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A LINK BETWEEN INTERNET ADDICTION AND ATTENTION DEFICIT HYPERACTIVITY DISORDER SYMPTOMS IN PAKISTANI UNDERGRADUATES

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ABSTRACT

The current research aims to establish a link between internet addiction and Attention Deficit Hyperactivity Disorder (ADHD) Symptoms among Pakistani Undergraduates. The sample comprised of (N =1020) undergraduates from Bahauddin Zakariya University Multan (BZU) and The Islamia University of Bahawalpur (IUB), Pakistan, including 255 male and 255 female from each university. A-Priori sample size was estimated with 974 participants, to consider sample size sufficiency, twenty three respondents were taken additionally from each university. There were two questionnaires employed; Chen Internet Addiction Scale by © Ko et al. (2005), and ADHD Adult Self Reporting Scale (ASRS) by © Kessler et al. (2005). Cross-sectional survey research design was used. Data were collected through purposive sampling and analyzed by use of SPSS (21.0). Regression, t-Test, mean, and standard deviation were employed. The result depicts; overall 28% students fulfill the criteria of internet addiction, and comparatively BZU students have higher prevalence of internet addiction with ADHD symptoms as compared to IUB. Likewise, male students are found more vulnerable towards ADHD symptoms and internet addiction as compared to female students. Study proved the significant relation of internet addiction with ADHD symptoms (0.082). Finally, implications, significance of the study, and limitation are enclosed.*

Key terms: *Internet Addiction, ADHD Symptoms, Undergraduate Students, Pakistan*

INTRODUCTION

In the modern trends life is impractical without computer and internet (Korkeila, 2012). The internet has diverse uses from education to entertainment and from chatting to business enhancement (Young, Abreu, 2011; Mythily, Qiu & Winslow, 2008). But, overuse of internet in terms of time creates adverse outcomes (Griffiths, 2001). Internet addicts are classified into two categories; one are those whom gain pleasure out of it, and second are escapers from responsibilities (Griffiths, 1995). In some instance technology has negative consequences that cause physical and psychological harm to human beings such as development of ADHD symptoms (Griffiths, 1995; Griffiths & Parke, 2002; Yoo et al., 2004). Teenagers are most vulnerable towards development of ADHD (Ceyhan, 2010; Yen et al., 2007). Similarly, internet addiction is associated high ADHD symptoms (Chen, Chen, & Gau, 2015).

ADHD is a psychiatric disorder by nature in children and adolescents (Spencer, Biederman, & Mick, 2007). And it depicts great difficulty attending to task or persistent problems in attention, hyperactivity and impulsivity included (APA, 2013). The ratio of ADHD sufferers is increasing day by day especially in United States (CDC, 2012). Some studies reported that near about 14% adults were

internet addicts diagnosed with ADHD (Bernardi & Pallanti, 2009; Ko, Yen, Yen, Chen, & Chen, 2012; Ko et al., 2008; Yen et al., 2009). Similarly, another research reveals that a strong relationship exists between internet addiction and ADHD as well used term high comorbidity of ADHD and internet addiction (Petersen, Weymann, Schelb, Thiel, & Thomasius, 2009).

According to Yen et al., (2007), reported that ADHD has been associated with internet addiction for children, as vice versa excessive use of internet leads to high risk developing symptoms of ADHD for children (Yoo et al., 2004). Furthermore adolescents have higher symptoms of ADHD who play online games, using chat rooms, engaged social networking sites like Facebook (Chan & Rabinowitz, 2006). Another study probe that continuous playing online games was associated with ADHD and behavior become such as rigidity, poor concentration, hyperactivity and oppositional behavior (Chan & Rabinowitz, 2006).

A plethora of research investigated excessive use of internet and playing online games causes the release of dopamine neurotransmitter that further leads to ADHD (Bedard et al., 2007; Han et al., 2007; Kirley et al., 2002; Koepp et al., 1998; Miyake & Shah, 1999). Moreover, ADHD causes weak working memory; likewise some studies probed the correlation between ADHD and visual working memory (Hong et al., 2000; Ventre-Dominey, 2005). In contrast, some studies stated that playing video games enhance and active children visual spatial functioning that further generating symptoms similar to hyperactivity. Children plying action games produce inability to control time and increase efficiency of visual search and impulsivity (Castel, Pratt, & Drummond, 2005). Green and Bavelier (2007), reported that children continue 10 days playing online games increase motor coordination and detection object ability that resembles the symptoms of ADHD, like restlessness and wandering.

According to Schafer et al., (2013) investigated that children with ADHD have poor recognition skills and poor listening abilities especially in noise, further study reported that children would be prefer to escape social situations, excessive internet users prevailing ADHD symptoms and persistently avoid real social situations and crowd, because internet would cause isolation. There is strong relationship exist between internet and ADHD and this association higher in male of all ages as compare to female (Carli et al., 2013). Similarly another study suggested that the association of internet addiction and ADHD more common in males as compare to females, but presence of ADHD symptoms in female exhibit social phobia (Gau, Chong, & Chen, 2005; Ko et al., 2006).

Rationale of the study

Current study aims to investigate internet addiction in undergraduate university students of Southern Punjab Pakistan, and its effect on developing symptoms of ADHD. Researches supported that there is high prevalence of internet in undergraduates. The peak age of internet use is sixteen to twenty four years and this age group of individuals highly risks involving internet addiction and symptoms of ADHD. Literature supported that Internet addiction is associated with high ADHD symptoms, and comorbidity expected between ADHD and internet addiction. So, there was a dire need to extend this theory within the context of developing nations such as Pakistan.

Objectives of the Study

1. To investigate the prevalence of internet addiction in undergraduates of both universities (BZU & IUB).
2. To examine the relationship of internet addiction with all possible variations of ADHD symptoms (impulsivity/hyperactivity & Inattention problems).
3. To discern occurrence of internet addiction between male and female students.

Hypotheses

H_1. Prevalence of Internet addiction is higher in BZU than IUB students.

H_2. Internet addiction has a significant contributor to create ADHD symptoms of inattention, impulsivity/hyperactivity problems in students.

H_3. Internet addiction is higher in male as compare to female students.

METHOD

Participant characteristics

The sample was comprised of 1020 (N=1020) undergraduate students from The Islamia University of Bahawalpur and Bahaudin-Zakarya University Multan. Sample took from both genders equally on the basis of literature support. This is the rationale that data collected from both universities equally that engrosses 255 male and 255 female belongs to The Islamia University of Bahawalpur. Similarly, 255 male and 255 female students belong to Bahaudin-Zakarya University Multan. Cross sectional survey method used for this research and Purposive sampling technique was used for collecting data.

Procedure

Purposive sampling technique was used to collect data. There were two tools used for collecting data, before implementation, tools were translated into Urdu language with formal permission of the authors and followed guidelines of forward translation by (Wild et al.,2005). The purpose of study was explained to students and instructions given to each student regarding questionnaires. Moreover, after collecting data it was analyzed through SPSS 21.0. The results displayed through standard tables. After that, discussion was made on the basis of results and compare with relevant researches. Finally, discussed limitations of the study and suggestion recommended for the betterment of future research.

Measures and Covariates

Following questionnaires were used in the study:

Chin Internet Addiction Scale (CIAS).

Chen Internet Addiction scale developed by © Ko et al. (2005). The CIAS is a four-point likert type scale that consist of 26-item self-reported scale that assessing Internet-related symptoms and problems. The total score of the CIAS ranges from 26–84. Higher CIAS scores indicated high severity of addiction to Internet activity. The internal reliability of the scale in the original study was ranged from 0.79–0.93, during pilot study the reliability of the scale found Cronbach's alpha 0.760, as well as found good split half reliability (Guttmann split-half coefficient 0.447).

ADHD Adult Self-Reporting Scale.

ADHD Adult Self Reporting Scale (ASRS) developed by © Kessler et al. (2005). The ASRS will use to measure self-reported ADHD symptoms. It is an 18 items self-reporting questionnaire based on DSM-IV-TR criteria for check ADHD symptoms. It is a five-point Likert-type scale ranging from one (Never) to five (Very often). Further it has two sub-scales, Inattentive and Impulsivity-Hyperactivity. It is used adults as well adolescents. ASRS worldwide use scale has internal consistency of reliability range (Coefficient a= 0.63-0.72), and test-retest reliability (Pearson correlations, 0.58-0.77). After pilot study of translated ASRS scale the reliability found Cronbach's alpha 0.758. It has good split half reliability (Guttmann split-half coefficient 0.631).

Statistical Analyses

Statistical analyses were performed by using Statistical Package for Social Sciences (SPSS), Version 21.0. Analyzed data through descriptive statistics, in which Mean, Standard Deviation used and t-test for comparing mean of both University students, as well use Regression analysis to predict level of significance.

Precision and Statistical Power Level

A-priori sample size was calculated for Regression from online, at the anticipated effect size $f^2 = 0.02$, desired statistical power level 0.95, number of predictors 4, probability level 0.04. Finally, minimum required sample size 974 is obtained (Soper, 2015). Twenty three respondents were taken additionally from each University to minimize the biasness of respondents.

Ethical Considerations

Permission for using the scale has been taken from the respective authors and departmental permission taken. Informed consent has been taken from all respondents. All participants have filled questionnaires willingly; forced choice not applied on any respondents and not provides any reward or financial assistance to the participants.

Operational Definition of Variables

Internet Addiction.

Internet addiction is a relatively dangerous affliction with Internet through different sources that can wreck your health, damage relationships, poorly controlled preoccupations and reduce your overall productivity (Padwa & Cunningham, 2010**;** Young & Rogers, 1998)

Attention Deficit Hyperactivity Disorder Symptoms.

Persistent pattern of inattention and/or hyperactivity-impulsivity that is more frequently displayed and is more severe than typically observed in individuals at comparable level of development (APA, 2000; Biederman et al., 1996).

RESULTS

Table 1 Distribution of sample according to Internet Addiction

Internet Addiction	Frequency	Percent
Yes (57or Greater)	286	28.0
No (Less than 57)	734	72.0
Total	1020	100.0

The table 1 shows the level of internet addiction in the overall population of both universities. From the 1020 students 28% students have internet addiction and the other 72% do not have internet addicts.

Table 2 Comparison of the BZU and IUB in case of Internet Addiction

Institute	N	Mean	Std. Err	Comparison using t-test			
				Mean Diff	t-score	d.f	P-value
BZU (Multan)	510	54.69	0.377	8.204	15.012	1018	0.000
IUB (BWP)	510	46.49	0.395				

Note. P < 0.05

The table 2 shows the comparison of the both universities (BZU and IUB) in case of Internet Addiction. The average score of The Islamia University of Bahawalpur students is 46.49 with std. error 0.395 and the average score of Bahauddin Zakariya University of Multan students is 54.69 with std. error 0.377, and t-score for the comparison is 15.012 and P-value is 0.000 shows the significance of test at 5% level of significance. As the average of BZU is greater than IUB students hence we conclude that Internet addiction in BZU students is higher as compared to IUB.

Table 3 Effect of Internet Addiction on Impulsivity and Hyperactivity of ADHD

Dependent Variable	R Square	Std. Error	Regression Coefficient	t-score	P-value
Impulsivity and Hyperactivity	0.033	3.621	0.180	5.855	0.000

Note. a. Predictors: (Constant), Internet Addiction

The table 3 shows the effect of Internet Addiction on Impulsivity and Hyperactivity in overall population. The value of R-Square is 0.033 and the value of regression coefficient (Beta) is 0.180, the value of t-score is 5.855 and the p-value is 0.000 at 5% level of significance shows significant influence of internet addiction on Impulsivity and Hyperactivity.

Table 4 Effect of Internet Addiction on Inattention Problems of ADHD

Dependent Variable	R Square	Std. Error	Regression Coefficient	t-score	P-value
Inattention Problems	0.046	4.394	0.214	7.006	0.000

Note. a. Predictors: (Constant), Internet Addiction

The table 4 shows the effect of Internet Addiction on Inattention Problems in overall population. The value of R-Square is 0.046 and the value of regression coefficient (Beta) is 0.214, and t-score is 7.006 and the p-value is 0.000 at 5% level of significance. Result shows the significant influence of internet addiction on Intention Problems.

Table 5 t-Test for the Comparison of Gender in case of Internet Addiction

Gender	N	Mean	Std. Err	Comparison using t-test			
Male	510	51.19	0.433	Mean Diff	t-score	d.f	P-value
Female	510	49.99	0.419	1.204	1.997	1018	0.046

Note. $P < 0.05$

The table 5 shows the comparison of male and female students in case of Internet Addiction. The average score of the male students is 51.19 with std. error 0.433 and the average score of female students is 49.99 with std. error 0.419, and t-score for the comparison is 1.997 and P-value is 0.046 shows the significance of test at 5% level of significance. The score of males is greater than female hence we conclude that Internet addiction in male is higher as compared to female students.

Table 6 Impact of internet addiction on ADHD symptoms of both university students

Variables		IU (BWP)		BZU (Multan)	
	Reg. Co	Mean	Std. Devi	Mean	Std. Devi
Inattention type	0.214*	15.54	4.808	16.01	4.153
Impulsivity/Hyperactivity type	0.180*	6.74	4.098	6.75	3.211
ADHD	0.082*	22.34	6.323	22.73	5.052

The table 6 shows the summary of comparison of both universities in case impact of internet addiction on ADHD symptoms at 5% level of significance. The stars (*) on the values of regression coefficients shows the high significance of internet addiction on ADHD symptoms. BZU students have suffering more symptoms of inattention and hyperactivity as compare to IUB students.

DISCUSSION

The current study was conducted to investigate Prevalence of internet addiction in south-Punjab undergraduate University students and examine its consequences as symptoms of ADHD. Result supported that excessive use of internet lead to internet addiction, the first hypothesis of study accepted. The prevalence of Internet addiction in undergraduates is 28% out of 1020 sample that is alarming for this area of Pakistan, but as compare with other countries in South-Punjab ratio of internet addiction in students is less, than other countries and areas like, US adolescent use internet has 93% that was peaked ratio and Greece was reported as 72% for the 18-24 age group internet users (Observatory, 2011). Similarly another Italian research reported that 94.19% of adolescents are normal users of the internet (Poli & Agrimi, 2012).

Other researches also supported that prevalence of internet addiction in students increased, findings are, chi-squared = 25.907, df = 3, $p < 0.0005$. Result shows significant relationship between students and internet addiction (Hawi, 2013). Similarly, another research findings are, $\beta = .042$, $p < .0001$. Values show significant results between students and internet addiction, study also probed that the prevalence of internet in undergraduates are 85.3% of entire sample (Derbyshire et al., 2013). Other research findings show significant relationship of internet with adolescents users, $\beta = .0418$, $p < .01$. Students identified internet addicts (Israelashvili, Kim, & Bukobza, 2012).

While comparing both universities, Bahauddin Zakariya university students have more internet addicts as compare to The Islamia University students. The average score of IUB students is 46.49 with std. error 0.395 and the average score of BZU students is 54.69 with std. error 0.377, and t-score for the comparison is 15.012 and P-value is 0.000 shows the significance of test at 5% level of significance. Result indicated that BZU students score is greater than IUB students hence Internet addiction in BZU students is higher as compared to IUB. Furthermore, internet addiction has significant relationship with Attention Deficit Hyperactivity Disorder (ADHD). Internet addicts also exhibit ADHD symptoms. Result shows that in comparison of both universities BZU students was more internet addicts as compare to IUB, The value of R-Square is 0.033 and the value of $\beta = 0.180$ shows the influence of internet addiction on Impulsivity and Hyperactivity. The t-score is 5.855 and the p-value is 0.000 shows the significance of test at 5% level of significance. Likewise, inattention symptoms of ADHD the value of R-Square is 0.046 and the value of $\beta = 0.214$ shows the influence of internet addiction on Inattention Problems as well at $P < 0.05$. The t-score is 7.006. The hypothesis is proved. Similarly, research supported that internet addiction contributes to symptoms of ADHD, results shows t-score of male 10.69 and female t-score = 7.77 significance at $P < 0.01$. (Yen, Ko, Yen, Wu, & Yang, 2007). Other researches also supported that internet addiction induce symptoms of ADHD (Ko, Yen, Yen, Chen, & Chen, 2012). Internet addictions associated with high ADHD symptoms Internet addiction is associated high ADHD symptoms (Chen, Chen, & Gau, 2015).

Similarly, results proved that internet addiction in male is higher as compare to female. The mean score of male in internet addiction is 51.19 with std. error 0.433, and female 49.99 with std. error 0.419. Furthermore t-score for the comparison of both genders is 1.997 and P-value is 0.046 shows the significance of test at maintains 5% level of significance. Hypothesis of the study also proved. Other researches also supported that internet addiction is grater in male as compare to female (Yu & Shek, 2013; Caplan, 2007). Likewise, another study result shows that use of internet is greater in male students as compare to female students; t-score is 4.046, $P < 0.001$ (Odaci & Kalkan, 2010).

CONCLUSION

The present study concluded that 286 (28%) undergraduate students have internet addiction out of 1020 that studies in South-Punjab Universities of Pakistan. While comparing both universities, Bahauddin Zakariya University students have more internet addicts as compare to The Islamia University students. Furthermore, internet addiction has significant relationship with Attention Deficit Hyperactivity Disorder (ADHD) symptoms. Students of BZU suffer more ADHD symptoms as compare to students of IUB.

Significance and Implications

Internet addiction (IA) has been considered a serious public health issue (Koh, 2007). Internet addiction leads to deterioration of physical and mental health (Cao, Sun, Wan, Hao, & Tao, 2011; Chang & Man Law, 2008; Ko, Yen, Chen, Chen, & Yen, 2005; Young, 1998).
Internet addiction prevailed in students and need to solution of that problem (Ahmadi & Saghafi, 2013; Poli & Agrimi, 2012). Internet addiction was strongly correlated with ADHD symptoms (Chan & Rabinowitz, 2006). However, the prevalence of IA in Pakistan has not been accurately documented and not systematic research conducted before on this issue. This study can provide much information about internet addiction and its effects. The important effect that needs to be investigating in this study is whether the internet addiction

leads to ADHD symptoms in university undergraduates.

The strength of this study lies in its methodology (surplus sample size, reliable and valid translated tool used, and in results identified ratio of internet addicts) and the contribution to the IA field of inquiry through the construction of a consensus definition of IA along with the supportive literature.

Limitations and Suggestions

Likewise all other studies in the field of social and behavioral sciences, this study has some limitations and boundaries. Therefore, there were some problems during conduct this research. Followings are some limitations of the study.

1. The entire work was circled around government universities and undergraduate students due to limited resources and time or may be other extraneous variables. In future researchers should include students of private universities and colleges.
2. The research examined the nature of participants in a particular area of Pakistan. It might be difficult to generalize the study's findings further than the whole country in which the research was conducted because each society and culture has its own demographic profile and social norms that may influence student behavior with regard to Internet use. I suggest for future studies data will be taken from all provinces to generalize results into whole country.
3. Current study examined association of two variables; future research should investigate many other factors that associated with internet addiction.

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