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Role of Quality of Sleep in between Academic Stress and Mental Health among College Science Students: Gendered Perspective

Abstract

The current study was intended to find out the relationship among academic stress, quality of sleep and mental health problems of college science students. The sample of this study was college science students and it comprised of 72 boys and 78 girl students with an age range of 16 to 19 years (M =17.21, SD =0.80) drawn through purposive sampling strategy. Urdu translated version of educational stress scale for adolescent (Sun, Dunne, Hou, & Xu, 2011), depression anxiety stress scale-21 (Lovibond & Lovibond, 1995) and Pittsburgh sleep quality index (Buysse, Reynolds, Monk, & Kupfer, 1989) were used to collect information for academic stress, mental health problems and poor sleep quality, respectively. A mediation analysis through AMOS showed that academic stress has indirect effect on mental health problems through poor quality of sleep. Academic stress and poor quality of sleep has a negative impact on mental health of students through several ways.

Keywords: Academic stress, mental health, poor sleep quality, gender

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Introduction

Students are the masons of the nation and the current situation is portraying a horrible picture of these pillars falling apart by gradually becoming the prey of increasing mental health problems nationwide. Mental health has been the one of the leading concern these days as it is said that mental illness or mental health have far more economic consequences than general health or illness in a society (Hu, 2004; Saxena, Thornicroft, Knapp, & Whiteford, 2007) from which its importance could be inferred. Mental health is defined as “a state of well-being in which an individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to contribute to her or his community” (WHO, 2014). Anxiety and depression have been suggested as two major problems of mental health according to WHO (2014).

According to the statistics given by Ahmed and colleagues (2016) the values of anxiety and depression ranging from 22% to as high as 60% in Pakistan's population which is quite alarming. Mental health problems pose high societal cost (Kessler, Foster, Saunders, & Stang, 1995), burden on institutions (Meilman & Hall, 2006) and economic burden (Saxena, Thornicroft, Knapp, & Whiteford, 2007).

Teens are at high risk of getting into mental health problems and many reasons have contributed this pattern like the hormonal changes (Liu, 2017), transition from dependent to an independent individual is also itself stressful. Brain development is still on going in adolescence, may be some aspects of changes in structure makes them more susceptible

to mood changes and these teenage years are the time period of increased stress from different sources including academic stress (Hagell&Maughan, 2017). Academic stress had been a pronounced predictor of mental health problems worldwide (Sahakian, 2014). Academic stress is basically a type of distress, which is one of the most common stresses which students face which is defined as an imbalance between demands and resources where academic related demands exceeds to an extent that the available resources of an individual cut short to fulfill those demands (Wilks, 2008).It is a pressure and workload students felt from study, stress caused by worrying about grades and self-expectations and stress caused by despondency regarding academics (Sun, Dunne, Hou, &Xu, 2011).

Stress strongly influences sleep and as it rises sleep disturbance rises due to increase in secretions of cortisol known as stress hormone which is being researched as a cause of suppression of REM sleep which is associated with initiating sleep staying asleep etc. In the time of increases workloads and commitment and fast-moving life adolescents are experiencing upset in overall sleep that its quantity as well as quality in response to all those stresses (KuulaPesonen, Martikainen et al., 2015) and sleep quality is itself a threat to mental health making students more prone to anxiety and depression (Lemma, Gelaye, Berhane, Worku, & Williams, 2012).Poor sleep quality could also be explained in terms when an individual finds difficulty or trouble in initiation of sleep or maintenance of sleep or even when could not have restorative sleep throughout the night (Sexton, Storsve, Walhovd, Johansen-Berg, &Fjell, 2014).

Sleep problems are not only unique to clinical population, in a fact it is also found in general population in a significant amount. Rates of poor sleep quality are rising up to 48% depending on the techniques used (Hinz, Glaesmer, Brähler et al., 2017). Social demands other than biological factors can also affect sleep. Homework, assignments, assessments, extracurricular activity and extra coaching are known to be affecting sleep patterns of students and this has shown variability of wide range in sleep wake patterns in weekdays and weekend. Student sleep more on weekends for compensation for sleep debt which is also known as oversleeping and it has been contributing disturbance in circadian rhythm and creating other sleep related problems (Kurth, Jenni, Riedner, Tononi, Carskadon et al., 2010).

An association with sleep and health (physical and mental) had been documented as poor sleep is known to be a risk for cardiac failure (Zuurbier, Luik, Leening et al., 2015), if mental health is considered depression and generalized anxiety disorder (GAD) had been associated with poor sleep (Ohayon & Roth, 2003). Sleep and mental health have been interlinked and has started to deepen its roots in literature as this relationship is confirmed and extended in adolescents and young adults (Milojevich & Lukowski, 2016) and example of which could be given from findings of study which reported that about sixty seven percent of adolescents were suffering from different sleep problems and were categorized as sufferer of anxiety and depressive disorder against diagnostic statistical manual (Paavonen, Solantaus, Almqvist, & Aronen, 2003). On the basis of the literature

review of the present study, following hypotheses were formulated:

- There is likely to be positive relationship of academic stress with poor sleep quality and mental health problems (anxiety and depression).
- Academic stress is likely to have an indirect effect on mental health problems through poor quality of sleep.
- There is likely to be gender differences in academic stress, poorer quality of sleep and mental health problems (anxiety and depression).

Method

The current research has been based on co-relational research design. The data was collected using purposive sampling strategy. The sample was carefully selected and was assessed with psychometrically sound measures.

Sample

The sample size for structural equation modelling using AMOS was determined using $N: q$ rule given by Jackson (2003). It explains the size of sample by taking in the ratio of number of model parameters and cases (N) that require statistical estimates (q). 1:20 is considered as sound size of sample to parameter ratio. For the current study the ideal minimum sample size for a total of $q = 5$ model parameters that require statistical estimate, was 20×5 or $N = 100$. The sample size was determined to be $N = 150$ because different views have been proposed and it is a common suggestion that more the ratio of $N: q$ the more trustworthy the results would be (Kline, 2011). One hundred and fifty students of

the colleges of science group with age range of 16 to 19 ($M=17.21$, $SD=0.80$) were selected as a sample for present study. The inclusion criteria included students that were regular college students and were enrolled in science subjects. Students with any diagnosed disability, psychiatric problem and taking medication for it were excluded. Students who were considered as defaulters and part time jobs holders were also excluded. The response rate was found to be 81% as calculated by following the definition of (American Association for Public Opinion Research, 2016). 184 questionnaires were distributed out of which 160 were received back and from that 10 questionnaires were discarded due to not being filled completely, making the final number of sample as 150.

Assessment Measures

A self-constructed demographic sheet was administered in addition to other proven psychometrically sound research tools to seek information about respondents. Demographic sheet included age, gender and etc.

The Educational Stress Scale for Adolescent (ESSA). Sun, Dunne, Hou and Xu (2011) developed the ESSA. It is 16 items scale with five point Likert scale with ranges from 1 is strongly disagree and 5 is strongly agree. Total ESSA score ranges from 16 to 80. Urdu translated version of ESSA by Javed, Komal and Kausar (2013) was used in the current study and reported to have good alpha reliability of .81 (Asghar & Butt, 2016).

The Pittsburg Sleep Quality Index (PSQI). PSQI was developed by Buysse, Reynolds, Monk and Kupfer (1989).

This is self-report measure use to measure the quality of sleep and respective disturbances of 1-month duration.. It comprises of nineteen self-rated individual items which collectively forms seven "component" scores: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. The range of values for questions 5 through 10 and their subheadings are all 0 to 3. For global PSQI score sum of all the seven components is calculated which ranges from 0-21 (Buysse et al, 1989). The score higher than 5 indicating poor sleep and vice versa. Urdu translated version of PSQI by Hashmi,Khwaja, Butt, Umair, Naqvi and Jawad-ul-Haq (2014) was used and had shown satisfactory reliability of about 0.56 (Hashmi et al., 2014).

Depression, Anxiety and Stress Scale 21 (DASS-21)

DASS was developed by Lovibond and Lovibond (1995) to get quantitative information on three categories of emotional problems which are depression, anxiety and stress. It is a brief version of original 42 item DASS, it is 21 items self-reported questionnaire divided in three subscales. Each subscale had 7 items rated on 4-point rating scale ranging from 0-3 whereas 0 for 'did not apply to me at all and 3 represents 'applied to me very much, or most of the time (Oei, Sawang, Goh, & Mukhtar, 2013). Stress scale was excluded by author's permission. Scoring was done by adding sum scores for each subscale and multiplies the scores by 2. Urdu version of DASS-21 by Naeem Aslam (2007) was used and had shown good internal consistency of the depression and anxiety scales that were .72 and .74 respectively (Aslam, 2007).

Procedure

After getting approval and permission from the respective authorities, data was collected from science students of different institutes. They were informed of their rights to research participation and research protocol. Two pilot studies were conducted before main collection of data for the research with specifically four objectives. First, pilot study led to judge the language proficiency of original and translated version of ESSA, DASS-21 subscales and PSQI scales. The other objective was to find out the psychometrics of the scales used in current study and to explore the pattern of relationships among variables of the current study. The results of the first pilot study revealed language difficulties so translated version was used which had shown to be appropriate for students. The results of the second pilot study revealed no issue. The reliabilities were acceptable and relationships as proposed were found. After that main study was conducted and then data collected was analyzed.

Results

After data collection procedure, the collected data was entered in SPSS version 20 in order to make further analysis on it. The reliability analysis of all measures was computed using Cronbach's alphas and their descriptive statistics were also computed. Pearson product moment co-relation was computed to assess the relationship of academic stress with poor quality of sleep and mental health problems (anxiety and depression) and also the relationship of poor sleep quality with mental health (anxiety and depression). Mediation analyses through (Structured Equation Model) SEM using AMOS was carried out to examine the mediating

role of poor quality of sleep between academic stress and mental health problems. Independent sample *t* test was used to assess gender differences. The results are presented in Table 1 to Table 4.

Table 1 presented the psychometric properties, descriptive statistics of assessment measures and correlation among the variables of the current study. Cronbach's alpha of all the scales were acceptable, skewness and kurtosis values were also in acceptable range ensuring the normality of the data. Results revealed that academic stress has positive significant relationship with poor quality of sleep and mental health problems (anxiety and depression). Poor quality of sleep also has a positive significant relationship with mental health problems (anxiety and depression).

Table 1

Descriptive Statistics, Psychometric Properties and Correlations of Academic stress, Poor Quality of Sleep and Mental Health Problems(N =150)

Variables	K	M	SD	a	Ranges		^a Skewness	^b Kurtosis	AS	MH-	MH-	PQ	
							s				A	D	S
					Actual	Potential							
Academic	1	51.	13.	.8	16-	16-	-0.33	0.44		.42*	.39*	.4	
Stress	6	33	04	1	78	80				*	*	4*	
												*	
Poor Quality of Sleep	1	07.	2.8	.5	1-	0-	0.35	0.01			.58*	.5	

	9	68	0	0	16	21			*	6*
										*
MH-Anxiety	0	08.	6.5	.8	0-	0-	1.44	2.89		.7
	7	82	9	0	36	42				0*
										*
MH-	0	10.	7.0	.7	0-	0-	1.32	2.23		
Depression	7	75	0	8	36	42				

*Note: MH=Mental health problem; MH= Mental health problem;
K= Number of items; a = Standard error of Skewness = 0.19;
b=Standard Error of Kurtosis = to 0.39.*

Table 2 summarizes the findings obtained for the path analysis for the proposed model. A model representation of 2 exogenous variables and 1 latent endogenous variables had completely standardized likelihood parameters estimates as shown in figure 1. The model fit was $\chi^2 (1, 150) = 2.32, p < .05$. The model fit was analyzed and the indices of absolute and relative fit (GFI CFI, TLI, RMSEA) were compared which were accurate enough to the model to fit model.

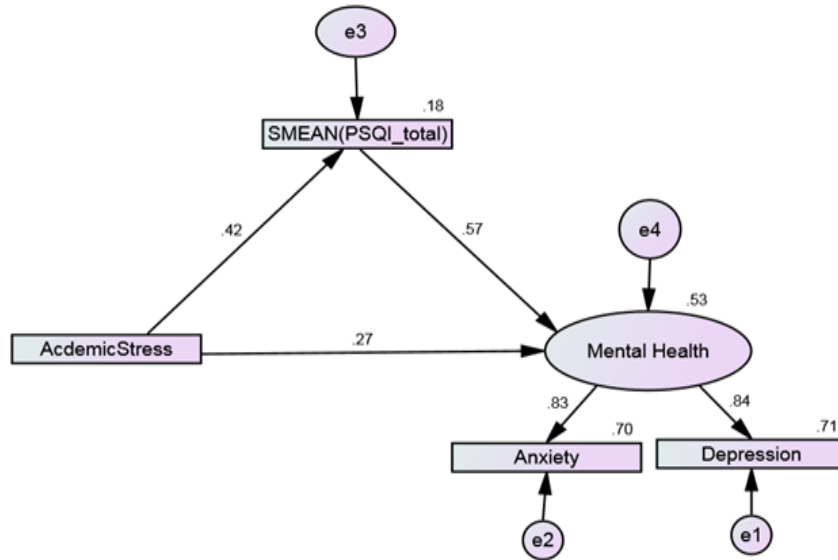


Figure 1. Structured Equation Model of the Current Study.

Table 2

Fit Indices for Academic Stress, Poor Quality of Sleep and Mental health Problems.

Model	χ^2	df	χ^2/df	CFI	TLI	GFI	RMSEA
Model fit	2.32	1	2.32	.99	.96	.94	.06

Note: N =150. Values are computed relative to $\chi^2 > .05$, GFI=Goodness of fit indices, CFI= comparative fit indices, TLI = Tucker Lewis Index, RMSEA= root mean square errors of approximation, χ^2 = chi-square

Standardized estimates of direct and indirect path are presented in table 3. The results revealed that academic stress and poor quality of sleep positively predicted mental health problems and academic stress positively predicted

poor sleep quality. Table also highlights that academic stress has an indirect impact on mental health problems through poor quality of sleep.

Table 3

Standardized Estimates of Direct (Academic Stress, Poor Quality of sleep and Mental Health Problems) and Indirect Path (Academic Stress and Mental Health Problems)

Variables	Direct effect		In-direct effect
	Quality of	Mental Health	Mental Health
	Sleep	Problems	Problems
Poor Quality of Sleep	-	.57***	-
Academic Stress	.42**	.27*	.24***

Note. *p<.05; **p<.01; ***p<.001

Gender differences in academic stress, poor sleep quality and mental health problems (anxiety and depression) were found and results revealed that girl students have poorer sleep quality and more mental health problems than their boy counterparts but no significant difference was found for academic stress. The results were presented in table 4

Table 4

Gender differences in Academic Stress, Poor Quality of Sleep and Mental Health Problems (N=150)

Variables	Boys (n=72)		Girls (n=78)		<i>t</i>	<i>P</i>	95 % CI		Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>LL</i>	<i>UL</i>	
Academic Stress	49.03	13.7	53.15	12.32	-1.92	0.06	-8.34	0.11	0.31
Poor Quality of Sleep	7.15	2.22	8.15	3.21	-2.21	0.03	-1.90	-0.10	0.36
Mental Health-Anxiety	6.17	4.17	11.21	7.51	-5.11	.000	-7.00	-3.08	0.82
Mental Health-Depression	9.06	4.78	12.28	8.32	-2.92	0.004	-5.40	-1.04	0.47

Note: * $p < .05$; ** $p < .01$; *** $p < .001$; *M*=Mean, *SD*= Standard Deviation, *CI*=

Confidence Interval, *LL*= Lower Limit, *UL*= Upper Limit

Discussion

This research was conducted to assess the relationship between academic stress, poor quality of sleep and mental health problems. Multiple hypotheses were presented and analyzed. Among them the first hypothesis was supported which stated that there is a positive relationship of academic stress with poor quality of sleep and mental health problems as well poor sleep quality also has a positive significant relationship with mental health problems (anxiety and depression).

As, academic stress had shown to be significantly and positively correlated with poor sleep quality. It could be because academic stress arises when academic related demands exceeds to those available resources to an individual which he/she adapts (Wilks, 2008) and for students from all their available resources sleep is one of them. Students often have poor sleep quality while trying for

balancing their challenging priorities like academic related demands (Andrew & Chung, 2011). Sleep quality is a very important component of life and tends to play a bridge between physiological and psychological domains of an individual and as soon as the student is faced with academic workload pressure he/she compromises on sleep to fulfill the demand for that time (Zunhammer et al., 2014).

It is evident from the previous researches done so far, that stress has hazardous effect on sleep as it gives rise to sleep disturbances due to increase in cortisol secretions known as stress hormone which has been researched as a cause of suppression of REM sleep which is associated with aspects of sleep quality (Kuula et al., 2015). Almojali (2017) did a study on students of medicines as they tend to reduce their sleep, to adjust and cope with their workload and stressful environment and found out that, soon the stressors of academia rise the quality of sleep starts to decrease which supports the results of current study and strengthens the notion while adding up to the support to previous researches of this nature (Fadipe&Mosaku, 2017; Moalla et al., 2016).

Academic stress was also found to be positively and significantly correlated with mental health problems in students. As the stress increases the mental health tends to decline. Many recent surveys have reported increased mental health issues including anxiety and depression especially in students (Tartakovsky, 2016), so academic stress could be one of the reasons behind it as per the results of present study. According to Wilk (2008) if students fail to effectively cater academic stress, which is experienced by individual either due to pressure from study, workload, self-

expectation, despondency, and worry about grades (Sun et al., 2011) then they are more prone to hazardous mental health problems. Every day there are assessments (workload), competition among students, apprehensions about future which makes them more vulnerable to stress which creates symptoms of anxiety (restlessness, apprehensions, worry) and depression (sadness, hopelessness) (Learn psychology, 2018). Ms. Cohen a renowned expert in psychology also highlights that anxiety is initiated as combination of problems at the same time when stress is building up from situations like deadlines etc. but it continues even when the stressor is no more there (as cited in Learn psychology, 2018). The result of the current study is in line with the previous researches (Kaur, 2014; Masood et al., 2016; Sandhu&Rajpal, 2015). A study by Moalla and colleagues found anxiety and depressive symptoms are common among students during exam periods which is the time of much stress for most of the students supporting the relationship of academic stress and mental health problems.

Poor quality of sleep also had a significant positive relationship with mental health problems (anxiety and depression). Sleep is a very important component of life which is biological but has effect on mental health. A study led by Yoo and his colleagues in 2007 had shown that sleep deprivation alone is enough to make the emotional brain behave as if an extreme danger is around. This reaction initiates the body's defense mechanisms and causes symptoms associated with anxiety and psychological problems, in short making one's mental health poor. Evidence from neuroscientific studies had also suggested

that sleep disturbances activates brain areas responsible for emotional processing and this activation is found similar in the sufferers of emotional disorders (Nauert, 2015). Similarly, study by Lemma and co-researchers (2012), Gunnarsdóttir (2014) and Moalla and colleagues (2016) also found sleep quality and mental health problems related to each other.

It was also hypothesized that academic stress had an indirect effect on mental health problems through poor quality of sleep and the results of the present study proved the mediating role of sleep quality (see Table 2 and 3). In stress, individual's sleep quality is disturbed leading to additional issues (ADAA, 2018). As sleep plays a key role in restorative functioning in individual's brain (Dahl & Lewin, 2002) which help them prepare for appropriate emotional responses according to REM sleep emotional homeostasis hypothesis (Goldstein & Walker, 2014) and when this all screws up, different problems arise. Academic stress is known to result in poor sleep quality which is investigated to contribute to poor mental health. According to bio-behavioral model of altered dysregulation in circadian systems the psychological functioning (stress, mood states) have direct-reciprocal relationship with sleep system and resulting in impaired well-being that is poor mental health among students (Carlson et al, 2007). Waqas and his colleagues did a study in 2015 on medical students and found that stress was a significant predictor of poor quality of sleep. Lohitashwa and colleagues (2017) also found stress among students responsible for poor sleep quality. Many other researches previously discussed had explained the relationship and prediction between academic stress, poor

quality of sleep with mental health problems separately (Lemma et al., 2012; Liu, 2017; Masood et al., 2016; Moalla et al., 2016; PaunioKorhonen, Hublin, & Kaprio, 2014) but more work had to be done to support the mediating role of poor sleep quality.

It was hypothesized that there is likely to be gender difference in academic stress which was not supported. Difference was found with girls having more mean scores on academic stress than boys, but this difference was not significant. This difference could be explained as females let out their feelings and are quite expressive as compared to males which do not report their feelings and worries (Dhakal, 2016). Findings of few previous researches were also in line with results of present study (eg. Deb et al., 2015; Dhakal, 2016). There are many previous contradicting findings to the current study as they had shed the light on such significant difference with girls experiencing more academic stress than boys (Ghosh, 2016; Liu, 2017).

Gender differences in poor sleep quality was hypothesized with girls having poorer quality of sleep than boys which was supported as the results highlighted significant gender differences as proposed. This difference could be explained in the light of biological basis (e.g. hormonal changes contributing to sleep disturbances) and family history which might make girls more prone to poor sleep quality (Comer, 2013; Seghal&Mignot, 2011). These results strengthen the findings of previous empirical researches and demands for more detailed searching of the roots of poor sleep quality and differences in male and female sleep quality. The results from the previous study

had shown similar results as of this study (Fatima, Doi, Najma,& Al Mammun, 2016).

It was hypothesized that there exist gender differences in mental health problems of students with girls proposed to have poor mental health (anxiety and depression) than boys. The results revealed that girls had more levels of anxiety and depression than their boy college mates. Many biological and social factors could contribute to such gender difference in mental health problems as females are constantly experiencing hormonal changes from puberty to old age which has known to be affecting mood pathways and resulting in other problems like sleep disturbances (Comer, 2013). Girls are experiences more responsibilities from early ages and are more socially held responsible for any upset than boys which could add to more mental health problems. This difference could be the product of gender roles assigned with females being emotionally vulnerable and expressive and boys being tougher and not letting their feelings expressed overtly unlike girls (Dhakal, 2016). A study done by Kelly and colleagues (1999) found the similar results regarding depression. Similarly, Liu did a study in 2017 and found gender differences in anxiety and depression.

Limitations and recommendations

Regardless of the interesting and important content of this study and its implications for research and social welfare, this study is subject to some limitations and for that some recommendations have been given.

The study was subjected to mono-method and mono operation bias as it only used one measure to assess variables and was based only on quantitative data received

from the measures. To overcome these biases multi method approach and integrated approach should be used that is multiple measures should be used to assess a single variable and qualitative and quantitative approach should be used simultaneously in future. Another limitation of this study is sampling strategy which was a non-probability sampling technique and it targeted a specific population of students who were studying science subjects and were from Lahore city which might limit the generalizability of the results. Random multi-stage sampling is suggested to use in further study to avoid sampling bias and students from different cities and enrolled in different educational programs must be included.

Conclusion and implications

The findings of the present study highlight many key points to consider in this fast moving and increasing mental health problems in daily life. The study had concluded that academic stress had a direct and indirect effect on mental health problems. The model hypothesized was proven and mediating role of poor sleep quality was found, as academic stress student experiences had adverse effect on the sleep quality, which was related with mental health problems like depression and anxiety. Significant gender differences have been related with poor sleep quality and mental health problems with girls are experiencing more mental health problems and poorer quality of sleep than boys. So, to improve mental health there is a must need to reduce academic stress. These findings can be implicated in academic and health settings. As, it covers one of the three important aspects of human being like social aspects that is academic stress related to survival in this era, biological

aspect that is sleep quality and psychological aspects that is mental health of college science students. Academic stress could not be eliminated despite all the efforts but can only be made less and the authorities could work to teach and create opportunities to tackle with academic stress effectively and consequently avoiding negative affect on mental health. Students could be taught to engage in healthy activities like physical activity, strong healthy social interactions etc. that could act as a buffering element between stress and additional problems. Counseling facilities should be provided in institutes to help students in effectively dealing with daily problems. Students could be taught about the importance of sleep quality and effective time management.

References

- Ahmed, B., Enam, S., Iqbal, Z., Murtaza, G., Bashir, S. (2016). Depression and anxiety: a snapshot of the situation in Pakistan. *International Journal of Neuroscience and Behavioral Science*, 4(2), 32-36.
- Almojali, A. I., Almalki, S. A., Alothman, A. S., Masuadi, E. M., &Alaqeel, M. K. (2017). The prevalence and association of stress with sleep quality among medical students. *Journal of Epidemiology and Global Health*.
- American Association for Public Opinion Research-AAPOR.(2016). *Standard Definitions*.Retrieved on July 5, 2018 from [https://www.aapor.org/Standards-Ethics/Standard-Definitions-\(1\).aspx](https://www.aapor.org/Standards-Ethics/Standard-Definitions-(1).aspx).
- Andrew, A., & Chung, J. L. (2011).Exploring the wellbeing of students studying at an Australian

- university. *Journal of the Australian & New Zealand Student Services Association*, (37), 9-38.
- Asghar, A., & Butt, F. Y. (2016). *Locus of control, self-handicapping and academic stress in students*. Unpublished Master of science thesis, University of the Punjab
- Aslam, N. (2007) *Psychological disorders and resilience in earthquake inflicted individuals*. Unpublished M.Phil.dissertation. National Institute of psychology, Quaid-i-Azam University, Islamabad, Pakistan.
- Buyse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry research*, 28(2), 193-213.
- Carlson, L. E., Campbell, T. S., Garland, S. N., & Grossman, P. (2007). Associations among salivary cortisol, melatonin, catecholamines, sleep quality and stress in women with breast cancer and healthy controls. *Journal of Behavioral Medicine*, 30(1), 45-58.
- Comer, R. J. (2013). *Abnormal psychology* (8th ed.). USA: Worth Publishers.
- Dahl, R. E., & Lewin, D. S. (2002). Pathways to adolescent health sleep regulation and behavior. *Journal of adolescent health*, 31(6), 175-184.
- Deb, S., Strodl, E., & Sun, J. (2015). Academic stress, parental pressure, anxiety and mental health among Indian high school students. *International Journal of Psychology and Behavioral Sciences*, 5(1), 26-34.

- Dhakal, S. (2016). An Assessment of Academic Stress among Students of Bachelor's Level. *Psychological Studies-Journal of Central Department of Psychology*, 2(2), 12-15.
- Fatima, Y., Doi, S. A., Najman, J. M., & Al Mamun, A. (2016). Exploring gender difference in sleep quality of young adults: Findings from a large population study. *Clinical medicine & research*, 14(3-4), 138-144.
- Ghosh, S. M. (2016). Academic Stress among Government and Private High School Students. *The International Journal of Indian Psychology*, 62 (6), 593-602.
- Gunnarsdóttir, K. (2014). Effects of Poor Subjective Sleep Quality on Symptoms of Depression and Anxiety among Adolescents.
- Hagell, A., & Maughan, B. (2017). Epidemiology: Are mental health problems in children and young people really a big issue?. *Essential Research Findings in Child and Adolescent Counselling and Psychotherapy*, 14.
- Hashmi, A. M., Khawaja, I. S., Butt, Z., Umair, M., Naqvi, S. H., & Ul-Haq, J. (2014). The Pittsburgh sleep quality index: validation of the Urdu translation. *Journal of the College of Physicians and Surgeons Pakistan*, 24(2), 123-6.
- Hinz, A., Glaesmer, H., Brähler, E., Löffler, M., Engel, C., Enzenbach, C., Hegerl, U., Sander, C., & Sander, C. (2017). Sleep quality in the general population: psychometric properties of the Pittsburgh sleep quality index, derived from a German community sample of 9284 people. *Sleep Medicine*, 30, 57-63.

- Hu, T. (2004). An international review of the economic costs of mental illness. *World Bank Working Paper*, 31.
- Hussain, K. A., & Kausar, R. (2013). *Academic stress and psychological well-being of school children*. Unpublished master of science thesis, University of the Punjab.
- Kaur, S. (2014). Impact of academic stress on mental health: A study of school going adolescents. *Global Journal for Research Analysis*, 3, 2277-8160.
- Kelly, W. E., Kelly, K. E., Brown, F. C., & Kelly, H. B. (1999). Gender differences in depression among college students: A multi-cultural perspective. *College Student Journal*, 33(1), 72-76.
- Kessler, R. C., Foster, C. L., Saunders, W. B., & Stang, P. E. (1995). Social consequences of psychiatric disorders, I: Educational attainment. *American Journal of Psychiatry*, 152(7), 1026-1032.
- Kline, R. B. (2011). *Principles and practice of structural equation modeling*. Guilford publications.
- Kurth, S., Jenni, O. G., Riedner, B. A., Tononi, G., Carskadon, M. A., & Huber, R. (2010). Characteristics of sleep slow waves in children and adolescents. *Sleep*, 33(4), 475-480.
- Kuula, L., Pesonen, A. K., Martikainen, S., Kajantie, E., Lahti, J., Strandberg, T., Tuovinen, S., Heinonen, K., Pyhälä, R., Lahti, M., & Räikkönen, K. (2015). Poor sleep and neurocognitive function in early adolescence. *Sleep medicine*, 16(10), 1207-1215.
- Lemma, S., Gelaye, B., Berhane, Y., Worku, A., & Williams, M. A. (2012). Sleep quality and its psychological correlates among

- university students in Ethiopia: a cross-sectional study. *BMCpsychiatry*, 12(1), 237.
- Liu, F. (2017). Academic stress and mental health among adolescents in Shenzhen, China (Doctoral dissertation, Queensland University of Technology).
- Lohitashwa, R., Kadli, N., Kisan, R., Sindhuja, A., & Deshpande, D. (2017). Effect of stress on sleep quality in young adult medical students: a cross sectional study. *International Journal of Research in Medical Sciences*, 3(12), 3519-3523.
- Lovibond, S.H. & Lovibond, P.F. (1995). Manual for the Depression Anxiety & Stress Scales. (2nd Ed.) Sydney: Psychology Foundation.
- Masood, A., Rashid, S., Musarrat, R., & Mazzahir, S. (2016). Nonclinical Depression and Anxiety as Predictor of Academic Stress in Medical Students. *International journal of medical research & health sciences*, 5(5), 391-397.
- Meilman, P. W., & Hall, T. M. (2006). Aftermath of tragic events: The development and use of community support meetings on a university campus. *Journal of American College Health*, 54(6), 382-384.
- Milojevich, H. M., & Lukowski, A. F. (2016). Sleep and mental health in undergraduate students with generally healthy sleep habits. *PloS one*, 11(6), e0156372.
- Moalla, M., Maalej, M., Nada, C., Sellami, R., Thabet, J. B., & Zouari, L. (2016). Sleep disorders, depression and anxiety among medicine university students in Sfax. *European Psychiatry*, 33, S321.

- Nauert, R. (2015). Sleep Loss Increases Anxiety — Especially Among Worriers. *Psych Central*. Retrieved on July 5, 2018, <https://psychcentral.com/news/2013/06/27/sleep-loss-increases-anxiety-especially-among-worriers/56531.html>
- Oei, T. P., Sawang, S., Goh, Y. W., & Mukhtar, F. (2013). Using the depression anxiety stress scale 21 (DASS-21) across cultures. *International Journal of Psychology*, 48(6), 1018-1029.
- Ohayon, M. M., & Roth, T. (2003). Place of chronic insomnia in the course of depressive and anxiety disorders. *Journal of psychiatric research*, 37(1), 9-15.
- Ohayon, M. M., & Smirne, S. (2002). Prevalence and consequences of insomnia disorders in the general population of Italy. *Sleep Medicine*, 3(2), 115-120.
- Paavonen, E. J., Solantaus, T., Almqvist, F., & Aronen, E. T. (2003). Four-year follow-up study of sleep and psychiatric symptoms in preadolescents: relationship of persistent and temporary sleep problems to psychiatric symptoms. *Journal of Developmental & Behavioral Pediatrics*, 24(5), 307-314.
- Paunio, T., Korhonen, T., Hublin, C., Partinen, M., Koskenvuo, K., Koskenvuo, M., & Kaprio, J. (2015). Poor sleep predicts symptoms of depression and disability retirement due to depression. *Journal of affective disorders*, 172, 381-389.
- Sahakian, B. J. (2014). What do experts think we should do to achieve brain health. *Neuroscience and Biobehavioral Reviews*, 43, 240-258.

- Sandhu, P. K., & Rajpal, B. (2015). Mental health in relation to academic stress among adolescents. *International Journal of Education and Management Studies*, 5(4), 356.
- Saxena, S., Thornicroft, G., Knapp, M., & Whiteford, H. (2007). Resources for mental health: scarcity, inequity, and inefficiency. *The lancet*, 370(9590), 878-889.
- Sexton, C. E., Storsve, A. B., Walhovd, K. B., Johansen-Berg, H., & Fjell, A. M. (2014). Poor sleep quality is associated with increased cortical atrophy in community-dwelling adults. *Neurology*, 83(11), 967-973.
- Student guide to surviving stress and anxiety in college & beyond. (2018). *Learn Psychology*. Retrieved on July 5, 2018 from <https://www.learnpsychology.org/student-stress-anxiety-guide/>
- Sun, J., Dunne, M. P., Hou, X. Y., & Xu, A. Q. (2011). Educational Stress Scale for Adolescents: Development, validity, and reliability with Chinese students. *Journal of Psychoeducational Assessment*, 29(6), 534-546.
- Tartakovsky, M. (2016). Depression and Anxiety Among College Students. *Psych Central*. Retrieved on November 12, 2017, from <https://psychcentral.com/lib/depression-and-anxiety-among-college-students/>
- Understand the facts Sleep disorder. (2018). *Anxiety and Depression Association of America (ADAA)*. Retrieved on July 5, 2018 from <https://adaa.org/understanding-anxiety/related-illnesses/sleep-disorders>.
- Understand the facts Sleep disorder. (2018). *Anxiety and Depression Association of America (ADAA)*. Retrieved on July 5, 2018 from

<https://adaa.org/understanding-anxiety/related-illnesses/sleep-disorders>.

- Wilks, S. E. (2008). Resilience amid Academic Stress: The Moderating Impact of Social Support among Social Work Students. *Advances in Social Work*, 9(2), 106-125
- World Health Organization.(2014). *Global status report on alcohol and health, 2014*.World Health Organization.
- Xie, H. B. (2013). A comparative analysis of anxiety among adolescents.*The Guide of Science & Education*, (14), 54-54.
- Yoo, S. S., Gujar, N., Hu, P., Jolesz, F. A., & Walker, M. P. (2007). The human emotional brain without sleep – a prefrontal amygdala disconnect. *Current Biology*, 17(20), R877-R878.
- Zunhammer, M., Eichhammer, P., & Busch, V. (2014). Sleep quality during exam stress: The role of alcohol, caffeine and nicotine. *PloS one*, 9(10), e109490.
- Zuurbier, L. A., Luik, A. I., Leening, M. J., Hofman, A., Freak-Poli, R., Franco, O. H., Bruno, H. S.,&Tiemeier, H. (2015). Associations of heart failure with sleep quality: the Rotterdam Study. *Journal of clinical sleep medicine: JCSM: official publication of the American Academy of Sleep Medicine*, 11(02), 117-121.