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Internet Addiction: Predictor of Disturbed Emotion Regulation, Sleep quality and General Health in University Students

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Excessive practice of using internet may result to behavioral addiction that is associated with detrimental physical, emotional and psychological health in university students by using between-groups correlational research design. The present research explored differences in university students with and without internet addiction regarding disturbed emotion regulation, poor sleep quality and general health issues. Further, the research explored internet addiction as a predictor of disturbed emotion regulation, poor sleep quality and general health issues in university students identified with internet addiction. The sample contained 600 students (375 with & 225 without internet addiction) from different public universities of Lahore. Findings revealed higher mean scores for the students with internet addiction on disturbed emotion regulation, poor sleep quality and general health issues ($p < 0.01$). Besides internet addiction, gender and nuclear family system emerged as significant predictors of disturbed emotion regulation, poor sleep quality and general health issues ($p < 0.01$) in university students. Research implications suggest that young adults from universities should be given counselling for appropriate usage of internet rather develop internet addiction so that they can be able to utilize internet rather than deteriorating their health and time .

Keywords: *i*nternet addiction; sleep quality; emotion regulation; general health

Use of internet has become the foremost source of communication, education and entertainment in the present time as internet technologies facilitate individuals to organize routine life functions expeditiously. University students use internet considerable amount of time as universities provide mostly free and unlimited internet to students for educational purposes. But it is found that besides educational purposes, university students also use internet technology to explore inappropriate content or other irrelevant activities using social media, Instagram, playing internet games, chatting etc. (Capetillo & Juárez, 2015). Overuse of internet is reported to be associated with internet addiction (Şenormancı, Saraçlı, Atasoy, Şenormancı, Koktürk & Atik, 2014). University students are especially vulnerable to internet addiction as they have easy accessibility in comparison with the other populations. What causes internet addiction in university students can be explained by Kandell (1998) i.e., students find twenty-four hours free access to internet in campus premises. Newly admitted students may find it challenging to adapt to be responsible for independent tasks management,

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choosing new friends etc. So, possibly, the new students find internet as a bridge between learning to leave dependent behaviors and adopt new lifestyles (Khan, et al., 2020). Starting taking independent decisions may cause stresses that may enforce the student to turn to addictive behaviors as coping mechanisms. Subsequently, the young adults get involved in chatting or romantic partners through internet can acquire impeccable interaction. This type of impeccable interaction present only the good aspects of each other's personalities those are difficult in direct communications.

Despite of innumerable advantages, the over use of these media is the leading cause of its addiction which is synonymous to dependence disorder. Addiction or dependence disorder is defined as excessively devoted to something with inability to control or choose freely and that can cause problematic behavior (Rooij & Prause, 2014). Addiction beyond substance use encompasses the category of non-substance related behaviors which may exhibit comparable effects on physiology, behavioral patterns and emotional deregulation. Excessively engage on internet has been included in "Internet use gaming disorder" in DSM-V (Diagnostic and Statistical Manual of Mental Disorders; section 3). DSM-V addiction specific criteria describes behavioral and chemical addiction have the same patterns and defines addiction in terms of severe physiological, psychological and emotional side effects (American Psychiatric Association, 2013). Even though generally, the internet addiction is never observed as a significantly threatening like substance addiction is, the abusive use sources to withdrawal and tolerance frustration. Physiological effects i.e., general health effects of internet addiction may accompany with the psychological symptom i.e., anxiety and depression.

Young (2007) appraised some of the criteria and guidelines to diagnose internet addiction in a person. These guidelines consist in "the person consistently mentally occupied concerning the internet mostly, get satisfaction by using excessive internet, unable to reduce using internet, in the absence of internet, feels mood swings, irritability, agitated, anxious and depressed, unplanned longer usage, careless about losing interpersonal relations within family, educational or occupational settings, cheating and lying to close friends and family members about being online mostly and avoid focusing everyday problems and remain busy on internet. Young elaborated further that the person becomes helpless to resist once an individual is addicted to internet, is preoccupied almost all the time with internet thoughts and having behavioral complications and psychosomatic symptoms.

Internet addiction has become recurrent phenomenon especially in Asian students (Orsal, Unsal & Ozalp, 2013). Consistently, the occurrence of internet addiction among university students is increasing in Pakistan also as they have been reported spending a great quantity of time using the internet, thus developing internet addiction (Gedam, Shivji, Goyal, Modi & Ghosh, 2016). Researches have proven that excessive usage of internet addiction can steer to disturbed emotion regulation, poor sleep problems, poor health outcomes and psychological distress (Walker, 2014). Spada (2014) and Gedam et al. endorsed the association of risky use of internet with disturbed emotional regulation which further cause poor sleep, general health issues, psychological distress and compromised family functions.

Emotion regulation process normalizes physical and mental progression and initiates, constrains and modulates the emotion related functions (Howe, 2005). Emotions are basically feeling that are physiological arousal reactions and can be expressive or subjective experiences (Gross, 1998). Emotion regulation comprises in two basic procedures i.e., reappraisal and suppression. Reappraisal means that the situation is construed in a less intensive emotional impact that is associated with significant optimistic reactions. Conversely, suppression holds back expressing inner feelings (Gross, 2002). Reappraisal of situation improves general well-

being and makes the person functional. When on the contrary, suppression is linked with destructive emotions that progresses dysfunctional behaviors.

Emotion regulation influences and directs the individual in re-appraising the situation and modifying the expression of emotions according to the situation (Rottenberg & Gross, 2003). Emotion regulation sustains, intensifies, maintains or inhibits certain emotions for the purpose of managing the emotional situations. Broadly speaking, emotion regulation consisted in regulating the stressful situations and negative affect (Koole, 2009).

Emotion regulation process coordinate and balance the emotions and emotional reaction appears in the form of physiological reaction, thoughts, feelings and behavior (Koole). If this harmony is disturbed, difficulties in emotional regulation emerges which ultimately deteriorate individuals' physical and psychological well-being as emotion dysregulation is related with anger, stress, anxiety and depressive reactivity (Harrist, Tait, Topham, Shriver & Page, 2013), hostility and disturbed sleep (Compare, Zarbo, Shonin, Van Gorden & Marconi, 2014; Amstadter, 2008). Researchers have demonstrated emotional dysregulation contributes in increasing multiple psychopathologies that affects physical health as well (Lynch, Robins, Morse & Krause, 2001). Some studies have established connection between suppressed emotions and development of addictive disorders (Wilens, Martelon, Anderson, Abrahanson & Biederman, 2013) and has confirmed a moderating role in addiction increase (Wills, Pokhrel, Morehouse & Fenster, 2011). So, internet addiction along with influencing emotion regulation, also disturbs sleep quality which ultimately deteriorates physical and psychological health in general (Stavropoulos, Alexandraki & Motti-Stefanidi, 2013).

Researchers i.e., Cheng et al., (2012) have found 19% to 57% of Chinese university students reported low quality sleep which was further reported to had significant association with internet addiction. Similarly, in another research in Turkey (Sahin, Ozdemir, Unsal & Tamiz, 2013) found significant association of internet addiction with low sleep quality in university students. These findings were endorsed by Aghdam, Some'eh & Kazemi (2016) who also reported that internet addiction and disturbed sleep were significantly associated in university students.

Researchers agree that excessive use of internet develops independent patterns which interfere with routine functioning of users such as Scherer (1997) found thirteen percent of South American college students (N=531) who were addicted to internet, developed dependent patterns. They were having difficulties in performing day to day routine work, in interpersonal relationships and in job performance. Moreover, Senormancia et al., (2014) conducted a large survey and found lengthy internet timings, being male, symptoms of anxiety and depression and idealistic behavior as significant predictors of internet addiction.

The current study is the first systematic study on the adverse effects of internet addiction on disturbed emotion regulation, poor sleep quality and general health in university students in Pakistan. Studying the predictive relationship of internet addiction with disturbed emotion regulation, poor sleep quality and general health issues would help to understand the importance of maintaining stable behavior while using internet. These findings will also help university students to manage their internet addiction and make them aware of normal use of internet so that it would not affect their physical or mental health. The objectives of the present study were to find out (i) group differences regarding disturbed emotion regulation, poor sleep quality and general health issues in university students with and without internet addiction and (ii) explore predictive relationship of internet addiction with disturbed emotion regulation, poor sleep quality and general health in students with internet addiction.

Method

Research Design: The present research used a between-groups correlational research design.

Participants

The sample included a total of 600 university students with (n=375) and without (n=225) internet addiction. The groups were matched on age range i.e., 19-24 and education level (BS honors). The mean age of group with internet addiction was $Mean_{(age)}$ = 16.26, *SD*= 1.44, whereas mean age of the group without internet addiction was $Mean_{(age)}$ = 16.14, *SD* = 1.99 (t = 0.69; *p* = 0.490). All the students reported that they have 24 hours access of internet.

Assessment Measures

Internet Addiction Test (IAT; Young; 1998)

Internet addition was assessed through IAT which measures addictive use of internet in terms of severity e.g., mild (20-49), moderate (50-79) and severe (80-100) levels of addiction. IAT is 20 items test and the response options range from rarely (1) to always (5) and not applicable (0). The scores fall in the category of "moderately" meant that "the individual is facing recurrent problems due to the excessive usage of internet and the last category i.e., "severely" meant that excessive usage of internet is triggering significant disturbances in user's everyday life. IAT revealed excellent Cronbach's alpha value for this research (α = .91).

Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989):

The PSQI is comprised of seven components which measures sleep quality in terms of subjective general sleep quality, sleep latency, duration, efficiency of sleep, sleep disturbances, use of sleep medication or drugs, and day-time dysfunctions. The response options of all components are rated on 0 (normal status) to 3 (severe problem) and composite scores of seven components assesses sleep quality as the maximum scores (21) indicate poor sleep quality. PSQI showed good reliability coefficients i.e., "0.66, 0.89 and 0.82" by Cheng et al. (2012). PSQI showed good Cronbach's alpha i.e., .88 for the present study.

Emotion Regulation Questionnaire (ERQ; Gross & John, 2003)

ERQ is a 10 items scale that assesses the respondents' emotion regulation. The questionnaire measures emotion regulation by assessing two facets i.e., Expressive Suppression and Cognitive Reappraisal. For the facet i.e., cognitive reappraisal, the person redefines the emotional situation and appraises the situation in different context and in expressive suppression. ERQ is a Likert-type scale and the response selections from strongly disagree to strongly agree with the appraisal for Cognitive Reappraisal (minimum scores = 6; maximum scores = 42) and Expressive Suppression (Minimum scores 4; maximum scores = 28) make up the Expressive Suppression facet. In the present research, only expressive Suppression facet was employed that emerged with good Cronbach's alpha reliability i.e., (α=.84) for the present research.

General Health Questionnaire (GHQ; Goldberg, 1992)

The GHQ is a 12 items questionnaire used to screen for non-psychotic psychopathological comorbidity such as depressive symptoms e.g., sample item "have you been feeling unhappy and depressed?" and perceived stress i.e., sample item "have you felt constantly under strain?" and sleep disturbances e.g., sample items "have you lost much sleep over worry?" or self-confidence i.e., sample statements related to measuring confidence. The response options ranges from much less than (1) to better than usual (4) with the lowest scores i.e., 12 and highest score i.e., 48, the maximum, the individual has poor general health.

Cronbach's alpha reliability of the scale was sufficient .76 while it was .82 for the present study.

Demographic Information

Demographic information sheet was used to gather information related to the personal characteristics of the participants. It included information about age, gender, education, family system and family monthly income.

Procedure

The BS-honors students from different public sector universities were approached after taking formal permission from the chairpersons of the students' departments. The researchers told the aims of the study to the students and took forms for informed consent from them. The students who gave consent were further were identified with and without internet addiction by asking two basic questions from Internet Addiction Test about their extra staying on online and about neglecting their routine tasks due to internet usage. All the students were recruited as addictive users of Internet who responded "yes" to these two questions. The students identify as having internet addiction were given Internet Addiction Scale (Young, 1998). Based on scores, the students who scored mild (20-49) were considered as normal users of internet and those who scored severe (80-100) were considered as addictive users of internet. The selected students were asked to fill a set of assessment measures including demographic information sheet and questionnaires. Data were collected and were analyzed.

Statistical analyses

For demographic variables, frequencies and percentages were calculated to compare two groups (see table 1). Means (SD) were reported for age, family monthly income and independent t-tests were employed for comparing the two groups i.e., students with and without internet addiction on disturbed emotion regulation, poor sleep quality and general health (see table 2). Pearson correlation analyses were employed to see relationship between age, gender, family system, family monthly income, internet addiction, poor sleep quality and general health issues for separate groups (see table 3). Then, hierarchical regression analyses were performed on scores of students with internet addiction. Demographic variables were entered first as control variables and then internet addiction was entered as predictor variable for disturbed emotion regulation, poor sleep quality and general health issues (see table 4).

Table 1

Socio-Demographic Characteristics of University Students (N=600)

		Students with Internet Addiction n=375		Students without Internet Addiction n=225	
Variables		F	%	F	%
Sex					
	Males	250	66.6	115	51.11
	Females	125	33.3	110	48.88
Living status					
	Campus hostel	160	42.66	120	53.33
	Home	215	57.33	105	46.66
Family system					
	Joint Family system	210	56	170	75.55
	Nuclear Family System	165	44	55	24.44
Family monthly income (in rupees)		Range: 80,000-120,000		Range: 80,000-150,000	

Table 2

Independent t-test Comparing Mean Scores (SD) of Students with and without Internet Addiction

Variables	Students with Internet Addiction n = 375 *M (SD)*	Students without Internet Addiction n=375 *M (SD)*	$t_{(598)}$	*p*
Internet Addiction	89.59 (11.38)	47.24 (9.32)	40.88	.000
Disturbed Emotion Regulation	25.36 (6.58)	9.68 (2.35)	34.46	.000
Poor sleep quality	20.77 (4.86)	15.32 (2.80)	13.74	.000
General health issues	44.28 (7.17)	22.00 (10.36)	25.00	.000

Pearson correlation analyses were calculated to see relationship between gender, age, family monthly income and family system, general health, sleep quality and internet addiction in students with and without internet addiction. The results are given in table 3.

Table 3

Pearson Correlation between Gender, Age, Family Income, Internet Addiction, Poor Sleep Quality and General Health in University Students.

Variables	1	2	3	4	5	6	7	8
1-Age	-	**-.21****	**-.03**	**.29****	**.23****	**.29****	**.19****	**.26****
2-Gender (boys=1, girls=2)	.11	-	**.14****	**.25****	**.25****	**.22****	**-.27****	**-.22****
3-Family system(NFS=1, JFS=2)	.14*	.05	-	**.21****	**.34****	**-.44****	**.24****	**.13***
4-Family monthly income	.20**	.32**	.18*	-	**.39****	**.36****	**.24****	**.45****
5-Internet Addiction	.13*	.08	.07	.11	-	**.32****	**.33****	**.21****
6-Poor Sleep Quality	.06	.04	.04	.13*	.12	-	**.46***	**.27****
7-Disturbed Emotion regulation	.10	.07	.12	-.13*	.12	.13*	-	**.38****
8- General Health	.04	.12	.08	.03	.10	.12	.11	-

Note. Vertical line *means (sd)* including values above diagonal (bold) represents university students (n=375) with internet addiction and horizontal line values below diagonal (unbold) represent university students (n=225) without internet addiction.
***p<0.05. **p<0.01.**

Correlational analyses for demographic variables of students with internet addiction show that age had significant negative correlation with gender (being female), whereas it had significant positive relationship with family monthly income, internet addiction, poor sleep quality and general health ($p < 0.01$). Gender (being female) had significantly positive correlation with joint family system, family monthly income, internet addiction and poor sleep quality but significant negative correlation with disturbed emotion regulation and with general health ($p < 0.01$). Joint family system had significant positive correlation family monthly income, internet addiction, disturbed emotion regulation, poor sleep quality and general health ($p < 0.01$). For study variables i.e., internet addiction had significant positive correlation with poor sleep quality, disturbed emotion regulation and general health issues ($p < 0.05$).

The correlational analyses for students without internet addiction showed significant correlation between age and family system (being in joint family; $p < 0.05$), family monthly income ($p < 0.01$) and internet addiction ($p < 0.05$). Gender (being girl) and being in joint family; *p<0.05*) showed significant positive correlation with family monthly income ($p < 0.01$).

Family monthly income had significant correlation with poor sleep quality ($p < 0.05$) and significant negative correlation with disturbed emotion regulation ($p < 0.05$) while poor sleep quality had significant correlation with disturbed emotion regulation.

Hierarchical regression analyses *(enter method)* were used to explore internet addiction as a predictor of disturbed emotion regulation, poor sleep quality and general health issues respectively. The results are presented in table 4.

Table 4

Hierarchical Regression Analyses Predicting Disturbed Emotion Regulation, Poor Sleep Quality and General Health issues from Age, Gender, Family System and Internet Addiction for University Students with Internet Addiction (N=375).

Predictors	Poor sleep quality			Disturbed Emotion Regulation			General health issues		
Step1	ΔR2	R2	B	ΔR2	R2	β	ΔR2	R2	β
Gender	.67	.67	-.81**	.53	.52	-.72**	.60	.61	-.78**
Nuclear Family system			-.48**	.47	.46	-.38**	-	-	-
Step2									
Monthly income	.69	.69	-.58**	.62	.61	-.22**	.70	.71	-.28**
Internet addiction			.27**			.59**			.59**

Note. Categorical variables are gender and family system whereas Gender; 1= males, 2 = females; Family system; 1=Nuclear family system, 2= Joint family system. Family monthly income was a continuous variable.

For poor sleep quality, F = 207.53 (p<0.01), F=107.71 (p<0.01); for disturbed emotion regulation, F=155.82 (p<0.01), F=177.28 (p<0.01); for general health issues, F=109.34 (p<0.01), F=120.56 (p<0.01)

** p<0.01.

Results from hierarchical regression analyses revealed gender being male emerged as a significant predictor of poor sleep quality, disturbed emotion regulation and general health issues whereas nuclear family system emerged as significant predictor of poor sleep quality, disturbed emotion regulation. Both the variables accounted for 67% of the variance for poor sleep quality, 52% of the variance for disturbed emotion regulation and 61% of the variance for general health issues.

Similarly, monthly income and internet addiction emerged as significant predictors of poor sleep quality, disturbed emotion regulation and general health issues accounting for 69% of the variance for poor sleep quality, 61% variance for disturbed emotion regulation and 71% of the variance for general health issues.

Discussion

The main findings of the present study were that students with internet addiction had significantly higher mean scores on disturbed emotion regulation, poor sleep quality and general health issues as compared to the students without internet addiction. Further, the results revealed for students with internet addiction revealed significant positive correlation between age and family monthly income, internet addiction, poor sleep quality and general health issues. Gender (being female) had significantly positive correlation with joint family system, family monthly income, internet addiction and poor sleep quality but significant negative correlation with disturbed emotion regulation and with general health. Joint family system had significant

positive correlation family monthly income, internet addiction, poor sleep quality, disturbed emotion regulation and general health issues. Internet addiction had significant positive correlation with poor sleep quality, disturbed emotion regulation and general health issues. The correlational analyses for students without internet addiction show significant correlation between age and joint family system, family monthly income and internet addiction. Gender (being girl) and joint family system had significant positive correlation with family monthly income. Family monthly income had significant correlation with poor sleep quality and significant negative correlation with disturbed emotion regulation while poor sleep quality had significant correlation with disturbed emotion regulation. Hierarchical regression analyses showed gender (being male), family monthly income and internet addiction emerged as significant predictors of disturbed emotion regulation, poor sleep quality and general health issues in students with internet addiction.

Results from hierarchical regression analyses revealed that nuclear family system predicted poor sleep quality and disturbed emotion regulation whereas gender (being male), monthly income and internet addiction emerged as significant predictors of poor sleep quality, disturbed emotion regulation and general health issues i.e., headaches, dizziness, digestive issues due to lack of sleep and physical inactivity.

It is well established from previous researches that overuse of internet can be the source of physical and psychological health issues. Reviewing psychology literature confirms that internet addiction can affect physical, emotional and psychological health. Rhythmic emotional regulation has identified as the most important factor of health and pleasant interpersonal relations (Cicchetti et al., 1995) while dysfunctional emotional regulation is manifested in psychiatric disorders (Aldao et al., 2010) i.e., poor sleep quality, disturbed thoughts, stress and worry (Morin & Barlow, 1993). Lund et al., (2010) established that the disturbed emotion regulation in emergence of sleep disorder and emotional regulation problems were strong predictor of insomnia and depressive symptoms. These findings are supported by previous research findings as Williams et al., (2012) advocated that emotional dysregulation was found to have strong association with maladaptive behavior i.e., disturbed emotions causing mood disorders or addictive behaviors.

Yen et al., (2017) also confirmed that subjects with internet gaming disorders had higher mean scores on suppressed emotions. Their research results also revealed that suppressed emotions were significantly associated with anxiety, depressive disorder, hostile feelings and sleep disturbance in subjects with internet gaming disorder.

It has also been well-established from research that suppressed emotions prevent the outflow of inner emotions. Suppression of inner emotions does not regulate negative emotions rather suppressed emotions create internalizing behavior problems in people e.g., sleep disturbance, depression, anxiety etc. (Nikmanesh et al., 2015). So, it is evident from studies that problematic internet influence both emotion regulation process and smooth sleep which ultimately cause psychopathology in people with internet addiction (Lemola et al., 2014; Hwang et al., 2012).

The findings of the present research were also in agreement with previous research studies i.e., Lemola et al., (2014) reported significant association between later bedtimes and internet addiction in students. Similarly, Canan et al., (2013) also endorsed these findings that there is a significant association between internet addiction and poor sleep in young adults (Yusof, et al., (2022). The findings from present research were supported by Park and Lee (2014) who found negative association between internet addiction and level of physical activity,

low stress and sleep satisfaction in North Korean and South Korean adolescents. Another study, investigated by An et al., (2014), found the association between over use of internet and mental as well as physical outcomes of youngsters.

Internet addiction had negative association with disrupted sleep destroying sleep quality that was also sustained in another study by Demirici et al., (2014) who did a research on university students (*N=319*) exploring association concerning severity of smartphone over use and disrupted sleep, mental distractions, anxiety and depression. They found internet addiction, disrupted sleep patterns and day time dysfunction were positively correlated. In another study, Demirici et al., also supported that extra timings on smartphone caused disturbed sleep quality and are the predictors of anxiety symptoms in adolescents.

Literature has supported the notion that overuse of internet may affect sleep construction patterns and spoil shaping sleep duration and effectivity, causes disturbances in rapid eye movement and slows down the sleep wave (Dworak et al., 2007; Higuchi et al., 2005). Higuchi et al., (2003) described that overuse or continuous gaze for a longer duration destroy secretion process and disrupt sleep in people with internet addiction. Cain and Gradisar (2010) also endorsed these findings and suggested some necessary mechanisms related to the long duration exposure of electronic media on sleep disruption e.g., electronic media may cause physiological, cognitive and emotional arousal because light emission of devise's screen being used upset sleep badly and cause disturbed sleep (Mukhtar & Naz., 2021). These constructs were supported by Yen et al., (2009) who reported that internet addiction and cognitive disturbances i.e., inattention and impulsivity were associated in college students.

Conclusion

It is concluded that findings from our study will contribute in the existing literature related to internet addiction describing its adversative effects on emotional regulation, mental and physical health and psychological well-being in university students. The findings from the present research has practical implications for university students to be guided that internet addiction may lead to disturbed emotion regulation, poor sleep quality and general health issues in students. So, students in universities should be given awareness about the addictive engagement of internet is linked with behavioral addiction which can have devastating effects similar to those of substance addiction.

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