Addiction is any compulsive activity or involvement which decreases a person's ability to deal with other aspects of his life to a point where the activity or involvement comprises the dominant source of emotional reinforcement and identity for the person" [1].

Addictive behaviors are irresistible, repetitive and may even be harmful. Some examples include gambling, internet use, shopping, online game playing, sexuality, and eating disorders. Such behavioral addictions resemble each other psychologically and often show similarity with substance addictions [2]

Everyone who plays video games has a different reason for playing, and the usage of the game leads to different effects for each individual. Childhood upbringings, peer influences, pressures at school and family issues are all factors that have a strong connection with the effects of gaming on individuals. Video games maybe therapeutic for some people, but the people who are negatively affected by gaming impact are many.

Game playing is considered as a part of modern culture rather than simply an addictive product. Game playing is not just a damaging activity, actually enhances the cognitive, motivational, emotional and social abilities of a person and fosters some real world benefits [3]. Contrary to conventional beliefs that video games promote lazy and sedentary behavior, they actually promote a wide range of cognitive skills.

Online game playing is most trendy and adopted activity followed by kids of this generation. Even though the elders are also not an exception in this. Good aspects include the mental exercise and training, improvement in recursive and proactive thinking, increase in amiability, enhanced interpretability, and increase in mental activity. The

drawbacks include increase in emotional arousal, decrease in self-control, response delay, attention disorder, mindless entrainment, social solitary factor, commercialism, and addiction.

2. Literature Review

Addiction has an inherent negative connotation and has traditionally denoted a person's physical need for, tolerance of, and inability to withdraw from a psychoactive, chemical substance. Such substances ranging from nicotine, to alcohol, or other drugs have a specific, physiological, pleasure-inducing effect on our brains.

Internet gaming disorder is categorized along with internet use disorder/ internet addiction in appendix of updated version of Diagnostic and Statistical Manual for Mental Disorders, Fifth Edition (DSM-5) for first time [4], which describes internet gaming disorder as behavioral addiction type that refers to "Persistent and recurrent use of internet to engage in games, often with other players, leading to clinically significant impairment or distress." It was defined by the impairment or distress indicated by five or more factors from the below given list for the time period of 12 months [4]



Figure 1: Game Addiction criteria defined in DSM-V

From above given conceptual description it is clear that majority of criteria highlighting the psychological symptoms with minority criteria refers socio environmental states.

In the light of some facts and reports some numbers in terms of percentages are given below showing the prevalence level of game addiction. In a report about the facts regarding Australian computer and video game industry in 2007, 79% of Australian households had a device for playing computers/video games. 77% of parents play computer games with their children and they valued this as family entertainment [5]. Previous studies have reported prevalence of internet game addiction up to 0.2% in German Population of all ages [6], which must have increased to many fold up till now. In United States 91% of children ages 2-17 play digital games, including 99% teenage boys and 94% teenage girls [3]. A total of \$23.5 billion was spent by gamers in 2015 [7], whereas majority of households in United States have at least one person playing video games regularly in each home [8].

Based on the increasing number of population getting to addicted of playing video games, the trajectory of digital gaming sophistication, lack of generalized criteria for diagnosis, and lack of evidence based for treatment and prevention strategies, the game addiction is in way to becoming a major public health problem.

3.Flow

Flow is a state in which an individual is completely immersed in an activity, without reflective sub-consciousness but have deep sense of control [9]. The flow concept by listing the components of flow as provided by Csikszentmihalyi [10] systematically described this “optimal experience” in his book “Beyond Boredom and Anxiety.” He noted that artists are entirely caught up in their projects, working feverishly to finish them and then lose all interest in their work after completion. Flow is experienced when a high level challenge is balanced with high level skills and intrinsic rewards are generated.

Flow, immersion and addiction had been well defined and researched by psychologists. Different evaluation methods by using questionnaires and surveys have also been developed. But in literature not much techniques or methods are available from neurobiological field. There is not a single study to differentiate these three states of mind using EEG or EMG signal from mind. As psychologists also claim that using the interviews and questionnaire method may not be so accurate for detecting and differentiating these three states accurately.

Sometimes the standard questionnaires developed for psychological detection had to be filled after some fixed intervals of time again and again. Normally for flow estimation psychologically FSS (Flow State Scale) and DFS (Dispositional Flow Scale) is used, ITQ (Immersive tendencies questionnaire) for immersion and for measuring addiction GAS (Game Addiction scale) and CAAS (Computer apathy and anxiety scale). With the flow experience, a game player derives intense enjoyment by

being immersed in the gaming experience, the challenges of the game are matched by the player's skills, and the player's sense of time is distorted so that time passes without it being noticed [11].

It can be observed flow is viewed as a positive phenomenon [12], may be less positive for video game players if every time they keep on experiencing the same kind of cravings of getting ‘high’, like experienced when playing for first time. Flow is negatively associated with the subjective anxiety.

Nine characteristics of “flow” include “a balance between challenges and skills, clear goals, immediate feedback, intense concentration, merging of action and awareness, full concentration on task in hand, loss of self-consciousness, a sense of control, time distortion and experience the activity as intrinsically rewarding”[13].

The application of flow theory in video gaming is related to core concepts in game designing. Given that several studies have psychological involvement of flow and addiction in relation to video games, it's not surprising if we consider these two factors at times found interrelated. Ting-Jui and Chih-Chen [14] researched that flow is due to repetitive behavior desire to repeat the positive experience, this may subsequently result in addictive tendencies, when the concerned activity is wished to be repeated.

One point needed to note here that it is not important that all the video game players experiencing flow may get addicted, or all the persons who get addicted may necessarily have a state of flow when playing. This means that all addicted persons may not lead to addiction after experiencing flow. We may consider flow as an antecedent to increased likelihood of being addicted, as the gamer's expertise increase with increasing challenges within the same game space, otherwise the player may get bored if level of challenge remains same.

It is time to understand the potential positive effects of flow experiences associated with healthy gaming to pave way for future research by using benefits and mitigating the negative outcomes due to game addiction [15]. Up till now the studies on flow are very limited and there are no standardized criteria to measure it physiologically. Although there is a multitude of similar research lines that offer hardly comparable results, it's very difficult to draw general conclusions from them [16].

There is a need to distinguish flow from Addiction [17]. Below figure shows the research scope in the field of game addiction. There is a gap to find the distinction between addiction and flow that needs to be researched for getting benefit of the useful aspects of flow.



Figure 2: Game Addiction Research Scope

4. Psychology of Game Addiction

The proposed Internet game addiction criteria was based on nine factors criteria including obsession with game playing, withdrawal feeling in the absence of game playing, tolerance in the terms of spending most time busy in games, uncontrolled behavior towards game playing, in spite of realizing negative psychosocial concerns continue to play excessive games, loss of interest in all other activities, use of games playing to relieve dejected mood, deceive family, friends and other related people and work for the sake of game playing, and endangered or lost close relations, job or education of game playing activity.

Some negative psychosocial and psychological consequences of being addicted to gaming include loss of time at work; less attention to education leading to lower academic achievements and interests; ignoring close relations, family members and friends; decrease in rest and sleep; depression; ignoring life goals; increasing loneliness; aggressive behavior; maladaptive cognition; inattention; and suicidal thoughts [18, 19].

There had been more than 20 screening instruments being in practice to incorporate the internet game addiction criteria [20-30].

A comprehensive review [31] examined the criteria for psychometric assessment of pathological video game playing based on 63 quantitative studies including 18 instruments (N= 58,415). Concluded key limitations included non-consistency in reporting of main addiction indicators, variations in evaluation of cut-off scores to judge the clinical status, lack of chronological dimension criteria, and inadequacy in data for prediction validity and reliability, and inconsistency in dimensionality.

It was observed by research that the children playing video games tend to act like the characters in the game [32]. Video game addictions are related to depression, lower academic achievement, and conduct problems [19]. In this situation many psychological studies are referring this widely growing problem [33].

In relation to some of the problems raised concerning the cut-off points of most psychometric tools developed, one of the main problems regarding gaming addiction assessment (and psychometric research more generally) concerns the fact that the vast majority of the available measures were not validated

using clinical samples. This is especially important due to the fact that this is the only way to ascertain how robust the measures perform in truly discriminating gaming addicts from game enthusiasts. Nevertheless, some authors have recently proposed an empirically data-driven approach in order to distinguish between disordered and non-disordered players based on advanced statistical analyses such as latent class analysis [34].

User characteristics are also a reason to take the player into addiction state. Some specific motives like escape and desire for competition behind the gaming are predictive of problematic gaming [35]. Interventions for game addiction are still in early stage in United States, with greater activity in this regard in south Korea and China [36].

It was observed that game addiction cause serious health and social problems but efficacious interventions for this disorder have not been well established yet. In the light of it, prevention from occurrence of game addiction is very important. Longitudinal studies are insufficient for standardized diagnosis criteria; there are diversified methodologies and hindrance in identification of involved factors.

5. Psycho-physiology of Game Addiction

There is not very much invading of this area for game addiction, some researchers have tried to find the neurobiological correlates of game addiction physiologically which are discussed in this section:

With regard to obtaining objective data, neuroimaging studies have an edge over traditional survey-based studies and behavioral research by highlighting problem regions and underlying causes exactly to define more appropriate treatment [37]. Neurobiological changes in four major domains in addictions most commonly reward processing, impulsivity, cue reactivity and decision making [38]. Literature review have indicated that almost all age groups including the children and adolescents are being involved in game addictions, in similar manner as adults involved in drug or any other substance addictions [39].

Different mental disorders are associated with the internet gaming problem like panic, depression, stress and anxiety, social phobias, autism, attention deficit hyperactivity disorder are few to name here [40-42]. As a matter of fact, pathological video gaming has potentially serious mental health consequences [43].

The negative consequences of online gaming are associated with psychological dependency and an inability to self-regulate play [44]. Online game addiction causes impair physical and mental health, personality development and interpersonal relationships [45]. It was observed that a positive correlation exists between the video game addiction and the negative personality traits like self-centeredness, anxiety, moodiness etc.[46, 47].

The complications of Internet gaming addiction were found to be negative consequences, which allow for the behavior to

be classified as pathological as based on established clinical standards (American Psychiatric Association 2000). In line with this, Internet gaming addiction may require professional treatment.

Recent imaging research shows that individuals with game addiction or internet game disorder have cognitive structural changes and altered functional mechanisms of reward and craving similar to changes seen in case of substance use disorders [48]. Video games also promote aggressive behaviors such as smoking and aggression.

However, currently there are no formal physiological diagnostic criteria that characterize excessive or addictive video game playing. There are several studies that address problematic mobile phone use (specifically for game purposes); these were lagging a standard scale [49-51].

More research is now focused on the neuroimaging and physiology of game addiction compared to traditional self-reports and clinical research [52]. To understand the specific regions of the brain involved in the development and maintenance cycle of addiction and to better treat them, a variety of diverse approaches are required [53].

However, there is still a lack of systematic integration of these factors and approaches. Rehabilitation and treatment of any addiction requires a complete understanding of the changes involved as a part of addiction process. Currently, there are no formal physiological diagnostic criteria that characterize excessive or addictive video game playing. Recently a study has been conducted to give the scenario to diagnose the game addiction psycho-physiologically using the EEG data [54].

6. Video Games Important for Life

Video game addiction is considered as an impulse control disorder with psychological consequences but there had been a long history of using video games in therapeutic capacity including rehabilitations for patients suffering from strokes, trauma, brain injuries, burn victims, children undergoing chemotherapy treatment process, children with muscular dystrophy, autistic children, and people undergoing through stresses or overcoming life challenges etc. are few to list here. In short video games seem to have very positive therapeutic potential in addition to entertainment value.

Many positive applications in education and healthcare have been developed and used by people. There would be a considerable success when the games would be designed for specific problem or to enhance some specific skill. Above all this generalizability is very important factor outside the game playing situation. This does not mean that all commercial games may be used for therapy as therapy tool, as they lack the carefully standardized conditions for any particular therapy issue. Moreover with advancement in artificial intelligence there may be new avenues for clinicians to explore therapeutic use in much more effective way [55].

Preliminary research has also revealed quantifiable improvements in neural processing efficiency by playing

some specific types of games [3]. In addition to these, other benefits of playing games include improved problem solving skills [56]; improved creativity [57]; high levels of motivation and optimistic behavior toward facing failures, triggering of positive emotional experiences [58]; distraction from pain in patients undergoing prolonged invasive cancer treatments; psychotherapeutic effects in children; and physical therapy and rehabilitation uses in patients following trauma or other injuries [55]

Due to extensive use of attentional systems, action video games may be helpful in improving the attentional responding skills. Some neural correlates have found the relationship between the visuospatial skills and structural volume enlargements of right hippocampus, both in video game addicts and the people trained for video game experimentally [59, 60].

Video games offer potential cognitive, motivational, emotional, social, and educational benefits [3]. It was found that playing Tetris decreased cravings for drugs, food and activities including gaming [61]. Now schools are building learning based games increasingly. Research is required to carefully design the games with specific conditions to use them for productive reasons.

In short it can be concluded that games are necessary for a healthy life and for refreshment, positive brain training and to enhance mental skills, but excess of everything is bad. There is a need to have check on playing habits, and timings to remain in safe limits.

7. Conclusion and Future Work

Quantitative approach can help to remain in flow state and enjoy game without being addicted. Flow is experienced by people when they are busy in their chosen activity feeling "Often as most enjoyable part of life" (Mihaly, 1990). Lack of quantitative Techniques for Assessment. Increasing number of addiction patients in playing games. Flow is needed to be separated from addiction to use games for education purpose to maximize human brain function, at the same time we have to avoid the addiction.

There are several methodological constraints in gaming addiction research to date, one of the most important being that the majority of research depends on survey assessments. Self-reporting techniques and retrospective assessments rely exclusively on the data limits and the reliability of self-description of an individual's feelings and moods. There is a need for physiological techniques by which objective observations of gaming behavior can be more genuinely understood to avail the benefits of being in a state of "flow" while avoiding the state of addiction.

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