P: ISSN No. 0976-8602 RNI No.UPENG/2012/42622 VOL.-7, ISSUE-2, April-2018

E: ISSN No. 2349-9443 Asian Resonance

Effect of Smart Phone Addiction on Cognitive Failure among Adolescents

Mamta Sharma
Associate Professor,
Deptt.of Psychology,
Punjabi University,
Patiala

Amarpreet Singh
Research Scholar,
Deptt.of Psychology,
Punjabi University,
Patiala

Abstract

The smart phone has emerged as a source of potentially addictive behavior as usage of smartphone in the age range of 16-18 rise from 5% to 25% during the period of 2012 to 2014 in India. The intention of this research is to better understand how smartphone addiction leads to cognitive failure among adolescents. 200 students were selected randomly from Patiala and Bathinda. For this purpose, Smartphone Addiction Scale (Kwon et al, 2013) and Cognitive Failure Questionnaire (Broadbent et al., 1982) were used to assess levels of smartphone addiction and cognitive failure respectively. Analysis of variance revealed that subjects with high and low level of smartphone addiction differed significantly (F= 9.57**) on cognitive failure. Results also revealed significant gender differences (F= 4.28*), girls showing more cognitive failure in comparison to boys.

Keywords: Smartphone Addiction, Cognitive Failure.

Introduction

Modern day adolescents and youth of India live in the most interesting phase of the history. As the Indian economy went globalized, the internet is already an integral part of their lives. The youth depends on the internet for its life to get in touch with friends, send emails, play games, watch movies and look for jobs. The internet is the best manager one could have; it has the answers to everything and will never let one down.If the Internet was initially the technological addiction par excellence, the cell phone soon emerged as a source of potentially addictive behavior, particularly since the arrival of smartphone devices (Lin YH, et al., 2015; Lane W, Manner C 2011), along with the evolution from a global approach to a progressive differentiation of addictions by contents and concrete applications.

When Internet usuageinterferes with normal living and causes severe stress on loved ones, family, friends, and one's work environment then it become a disorder. Addiction is considered by WHO as dependence, as the continuous use of something for the sake of relief, comfort, or stimulation, which often causes cravings when it is absent (WHO, 2013)

Addiction is of two categories, i.e. substance addiction, e.g. "drugs or alcohol addiction" and "behavioral addiction such as mobile phone addiction." (Kim, H, 2013). Behavioral addiction,also named as technology addiction; internet addiction; internet use disorder or internet addiction disorder, is a fairly new but problematic phenomenon involving the inability to control use of various kinds of technology, in particular the Internet, smartphones, tablets and social networking sites like Facebook, Twitter and Instagram.Online mobile or smartphone addiction is closely related to internet addictions because the features are similar (Kwon, Kim, Choi, Gu, Hahn & Min, 2013), that is, individuals engrossed in their smartphone use to the extent that they neglect other areas of life. This is particularly true of adolescents, as they spend much time with and on their smartphones; in addition, adolescents are more sensitive to rewards and cues than older people (Haverlag, 2013). The difference between internet and smartphone addiction is in the usage gratifications and usage context of the two (Ghose, Goldfarb, & Han, 2010). Gratifications of a substance or behavior create the addiction and smartphones have different gratifications that can make a strong positive reinforcement (pleasurable experience) for it users.

Smartphone addiction leads to problematic behaviors such as desperate efforts to connect with others, excessive time spent on smartphones, losing temper, psychological disorders and disruptions in daily works were reported (Ko, Lee, & Kim, 2012). Many studies have mentioned its detrimental effects of excessive use on psychosocial and physical health which include personal stress, insecurity, low self

confidence and frequent mood changes, sleep disturbances and insomnia (Sansone RA &Sansone LA, 2013); anxiety due to inadequacy of access to mobile services at time, or due to social isolation (Ha JH, Chin B, Park Dh et al, 2008). The current literature suggests that there are many detrimental effects of smartphone addiction which yet to be explored in Indian setting such as cognitive failure. This research paper unravels the effect of smartphone addiction on cognitive failure.

Cognitive failure refers to small slips that cause the usaually smooth flow of intended action (physical or mental) to be distruct, which represents a global liability towards frequent lapses in cognitive control (Broadbent et al., 1982). It reveals to all conceivable different kinds of failures such as lapses of attention, mind wandering, failures of memory, activity failures (Broadbent, Cooper, FitzGerald, & Parkes, 1982) inside the cognitive framework (i.e. memorial, attentive, or otherwise) that could possibly happen in clinical and non-clinical people's daily life. Cognitive failures occur, due to failures of cognitive control, e.g., when attention is withdrawn from the current task and concentrated on other outside distracting stimuli or internal thoughts (e.g., daydreaming). Our ability to efficiently process information and generate appropriate responses depends on the processes collectively called cognitive control (Norman 1981& Reason 1984).

A scope of steady and variable elements were connected to increased risk of cognitive failures. The abuse of cell phone makes the individual more powerless against to failures. The presence of the gadgets alone is sufficient to reduce available cognitive capacity resulting in poor fundamental processes such as learning, logical reasoning, abstract thought, problem solving, and creativity leading to cognitive failures, even when smartphone users are successful in abstaining from attending to their smartphones (Adrian, 2017). Smartphone over use prompts to cognitive failure which happen because of errors in beliefs, values, and actions, which communicate in a dynamic way to help organisms navigate their way in the world and to resolve problems posed by the environment.Adolescents are known to be the gathering most in danger of smartphone addiction which they have poor drive control and utilize a smartphone as a device to deal with their emotional social status. Indian adolescents are greatly affected by this high smartphone engagement and are currently driving Smartphone's market in India. Keeping in mind the world-wide popularization of smartphones & their long-lasting effects on youngsters, it can be ascertained there is an imperative need to explore the effect of smartphone addiction on cognitive failure among Indian adolescents. The objectives were to study the effect of smartphone addiction on cognitive failure among adolescents and to explore the gender differences in cognitive failure as well.

Review of Literature

The high frequency exposure to digital media and the use of the digital technology was historically a recent one and to date the effect of such on human cognition has received very little empirical attention. Although, there may be anecdotal connections between poor attention and higher levels of smartphone use, very little was known about the effect of such exposure was having on human information processing. There is clear evidence that engagement with smart devices can have an acute impact on ongoing cognitive tasks.Hartanto et al., 2016 revealed the effect of smartphone on cognitive flexibility of 87 undergraduate students. ANOVA revealed that smartphone impaired the cognitive flexibility.Adrian et al. (2016) investigate the “brain drain” hypothesis by conducting a qualitative research on smartphone and cognition and showed that the mere presence of one’s own smartphone may occupy limited-capacity cognitive resources, thereby leaving fewer resources available for other tasks and undercutting cognitive performance.The current generation of children and adolescents were developing increasingly shorter span of attention because of their increased contact with smartphone technology, and use onset at younger ages (Nikken and Schols, 2015). Egan (2016) concluded that regular use of devices can lead to decreased attentional capacity and producing cognitive failures.

Research investigating the direct impacts that interruptions can have on performance is complemented by research on “resumption errors” – errors that arise in task performance that is resumed following an interruption or task-switch (Monk, 2004; Cades et al., 2007; Brumby et al., 2013). The tendency to commit resumption errors increases steeply when the interruption duration exceeds 15s (Monk et al., 2008). Smartphone interruptions frequently exceed this 15threshold (Leiva et al., 2012), and therefore may be especially deleterious to the resumption of ongoing tasks resulting in cognitive disorientation. Hadar et al., (2015) revealed that the cognitive, behavioral, and neural consequences of smartphone use, with a specific emphasis on delay discounting. The mere presence of a cell phone may impact cognitive performance (Thornton et al., 2014). The review of literature indicates more negative consequences than the positive ones. With regard to cognitive processes, it is noted that mobile phone users tend to be distracted easily, have a shorter attention span and display a constant need for external stimulation. Long late night conversations on the mobile phones can disturb attention in the classroom the next day. The studies that concentrated on gender differences showed that girls are more addicted to mobile phones and tend to perceive a degree of autonomy and resistance to parental control. During the prenatal period, sex hormones are released in non-impaired individuals that cause gender differences in hemispheric dominance which, in turn, create differences in cognitive abilities (Geschwind and Galaburda, 1987).

The key research questions which guided the present research are,

1. To what extent smartphone addiction plays a role in the severity of cognitive failure?

2. Do girls exhibit more cognitive failure than boys due to smartphone addiction?

Hypotheses

Based on the existing relevant literature, the study verified the following

1. High smartphone addiction would lead to more cognitive failures as compared to low smartphone addiction
2. Girls would be high on cognitive failure as compared to boys.

Research Design

The sample consisted of 200 adolescents (100 Boys & 100 girls) in age group of 14 to 17 years, screened in on the basis of their score range i.e. low and high scores in the range of 1-66 and 133-198 respectively on Smartphone Addiction Scale (Kwon et al, 2013). Then, all the screened in subjects were administeredCognitive Failure Questionnaire (Broadbent et al., 1982) to assess the degree of cognitive failure. Incidental sampling procedure was used to collect the data.Analysis of Variance was applied to analyze the effect of independent variable, i.e. levels of smartphone addiction (high and low) and gender on dependent variable i.e. cognitive failure.

Findings

In the light of above hypotheses, Analysis of variance was used to assess the effect of two levels of smartphone addiction (High/Low) and two levels of gender on cognitive failure.

Table 1: Means, Standard Deviations and F-ratios for Cognitive Failure as a function of Smartphone Addiction and Gender

Variables	Levels	Means	SDs	F-Ratios
Smartphone Addiction	High	58.40	9.55	4.284*
	Low	54.29	9.22	
Gender	Girls	57.72	9.75	9.570**
	Boys	54.97	9.02	

Table 1 shows Means, Standard Deviations along with F-ratios of cognitive failure as a function of smartphone addiction and gender. As shown, high level of smartphone addiction scored higher on cognitive failure (M = 58.40, SD = 9.55) as compared to low level of smartphone addiction (M = 54.29, SD = 9.22). The difference between these two groups was found to be significant {F (1,196) = 4.284, p<0.05}, which implied that individuals high on smartphone addiction were high on cognitive failure than those who were low on smartphone addiction. These findings support the first hypothesis that the subjects high on smartphone addiction would be high on cognitive failure as compared to subject low on smartphone addiction. It can also be observed from Table 2 girls, irrespective of their level of smartphone addiction, scored higher on cognitive failure (M = 57.72, SD = 9.75) as compared to boys (M = 54.97, SD = 9.02). Significant difference was found in both groups {F (1,196) = 9.570, p<.01}. This shows that boys scored low on cognitive failure than girls, which led to the acceptance of second hypothesis that girls would score higher on cognitive failure as compared to boys.

Table 2: ANOVA Summary for Cognitive Failure as a function of Smartphone Addiction and Gender

Source of Variance	SS	df	MS	F
Smartphone	378.125	1	378.125	4.284*
Gender	844.605	1	844.605	9.570**
Interaction (Smartphone X gender)	105.125	1	105.125	1.191
Within Group	17297.34	196	88.251	
Total	18625.195	199		

P<0.05*

Table 2 represents ANOVA summary for cognitive failure as a function of Smartphone Addiction and Gender. Although the main effect of both smartphone addiction and gender came out to be significant for cognitive failure, but the interaction effect of smartphone addiction with gender did not reach the significance level{F (1,196) = 1.191, p>0.05}. Therefore, it is inferred that there is significant effect of smartphone addiction and gender on cognitive failure but their interaction effect on cognitive failure among adolescents came out non-significant.

Substantial research supports our first hypothesis that the overuse of mobile devices is seen as having a direct impact on the development of cognitive processes. The current generation of children and adolescents are developing increasingly shorter attention spans due to their increased contact with smartphone technology, and use onset at younger ages (Nikken and Schols, 2015). Egan (2016) concluded that regular engagement with these devices can lead to diminished attentional capacity, producing cognitive failures. The results find support from the study of Adrian et al. (2016) who conducted a qualitative research on smartphone and cognition. In this research, they test the “brain drain” hypothesis that the mere presence of one’s own smartphone may occupy limited-capacity cognitive resources, thereby leaving fewer resources available for other tasks and undercutting cognitive performance. The effects of smartphone on cognitive flexibility of undergraduate students were investigated by Hartanto et al., (2016). It was revealed that smartphone impaired the cognitive flexibility of students. Williams et al. (2014**)** studied the impact of mobile phone usage on the psychosocial wellbeing of 193 nursing students and found a significant association between excess usage of mobile phones, attention and concentration of the subjects.

The main effect of gender on cognitive failure found to be significant indicating that females scored more on cognitive failure than their male counterparts. These results {F (1,196) = 9.570, p<0.01}the girls would be high on cognitive failure as compared to boys.The research on gender differences in cognitive abilities is marked by inconsistency. Discrepancies in

the literature on gender differences in cognitive abilities may arise from discrepancies in how cognitive abilities are operationalized. Even for those gender differences receiving consistent support in adults (e.g. a male advantage in visual–spatial ability), the age at which these differences emerge in childhood is unclear. Cognitive slips and errors are common in daily life, with most people at one time or another. However, some individuals are more likely to commit such slips than others. The differences of learning and memory between males and females have been well documented and confirmed by both human and animal studies. The sex differences in cognition started from early stage of neuronal development and last through entire life span. The major biological basis of the gender-dependent cognitive activity includes two major components: sex hormone and sex-related characteristics, which are responsible for vulnerability to cognitive errors in females.

Past research has also examined the fear of success, specifically in women (Sherman, 1988; Depner& O'Leary, 1976; Golden, 1988). Over usage of smartphones results in cognitive overload and fear of failure hampering the natural performance. Fearing failure has been associated with a decrease in goal attainment and enjoyment of chores or duties, as well as an increase in avoiding tasks and committing errors (Conroy, 2001). Individuals who demonstrate fear of failure are unsure about their ability to be successful (Covington &Omelich, 1991), and do not believe in their capacity to avoid failure in their endeavors and often attach negative and painful consequences to the act or experience of failing at a given task or goal results in more errors (Shultz, 1999). This results either in cognitive errors or in a motive to avoid situations where one may fail due to anticipatory shame and humiliation because the individual was fearful of failing (Conroy, Kaye, & Fifer, 2007). Failure can be a threat to persons that associate failing with aversive consequences. Further, Conroy et al. (2007) reports females believe that aversive consequences will occur after failure so they feel threatened during evaluative situations and commit cognitive errors. This fear of failure becomes a constant source of anxiety and stress that sabotages performance resulting in cognitive failures.

Conclusion

The detrimental effects of smartphone addiction such as fatigue, headache, decreased concentration and local irritation & burning appear scary, and definitely call for better understanding. One striking negative effectabout digital technology consumption, revealed in this research study, is how it is diminishing our attention span and cognitive capacity by overloading stimulation.The addictive qualities associated with smartphone cannot be denied and is gaining prominence as a serious concern. Overall, the findings of this research emphasize the utmost importance to integrate and habituate healthy "digital practices" in teenagers' lives. As the youth is being trapped by the internet addiction, regular counseling sessions should be provided by expert psychologists, psychiatrists or expert administrator. Seminars, workshops or conferences should be held in the colleges on regular basis in order to create awareness regarding Internet Addiction, its etiology and prevention. Parents should spare few minutes of their valuable period for their wards so that could feel comfort and frankly share their pros with their parents rather than via virtual world.Modern Youth should be motivated to participate in physical activities as sports or meditation. This could help them in cutting down their excessive time spent on internet with an ease and would further result in high well-being.

References

1. *Adrian Leemann, Marie-José Kolly, Ross Purves, Britain, Elvira Glaser (2016). Published: January 4, 2016.*
2. *Broadbent, Donald E., et al. "The cognitive failures questionnaire (CFQ) and its correlates." British journal of clinical psychology 21.1 (1982): 1-16.*
3. *Brumby, Duncan P., et al. "Recovering from an interruption: Investigating speed− accuracy trade-offs in task resumption behavior." Journal of Experimental Psychology: Applied 19.2 (2013): 95.*
4. *Cades, David M., et al. "Does the difficulty of an interruption affect our ability to resume?." Proceedings of the human factors and ergonomics society annual meeting. Vol. 51. No. 4. Sage CA: Los Angeles, CA: SAGE Publications, 2007.*
5. *Conroy, Ruth Alison. Spatial navigation in immersive virtual environments. Diss. University of London, 2001.*
6. *Conroy, David E., Miranda P. Kaye, and Angela M. Fifer. "Cognitive links between fear of failure and perfectionism." Journal of Rational-Emotive & Cognitive-Behavior Therapy25.4 (2007): 237-253.*
7. *Conroy, David E., Miranda P. Kaye, and Angela M. Fifer. "Cognitive links between fear of failure and perfectionism." Journal of Rational-Emotive & Cognitive-Behavior Therapy25.4 (2007): 237-253.*
8. *Covington, M.V., &Omelich, C.E. (1991). Need achievement revisited: Verification of Atkinson's original 2x2 model. In C. D. Speilberger, I.G., Sarason, Z. Kulesar& G.L. Heek (Eds.). Stress and emotion: anxiety, anger, curiosity. (pp. 85-105). New York: Hemisphere*
9. *Egan, T. (2016). The Eight-Second Attention Span. New York City, NY: The New York Times.*
10. *Galaburda, Albert M., et al. "Planum temporale asymmetry, reappraisal since Geschwind and Levitsky." Neuropsychologia25.6 (1987): 853-868.*
11. *Hadar, A. A., Eliraz, D., Lazarovits, A., Alyagon, U., and Zangen, A. (2015). Using longitudinal exposure to causally link smartphone usage to changes in behavior, cognition and right prefrontal neural activity. Brain Stimul. 8, 318. doi: 10.1016/j.brs.2015.01.032*
12. *Gamble, Amanda L., et al. "Adolescent sleep patterns and night-time technology use: results of the Australian Broadcasting Corporation's Big Sleep Survey." PloS one 9.11 (2014): e111700.*

13. *Ghose A., Goldfarb A., Sang- Pil H. (2010). How is the mobile internet different? Search costs and local activities. Wharton Interactive Media Institute-Marketing Science Institute*
14. *Haverlag, D. Compulsief gebruik van sociale media op de smartphone. MS thesis. 2013.*
15. *Hartanto, A., & Yang, H. (2016). Is the smartphone a smart choice? The effect of smartphone separation on executive functions. Computers in Human Behavior, 64, 329-336.*
16. *Ha, Jee Hyun, et al. "Characteristics of excessive cellular phone use in Korean adolescents." CyberPsychology & Behavior 11.6 (2008): 783-784.*
17. *Kwon, Min, et al. "Development and validation of a smartphone addiction scale (SAS)." PloS one 8.2 (2013): e56936.*
18. *Leiva, Luis, et al. "Back to the app: the costs of mobile application interruptions." Proceedings of the 14th international conference on Human-computer interaction with mobile devices and services. ACM, 2012.*
19. *Lane, Wilburn, and Chris Manner. "The impact of personality traits on smartphone ownership and use." International Journal of Business and Social Science 2.17 (2011).*
20. *Lin, Yu-Hsuan, et al. "Time distortion associated with smartphone addiction: Identifying smartphone addiction via a mobile application (App)." Journal of psychiatric research 65 (2015): 139-145.*
21. *Kim, Hyunna. "Exercise rehabilitation for smartphone addiction." Journal of exercise rehabilitation 9.6 (2013): 500.*
22. *Kwon, Min, et al. "Development and validation of a smartphone addiction scale (SAS)." PloS one 8.2 (2013): e56936.*
23. *Ko, Ki-Sook, Myoun-Jae Lee, and Young-Eun Kim. "A research on addictive use of smartphone by university students." Journal of Digital Contents Society 13.4 (2012): 501-516.*
24. *Sansone, Randy A., and Lori A. Sansone. "Cell phones: the psychosocial risks." Innovations in clinical neuroscience 10.1 (2013): 33.*
25. *Shultz, Thomas R. "Rule learning by habituation can be simulated in neural networks." Proceedings of the 21st Annual Conference of the Cognitive Science Society. Erlbaum Mahwah, NJ, 1999.*
26. *Monk, Christopher A. "The effect of frequent versus infrequent interruptions on primary task resumption." Proceedings of the Human Factors and Ergonomics Society Annual Meeting. Vol. 48. No. 3. Sage CA: Los Angeles, CA: SAGE Publications, 2004.*
27. *Monk, Paul MS, Roger J. Mortimer, and David R. Rosseinsky. Electrochromism: fundamentals and applications. John Wiley & Sons, 2008.*
28. *Nikken, P. and Schols, M. (2015) 'How and why parents guide the media use of young children.' Journal of Child and Family Studies, 5–8.*
29. *Sherman, Eli L. "Mailable mobile for photographs and similar planar objects." U.S. Patent No. 4,729,182. 8 Mar. 1988.*
30. *Thornton, Alex, Jess Isden, and Joah R. Madden. "Toward wild psychometrics: linking individual cognitive differences to fitness." Behavioral Ecology 25.6 (2014): 1299-1301.*