



Original Research Article

Effect of internet addiction on psychomotor response and depression among adolescents

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ABSTRACT

The study aims to establish a relationship between internet addiction and its effect on reaction time in adolescents and to correlate the results with psychological disorders like depression and anxiety. This cross sectional study was performed using validated questionnaires on Internet Addiction (IAT), Depression and Anxiety (KADS-11) and Human Benchmark Reaction Time test. One hundred students within the adolescent age group of 10-19 years old were selected randomly and were given the said questionnaires. The reaction time of the study population was calculated using the Human Benchmark Reaction Time test. Based on the IAT score, they were grouped into average internet user (n=50) and problematic internet user (n=50). Reaction time was significantly ($P<0.04$) higher in problematic internet user (534.2 ± 52.83 msec) compared to the Average internet user (472.82 ± 45.28 msec). KDS score also showed significantly ($P<0.05$) higher in Problematic internet users. Association between the IAT score with reaction time and KDS score showed a significant positive correlation ($P<0.05$). Internet addiction has a deleterious effect on reaction time and this in turn harms the day to day activities of adolescents and results in psychological disorders, like depression and anxiety in near future.

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1. Introduction

Science and Technology have advanced over the past decade leading to radical changes in the lifestyles of people across the world. Communication has become a lot easier and faster. Today, the Internet has become an inseparable and essential part of people's lives, becoming people's personal assistants and performs the task of giving wake up calls, ordering food, getting official and personal work done and even singing lullabies to put people to sleep. The Internet allows people to communicate, to learn something new, to stay updated with current affairs, and for other entertainment purposes. The Internet has made our loved ones, just 'one click' away.

However, just like the two sides of the same coin, Internet comes with its boon and bane. Prolonged use of the Internet has made people addicted to the online life, to such an extent

that, even a few minutes without their mobile devices make them irritable and brings them anxiety and restlessness, which is increasingly being referred to as Internet addiction.

Pathological use of digital technologies results in various health problems, both physical and mental. However, with respect to adolescents, Internet addiction behavior may be a more serious concern to address.¹ The Internet, which was meant to be a platform for knowledge and pass-time, has now become a jail-free-card for evading human interaction. This has resulted in various pathologic conditions such as Internet abuse, online gambling and cybercrimes like cyber bullying, cyber trafficking and hacking.

According to Goldberg, Internet addiction disorder is the extensive use of the Internet accompanied by anger, tension and anxiety, all of which are manifestations of stress and exhaustion. It has detrimental effects on an individual's health and social wellbeing and encourages disagreeable behavior. Internet Addiction Disorders (IAD) are rapidly taking over the world and is getting established as a

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consequential mental health problem around the world.²

Adolescents being a high-risk group for Internet addiction, are more prone to disorders in psychomotor reflexes. Over the past two decades, children and adolescents have exhibited high rates of Internet addiction. Numerous studies have reported that there is an adverse relationship between an individual's Internet addictive behavior and his or her physical health and psychological well-being.³

The use of Internet has a major role to play in determining the emotional status of a person. Reading about depressing incidents or watching an emotional video on the internet, that is known to make an individual sad directly or indirectly makes the person sad and unhappy, as the brain tends to record and save whatever flashes before the eyes, be it good or bad. This results in adolescents becoming extremely aggressive, sad and rebellious. A study conducted by Lee and colleagues⁴ involving adolescents with Internet gaming disorder demonstrated that Internet addicts tend to process things much slower than their non-internet addict counterparts.

Reaction Time is the amount of time taken for a person to respond to a given stimulus. It is crucial in events like driving, sports, emergency situations and in many day to day activities. It solely depends on nervous connections and signal pathways. Reaction time is an important tool for measuring the speed of an individual's psychomotor reflexes and emotional stability.

As internet addiction has detrimental effects on psychological and emotional responses, it drastically affects Reaction Time in individuals, which in turn affects their daily activities and psychomotor reflexes adversely.

Reaction Time, being a measure of psychomotor reflex, is mainly affected by nerve and signal disorders imposed by psychopathological effects of internet addiction.

A lot of surveys and researches performed over the last decade suggests that excessive use of the internet has deleterious effects on the physical as well as mental health of adolescents.⁵⁻⁷ Moreover, a growing number of studies point out to psychopathological disorders, withdrawal phenomena and negative repercussions in life, as the outcomes of Internet Addiction.⁸

Moreover, the relation between Internet Addiction and psychological problems like depression and anxiety, have been established in many studies, over the past few years, but none of them have correlated those results with that of reaction time. Thus this study establishes a relation among Internet Addiction, depression, anxiety and reaction time.

In the light of the above, this study was designed to assess and compare the reaction time of normal people and those of internet addicts and elucidate the significance of internet addiction as a predictor of delayed reaction time in internet addicts and to correlate these results with depression and anxiety.

2. Materials and Methods

2.1. Participants

One hundred students within the adolescent age group of 10-19 years old and pursuing education in Saveetha Institute of Medical and Technical Sciences were selected by the convenient sampling method.

2.2. Consent procedures

This study was reviewed and approved by Institutional ethics committee. Participants were involved in the study as part of a health promotion project. Information sheet on the intentions, methods and procedure of the study were circulated to all the participants. Written informed consent was obtained from all students before their enrollment in the study. Participants were assured their information and responses would be kept confidential and would not be disclosed under any circumstances.

2.3. Study design

This study was performed using a cross sectional study using validated questionnaires on Internet Addiction (IAT), Depression and Anxiety (KADS-11) and Reaction Time test.

2.4. Inclusion criteria

This study included adolescents within the age group of 10 to 19 years pursuing education at Saveetha Institute of Medical and technical sciences and using the Internet, who are willing to participate in the study and ready to sign informed consent after reading information sheet in their own language.

2.5. Exclusion criteria

Adolescents under medication for psychological disorders such as anxiety or depression and those already in rehabilitation for internet addiction have also been excluded.

2.6. Internet addiction test (IAT)

The Internet Addiction Test (IAT; Young 1998) is a self-report questionnaire consisting of 20 items rated on a five-point scale (1 = rarely, 2 = occasionally, 3 = frequently, 4 = often, and 5 = always). The scale ranges from 0 to 100. This test measures the extent of a person's involvement with the Internet and classifies addictive behavior in terms of mild, moderate, and severe impairment. Higher scores indicate a greater level of addiction and problems caused by Internet usage. According to Lai and colleagues' criteria (Lai et al. 2015), a score ranging from 20 to 49 corresponds to Stage I: Average Internet use, 50 to 79 represents Stage II: Problematic Internet use (PIU) and a score of over 79 indicates Stage III: Potential Internet addiction.

2.7. Kutcher adolescent depression scale (KADS-11)

The Kutcher Adolescent Depression Scale (KADS-11; Dr. Stan Kutcher, 2006) is a 11-item self-report inventory rated on a four-point scale (0 = hardly ever, 1 = much of the time, 2 = most of the time, 3 = all of the time). The scale ranges from 0 to 33. Higher scores indicate increased severity.

2.8. Reaction time

Reaction Time of all the hundred adolescents were calculated using Human Benchmark Reaction Time Test. The test is the simplified version of calculating time required to respond to visual stimulus. The test begins with a red screen and the test taker is asked to click the screen as soon as possible, once the red screen turns green. A total of 5 trials were performed and the average reaction time was calculated in milliseconds. On an average adolescent present a reaction time in the range of 400 to 1200 milliseconds.

3. Results and Discussion

Based on the IAT score, we have grouped them into average internet user (n=50) and problematic internet user (n=50). No subjects had scored more than 79 in IAT (Potential Internet addiction).

Reaction time was significantly ($P < 0.04$) higher in problematic internet user (534.2 ± 52.83 msec) compared to the Average internet user (472.82 ± 45.28 msec). KDS score also showed significantly ($P < 0.05$) higher in Problematic internet users. Association between the IAT score with reaction time showed a significant positive correlation ($r = 0.67$, $p = 0.01$) and with KDS also showed a positive correlation ($r = 0.71$, $p = 0.03$).

Table 1: Comparison of reaction time and KDS score

Variables	Average internet user	Problematic internet user	P value
Reaction time (msec)	472.82±45.28	534.2±52.83	0.04
KDS score	7.26±2.33	11.32±1.90	0.05

Table 2: Association between the IAT score with reaction time and KDS score

Variables	Correlation efficient (r)	P value
Reaction time (msec)	+0.67	0.01
KDS score	+0.71	0.03

4. Discussion

In this study of adolescent college students, findings support positive associations with internet addiction with

depression (KDS score) and their reaction time. Our results are similar to a study conducted by Moreno et al. in female adolescents showing a strong relationship between IAT score and depression score associated with severe depression symptoms including trouble concentrating, psychomotor dysregulation and suicidal ideation.⁹

Pallanti et al. (2006) suggested that adolescents, whose frontal cortex and subcortical monoamine system are immature, are impulsive and have disturbance in reward motivation.¹⁰ Therefore, adolescents are susceptible to Internet addiction. Yoo et al. reported that persons with an attention deficit disorder, such as ADHD, or with frontal lobe control dysfunction easily become addicted to the Internet.¹¹ On the other hand, there is the possibility that Internet addiction causes deficits in some cognitive functions. In a study it was suggested that a neuronal adaptation to excessive visual stimulation and synaptic plasticity due to Internet addiction causes hypometabolic changes in the visual information processing circuits and hypermetabolic changes in the prefrontal areas of adolescents with Internet addiction.¹² In a survey done by Tewngse showed that adolescents spent more time on social media and electronic devices, and spent less time on on-screen activities such as interaction with people, engaging in physical activity like sports/exercise, and attending religious services.¹³ These non-screen activities were negatively correlated with depressive symptoms in adolescents. Davis et al first described a model in which existing psychopathology of an individual susceptible to non-adaptive Internet cognitions which subsequently lead to the development of internet addiction.¹⁴ According to La Rose et al., negative cognitive bias causes the internet users to get addicted.¹⁵ The mild depression in adults will subsequently stimulate the person to overuse internet leading to complicated behavior issues associated with lack of concentration.¹⁶ This may be the reason for our findings such as increased reaction time among the PIU reflecting that lack of concentration and attention. It is also reported that internet use diminishes the cognitive ability and self-control of the person over the internet use leading to addiction. We found that the depression score has increased and were highly correlated with IAT score including increased reaction time which is an indicator for psychosomatic behavior in adolescents. Reportedly, the average age of onset of Internet addiction is 17 and the average course of addiction from the start of Internet use to the development of problems due to excessive Internet use is approximately 11 years.¹⁷ So long-term prospective follow-up studies are needed to determine whether continued Internet addiction leads to psychosomatic, psychiatric and metabolic problems in future in adults.

5. Conclusion

Findings from this study suggest that a positive association between the internet addiction and depression among the adolescent college students. Future studies can be carried to avoid or prevent these addiction induced depression and delayed reaction time among the adolescents which could reduce the risk of psychosomatic disorders in future.

6. Source of Funding

None.

7. Conflict of Interest

None.

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