

A Longitudinal Study on Internet Addiction's Effect on Health Among Adolescents

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ABSTRACT

Abuse of internet networks might result in internet addiction (IA), which associates with impairment to reward processing systems and is able to harm the human body both physically and mentally. Addiction to the internet among adolescents and the effects brought by this is one of the areas where a lot of researchers put efforts in. In this paper, a designed longitudinal study exploring this topic is presented. More than 10 participants from 13 years old to 19 years with considerable internet using the time (spending more than 2 hours on the internet that were not focused on schoolwork) are selected. Questionnaires and surveys are designed or prepared to theoretically diagnose participants' mental stasis and inspect their tendencies of becoming psychologically or mentally sicked once a month. Also, a thorough physical examination will be made once a month to participants to test the internet addiction's effects on participants' physical health. Based on previous researches and investigations, researchers discovered that people with Internet addiction are highly associated with diseases like anxiety, depression, and ADHD, etc. It also increases the risk to risk factors of the cardiovascular system and, negatively affects sleeping quality, which is essential to "memory, learning, concentration and emotional balance".

Keywords: internet addiction, reward system, adolescence, mental illness

1. INTRODUCTION

Internet addiction disorder generally refers to problematic, compulsive use of internet that likely result in impairment of individuals' brain and body functions. Internet gradually becomes an indispensable source of information and essential method for social interaction, partially due to technological developments that improve on computers or mobile phones' qualities and make people possible to have access to internet almost at any time anywhere. Also, applications for recreational purposes or social purposes make the internet more attractive to people. This convenience and amusement made people from different ages over the world increase amount of screen time over time. According comprehensive Internet Addiction Test (IAT), researchers found that about about 87.1% of Chinese adolescents were Internet users. Among these users, 12.2% could be consider as "problematic internet users", and about 2.2% of them can be consider as "addicted". Considering the size of Chinese population, this percentage does not not represent a small number. Because of this, growing concerns, debates and attention begin to focus on the effects of the internet on people's

life worldwide and the issue of internet addiction. Though with many benefits, the growing amount of evidence proves that excessive use of the Internet can cause both physical or mental harm to people, especially to adolescents with a brain in developmental periods that are more sensitive to the environment and are more likely to increase the risk of addiction [7]. In previous researches, researchers discussed the particular harm to the human body caused by internet addiction. This particular harm might be either any specific mental problems like depression, or any specific semantic problems. This paper will focus more on a comprehensive influence of the internet on teenagers to both semantic and mental aspects, thus this longitudinal study design will include summaries of the points made by previous researchers, make a connections between these points, and provide insights to readers into how addiction that causes disturbance in reward system effects adolescents in every aspects.

2. THE INCENTIVE THEORY OF MOTIVATION

Internet Addiction, or sometimes described in behaviors as “internet dependency or pathological use” [5], is one kind of Behavioral Addiction. Behavioral Addiction is kind of addiction that resembles addiction of drugs or alcohol, associates with disturbance in reward system and impulsivity when engaging in non-substance-related behaviors. When a certain behavior is associated with a reward and generates habits feeling of pleasure, this behavior will be enhanced so that a person is learned to repeat to gain reward. Similar things happen when learned behaviors are acquired in order to avoid punishments [7]. However, in all cases of addiction, like drug addiction, reward system will be changed. When we are doing things that we could gain pleasure, like taking drugs, or in this paper’s case, using internet, Dopamine floods in nucleus accumbens and other regions of reward system, resulting slight gray matter structural changes in these reward pathways that respond to stimulus of drug or internet. Over time, this process results in reward deficiency, which will results in tolerance for increasing stimulation of reward for satisfaction.[1]. People with harmed reward system and with addiction therefor have poor ability in behavioral inhibition, impulsivity or decision making [1]. Adolescents were during the age of development and curiosity. Without parents’ or elders’ interference and education, adolescents, who can be easily attracted by internet, might be unable to deny internet, due to the short-term rewards provided by internet. When the behaviors of using internet is not controlled in time, a lot of drawbacks will be reinforced by addiction, and by the time ridding addiction will be very difficult. The drawbacks from internet addiction are partially similar to symptoms of other kinds of addiction, with dysfunction in reward system and its resulting mental pressure or physical injury [7].

3. LONGITUDINAL STUDY DESIGN

A longitudinal study is a type of observational research on one topic that is carried out during a relatively long time span in natural environments with data collected usually through questionnaires or interviews. This type of research is usually carried out to collect information is medical, sociological, or psychological areas.

In this paper, in order to observe the every aspects of effects brought by internet addiction to adolescents, a research of about 7 or 8 years is conducted to monitor the mental stasis and physical states of teenage participants with internet addiction. In this research, more than 10 participants from 13 years old to 19 years with considerable internet using time (that is, spending more than 2 hours on internet that were not focused on school work) are selected. Questionnaires and surveys are

designed or prepared to theoretically measure participants’ mental stasis and also inspect whether they are having tendencies of becoming psychologically or mentally sicked or not once a month [1]. Also, a thorough physical examination will be held once a month to participants to test the internet addiction’s effects on participants physical health.

3.1. Physical Health

During the whole process of research, the participants’ normal life will not be affected, and their change in physical stasis will be tracked through health examination once every months.

One pf the biggest influences on adolescents brought by internet addiction is sleeping quality. According to researches, more than 60% of adolescents participants still use the internet on bed before going to sleeping. Exposed screen lights from phone or computer will disturb circadian rhythm pf adolescents because the light resembles daylight, and will trigger signals that suppress melatonin production, thus causing phase of sleeping and the onset of sleeping delay. [2, 8]. About 32.7% of participants also indicated that they changed sleeping hours due to internet use. These participants thus have a further shortened sleeping time due to internet [8]. Also, many media contents exposed to teenagers including video games, videos, novels or comics may increase adolescents’ physiological arousal and affect their sympathetic regulation, which cause them unable to fall asleep. This would further reduce adolescents’ sleeping time [2]. When sleeping and time can’t be ensured, a lot of other problems will simultaneously arise. Sleeping is important for teenagers to grow body system. When sleeping quality and time is not ensured due to emotional or physiological stimulation [8], problems like insomnia, depression or anxiety also arose. The interpretations and judgments of events will also be impaired as well. In long run, there’s a high probability that heart diseases or diseases like diabetes, stroke, low HDL cholesterol, poor stress regulation, and etc, will appear. Severe sleep deprivation will cause the risk of causing death significantly increased.

Not only sleeping, but also the cardiovascular system is effected by internet addiction too. Increasing screen time also means decreasing in physical activity, which reduced dietary choices and increased the possibility of obesity. When adolescents are focusing on shows or games that present stresses or excitements (which partially trigger fight-or-flight response), glucose is released into the bloodstream and reached in high level during resting conditions without hunger sensations. This abnormality results in obesity, which is one of the risk factor of cardiovascular system. High arousal which partially caused delay in sleep can also act as an risk factor to cardiovascular system cause heart diseases like heart attack, heart failures, irregular heartbeat, or high

blood pressure. Also, besides the possibility of causing obesity, a decrease in time of physical activity or increase in seating behaviors also could lead to discomfort symptoms on wrists, arm or neck [2].

In addition, eye fatigue is also one of the drawbacks of internet addiction. According to the research, eye fatigue caused by considerable amount of time on screen viewing for adolescents could lead to symptoms like eye dryness or eye strains, and might even further lead to headaches, and discomfort. [2]. A greater risk of myopic is also indicated.

In conclusion, we expect to see participants with internet addiction result in distortion of sleeping quality, vision problems, discomfort symptoms, etc. In long run, there's also a probability that diseases like cardiovascular diseases, stroke, myopia, hyperopia, and obesity appear. However, although these factors are related to internet addiction, this does not mean that every participants with internet addiction absolutely have all of these problems. These are simply possible consequences of internet addiction, and they vary from person to person. Among these consequences, sleep quality is the most positively correlated with internet addiction. Meanwhile, obesity have smaller correlations with internet addiction, since it depends more on diet and exercise habit and doesn't necessarily occur with internet addiction. In this paper, the author only discusses the possible consequence and possible mechanisms of why these consequences concur with internet addiction.

3.2. Mental Health

Throughout the research, the questionnaires and surveys are prepared for the participants to complete. They can be used to indicate participants' mental stasis. For example, a scale called Pittsburg Sleep Quality Index (PSQI), a scale that evaluates participants' sleeping quality, will be completed by the participants to inspect what state of sleep quality do they have and are there any tendencies of mental illness indicated. Other surveys and mental health diagnosis will also be made once a month so that researchers are able to understand internet addiction's influences on participants' mental health.

Since addiction affects the human's reward system in brain directly, problems within brain that effecting mental health can be expected. One of the most common disorders associates with internet addiction is Attention Deficit Hyperactivity Disorder (ADHD), a brain disorder marked by inattention or hyperactivity impulsivity interferes with functioning or development. According to research, children or teenagers diagnosed with ADHD positively correlates with long internet using time [2]. ADHD conversely is also considered as comorbidities of internet addiction, or in the other word, is the primary predictors of internet addiction disorder, which in turn proves the close connections between ADHD and

internet addiction [5]. In internet, the fast paced content like short videos or words and news with shocking titles but uninformative contents don't require users' attention to focus and think critically on it. Gradually, adolescents will become used to the scanning mode of reading. Therefore, when they come back to school work after recreation, there's possibility that adolescents are unable to form attention on the works anymore. Adolescents with more severe symptoms of this might result in ADHD [2].

There is also a positive correlation between the internet addiction with anxiety and depression, along with problems like difficulties in real-life social interactions with others and less attachment with family members, etc [2, 3]. These difficulties happen because adolescents' focuses on internet will diminish their interactions and even their patience during interaction with family members or peers in real life [8]. Depression and anxiety bring by internet addiction partially result from sleep disturbance, but are also possibly caused by contents online including violence from videos and games, digital device night use, unhealthy social interactions with online users, or even harm like cyber bullying that is unbearable. The violent contents in video games or movies could also able to trigger aggressive behaviors and decreases empathetic emotions among adolescents, which stimulate adolescents to imitate violent and dangerous behaviors. When chatting with users online, adolescents experience frequent and fast pace messaging with friends online, and will possibly gradually become anxious when waiting and worrying about receiving messages [2]. The symptoms of depression and anxiety positively correlate with screen viewing time. The longer the screen viewing time, the stronger tendencies to negative moods, violent behaviors, and even possibilities of self-injury and suicidal behavior.

Hence, we are expected to see tendencies of anxiety, depression, ADHD and other kinds of brain disorders associated with an increase in time of screen viewing and internet addiction. Circumstances like imitation of violent behaviors, weakening social interactions with real-life peers and family members, and other negative behaviors can also be observed. In a lot of times, internet addiction disorder and some mental disorders, like anxiety, depression, interpersonal disposition and so on are co-occurring. It's hard to know that it's internet addiction causing the disorders or the disorders' causing the internet addiction. However, It should be noted that, although there's evidence that increase in internet using time usually associates with increasing possibilities of these disorders or increasing tendencies of their behaviors, it doesn't mean that internet addiction has a hundred percent association with disorders and behaviors mentioned above [2].

4. CONCLUSION

By conducting and analyzing a longitudinal study that investigates on the effects of internet on both physical health and mental health of adolescents comprehensively, people are able to have a better understanding on the drawbacks and harms bring by internet and thus become aware of the importance of using internet healthily and controlling screen viewing time spend on internet. Especially for adolescents, whose brains are in the essential development period. In this period, the most complex functions of brains including decision making are not fully developed yet, and the changes in reward system's structure along with frontal brain and limbic system also make adolescents easily effected by external stimuli like internet that associates too closely to adolescents' daily life [7]. Thus, their brains are vulnerable and can be easily effected. Elders must take this seriously, and guide adolescents' internet using behavior properly and carefully to ensure that children will not become too addicted to internet and, in the worst case, become misled by contents displayed online and become sick both mentally and physically. Just like that the researcher Gadi Lissak concluded, "Excessive digital media use by children and adolescents appears as a major factor which may hamper the formation of sound psychophysiological resilience," and healthy social. People should be aware that: Even small reduction in the amount of time spent online was associated with a reduced risk of various brain diseases, mental illness, unhealthy social interaction and physical illness [4].

There are also several limitations that should be improved in this study. First of all, this paper only represents an outlined design that still requires modification and more details. The possible outcomes of the internet addiction to adolescents are only speculations based on background information provided by other researchers valuable results of their studies. Also, as the researcher mentioned in previous sections, all of the described effects of internet addiction, whether mentally or physically, are merely possible outcomes. They all have high correlation with internet addiction but this doesn't indicate that they will absolutely happen to all the people with internet addiction. The extent to which each person will be effected by the internet is also different from person to person.

There should be enough time, enough number of participants and a fully prepared and developed plans with details if further researches can be held based on this paper's design.

AUTHORS' CONTRIBUTIONS

This paper is independently completed by Wenlin Yang.

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