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Original Article

Determinants of Sleep Quality among Undergraduate Students of Universities of Karachi

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Abstract

Background: The goal of this study is to evaluate the extent to which caffeine consumption, cigarette smoking, technology use, and academics are associated with the sleeping habits of university students. Methods: 643 undergraduate students aged 18 to 23 from five universities of Karachi completed a cross-sectional survey about sleep patterns and lifestyle habits between December 2014 and November 2015. Pittsburgh Sleep Quality Index (PSQI) was used to assess the sleep quality. Data was entered and analyzed using SPSS version 22. Pearson Chi- square test was applied to determine relationship between sleep patterns and factors affecting sleep. Threshold of significance was set at <0.05. Results: Majority of the participants (60.5%) reported poor sleep quality (PSQI score >5), with an average PSQI score of 6.5 (±3.033). Sleep duration was less than 7 hours for 71.8% (N=462) of the participants. Also, most participants went to bed between 9pm to 12am, with 52.5% of males (N=136) sleeping after 12am compared to 46.1% (N=177) of the females. Other than energy drinks, no stimulant beverage showed significant relation with sleep quality. However, coffee, tea and energy drinks had a negative impact on sleep onset latency. Smoking too showed an association with poor sleep quality (p-value <0.009) and delayed sleep onset (p-value <0.009). Mobile phone was by far the most frequently used technological device. Conclusions: Poor sleep quality is prevalent among college students of Karachi. Behavioral habits like consumption of caffeinated drinks, smoking, and technology use are associated with increased odds of poor sleep quality.

Keywords

Sleep quality, PSQI, technology, beverages, college students

Introduction

College, a terminal educating and nurturing ground for professional education, is indispensable for the overall development and progress of any nation. It provides young individuals with the requisite skills for their preferred fields, along with enabling them to support themselves and contribute to their society. But the price paid can be dear. The hectic schedules, towering burden of studies and assignments, and the never ending stress of deadlines dispose individuals to constant self-neglect, not the least of which is compromise on their night-time sleep.

On an average, a young adult needs around 8 hours of sleep per day (Ohayon, Carskadon, Guilleminault, & Vitiello, 2004; Van Dongen, Maislin, Mullington, & Dinges, 2003). Yet majority of the students are sleep deprived, as shown by one study in which 70.6% of the college students reported sleeping less than 8 hours with mean total sleep time being 7.02 hours (Lund, Reider, Whiting, & Prichard, 2010). College students are prone to sleep related problems (Peltzer & Pengpid, 2016; A. A. Schlarb, D. Kulessa, & M. D. Gulewitsch, 2012). A research conducted among Lebanese university students (Kabrita, Hajjar-Muca, & Duffy, 2014) found out that more than half of the students scored in the poor-sleeper category on the Pittsburgh Sleep Quality Index (PSQI).

Sleep repairs physical and mental functions of one's body and restores its normal activity along with consolidation of learning and memory (Ohlmann & O'Sullivan, 2009). The repercussions of compromising on sleep can be severe as sleep deprivation and unhealthy sleep hygiene can result in, loss of cognitive functions (Wiebe, Cassoff, & Gruber, 2012), poor academic performance (Dewald, Meijer, Oort, Kerkhof, & Bögels, 2010), as well as increased risk of road accidents (Horne & Rumbold, 2015). According to the current literature, chronic sleep loss has been shown to have a link with several common health problems, such as cardiovascular diseases, weight gain, type II diabetes, poor memory, depression, digestive problems, and cancer (Ohlmann & O'Sullivan, 2009).

Voluntarily staying up late is only one part of the problem, however. Different habits adopted by students contribute to unhealthy sleep hygiene; for instance, the untimely use of caffeine, cigarettes, and media devices. The present study is aimed at finding out the effect on sleep of these activities.

Caffeine has a well-documented effect on sleep quality. Present in varying amounts in coffee, energy drinks, tea, soft drinks and even chocolate, it is commonly consumed by young adults. It was found that consumers of any stimulant beverage were 80% more likely to have poor sleep quality than non-consumers (Velez et al., 2013). Drake et al (Drake, Roehrs, Shambroom, & Roth, 2013) showed that consuming caffeine 0,3 or even 6 hours before bedtime significantly disrupts sleep.

Electronic media occupies an indispensable niche in young adults' life. Increased portability and affordability has made these devices available to all and sundry. According to National Sleep Foundation 2006, almost all (97%) adolescents had at least one technological device in their bedroom. However, in concern with their effect on sleep, not only the frequency, but the time and duration of media use are essential variables to be examined. Gradisar et al. (2013) reported in their research that 90% of American adolescents used some form of technology in the hours before bedtime (TV 60%, mobile 39%, computer/laptops 36%). They found a significant relation of evening technology use with sleep, where the quality of sleep and sleep latency were both affected by technology use in the hour before bedtime. High screen time was also found to have a positive significant relation with poor sleep quality among Chinese college students (Wu, Tao, Zhang, Zhang, & Tao, 2015).

In Pakistan, a few studies have been carried out on sleep quality of students (U. Bhatti, Rani, Memon, & Wali, 2015; Surani et al., 2015). One study was conducted among school-going children which found that more than three-fourth of the secondary school children of Karachi slept late, with homework and TV shows being more frequent reasons for later bedtimes, whereas parental influence was reported more by the early-sleepers (Nusrat, Khan, Hamid, Hussain, & Kadir, 2012). The sleep habits of first and final year medical students have also been evaluated (A. A. Bhatti et al., 2012). Yet another research studied the relation between sleep and academic performance in medical students (Waqas, Khan, Sharif, Khalid, & Ali, 2015). But, to the best of our knowledge, the present study is the first in Pakistan to assess sleep quality with its determinants among college students in detail.

Methodology

a) Subjects:

The study was approved by ethical review board of Dow University of Health and Sciences. This was a cross-sectional study conducted in 5 private and public universities of Karachi in late fall 2014 and early spring 2015. These include Dow Medical College, NED university of engineering and technology, Karachi University, Indus University and Iqra University. Subjects for this study were undergraduate students aged 18-23 years, who did not have any known disorder or acute or chronic psychiatric illness. Approval to conduct this study was obtained from deans of all selected universities.

b) Apparatus/ equipment:

700 questionnaires were distributed among students, out of which 213 were sent through Facebook via Google docs as online forms. The students were also encouraged to pass on the questionnaires to students of other universities who could fit into our criteria. The remaining 487 were distributed hand-to-hand. Students were first orally briefed about the purpose and importance of the study. Those who expressed an interest were given the questionnaires after obtaining consent. The questionnaires were anonymous and no personal identifiers were collected. Students enrolled in online or night time school programs were not included in the study. After excluding subjects of missing sleep quality components, the final analyzed sample consisted of 643 participants.

A 32-item self-administered questionnaire, consisting of four parts was used. The first part comprised of demographics including age (years), sex, employment status, participation in physical exercise. Height and weight were also asked for BMI and thresholds were set according to WHO protocol (underweight: $<18.5 kg/m^2$; normal: $18.5–24.9 kg/m^2$; overweight:$25.0–29.9 kg/m^2$; obese: $\geq 30 kg/m^2$) (Samuelson, 1997).

The second part consisted of Pittsburgh sleep quality index (PSQI), by which sleep quality was assessed (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). It is a 19-item self-reported questionnaire that

evaluates sleep quality over past month. It possesses 7 sleep components including sleep duration, sleep disturbance, sleep latency, habitual sleep efficiency, sleep medicine, daytime dysfunction, and overall sleep quality. The questionnaire was further modified by including bedtimes and arousal times on weekdays and weekends. These components yield a score of 0-3 with 3 indicating greatest dysfunction. All the components are summed up to give a total score (global score) from 0 to 21 with higher total score indicating poor sleep quality. Participants with a score below 5 are referred to as good sleepers while those ≥5 are poor sleepers (Buysse et al., 1989).

The third part consisted of inquiry about technology use before bedtime over the past month. Participants were asked about the presence of technological devices in the bedroom (TV, computer/laptop, mobile, video games, DVD) in *Yes* or *No* format and frequency of technology use per week. Questions were also asked about duration of device(s) used, the activities performed online, the contents viewed on TV/DVD and the type of music listened in the hour before bedtime. Participants were also asked self-analysis about the technology device affecting the sleep most and frequency of sleep disturbance due to technology use in a 4-point Likert scale ranging from *Always* to *Never*.

The fourth part consisted of questions on consumption of stimulants and academics. Participants were asked if they consumed any caffeinated beverage during past month. those answering *Yes* were further asked about type of caffeinated beverages (coffee, tea, carbonated soft drinks, energy drinks, others), frequency of use per week and their time of consumption. We asked the participants whether they smoked during the past month. Those answering *Yes* were asked further about number of cigarettes (frequency) smoked per week. In the academics portion we asked the participants about frequency of attending university per week, their study onset timings and grade points average (GPA). They were also asked their self-rating whether admission in university and academic stress affected their sleep.

Data were entered and analyzed using SPSS version 22 and Microsoft Excel 2013 for Windows. Frequency and percentages were calculated for categorical data and mean and standard deviation for continuous data. Pearson Chi- square test was applied to determine relationship between sleep patterns and other variables. Threshold of significance was set at <0.05.

Results

Demographic Characteristics and Lifestyle Habits:

A total of 643 students completed the questionnaires. Their average age was 20.03 ± 1.245 years. Majority of the respondents were females 59.7% (N=384); lived with their family (93.1%); attended university daily (59.7%) and were unemployed (79%). About 62.4% said they exercised regularly or occasionally. Only 6.8% (N=44) reported having stress. Table 1 summarizes the demographic characteristics of respondents.

Sleep Variables and Patterns:

Majority of the participants, about 60.5% (N=389) reported poor sleep quality (PSQI score >5), with an average PSQI score of 6.5 (±3.033). Sleep duration was less than 7 hours for 71.8% (N=462) of the participants with most sleeping 6 to 7 hours each night. Mean sleep duration for weekdays was 6.82 (±1.758) and for weekends was 8.73(±2.695). For 67.5% of the participants sleep latency was ≤30 minutes. Also, most participants went to bed between 9pm to 12am with majority of males 52.5% (N=136) sleeping after 12am compared to 46.1% (N=177) of the females. Most of the females took daytime naps 60.4% (N=232) compared to 45.6% (N=118) males. The results are represented in Table 2.

Association of Sleep and Lifestyle Habits:

There was no significant relationship between PSQI and age, sex, BMI, place of living, employment, or education level. Behaviorally, exercise and university attendance were not significantly related to PSQI either. Naps were found to decrease nocturnal sleep duration. 76.3% of the people who took naps had sleep duration of <7 hours compared to the 66.6% who did not (p- value 0.006).

Table 1: Demographics and lifestyle characteristics of respondents

Variables	n (N=643)	%	Mean ± SD
Age(years)			20.03±1.245
Gender			
Male	259	40.3	
Female	384	59.7	
Educational level			
Junior	233	36.2	
Sophomore	201	31.3	
Senior	209	32.5	
Employment status			
Yes	65	10.1	
No	578	89.9	
Exercise			
Yes	401	62.4	
No	242	37.6	
Smoking status			
Yes	98	15.2	
No	545	84.8	
Body Mass Index (BMI)			
Underweight	212	33.0	
Normal	365	56.8	
Overweight	47	7.3	
Obese	19	2.9	

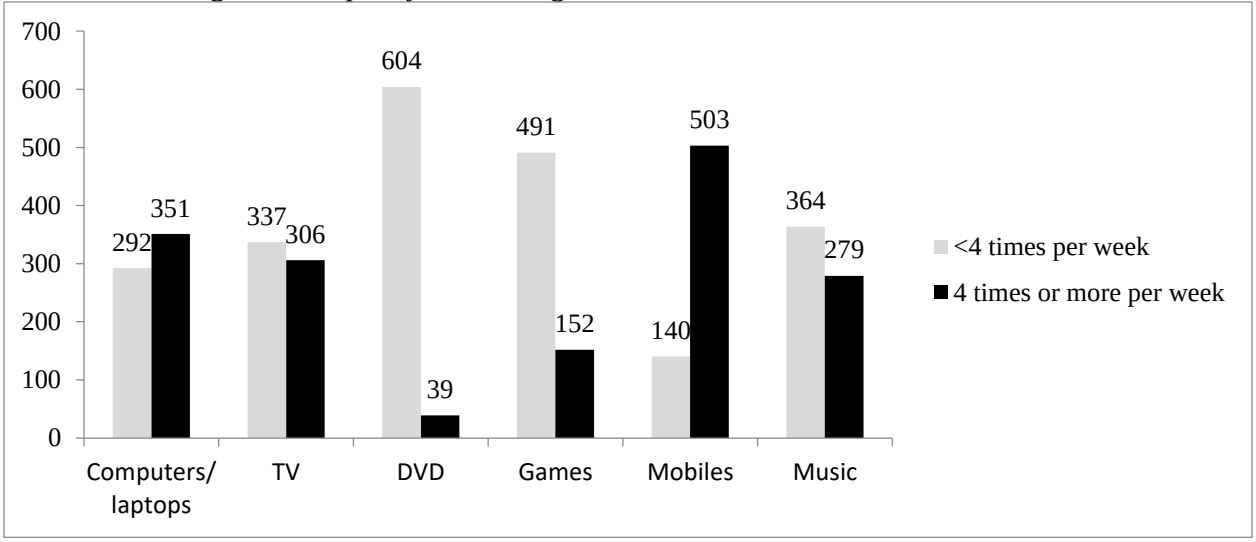
Table 2: Sleep Variables

Characteristics	All N = 643 n (%)	Male N =259 n (%)	Female N = 384 n (%)	P-value
1. TST (hours)				
<5	75(11.7)	35(13.5)	40(10.4)	0.536
5-6	163(25.3)	63(24.3)	100(26.0)	
6-7	224(34.8)	85(32.8)	139(36.2)	
>7	181(28.2)	76(29.4)	105(27.4)	
2.SOL (minutes)				
0-15	250(38.9)	108(41.7)	142(37.0)	0.669
>15-30	184(28.6)	72(27.8)	112(29.2)	
>30-60	105(16.3)	39(15.1)	66(17.2)	
>60	104(16.2)	40(15.4)	64(16.6)	
3.Bedtime				
6pm-9pm	10(1.6)	2(0.8)	8(2.1)	0.024
>9pm-12am	321(49.9)	121(46.7)	200(52.0)	
>12am-3am	282(43.9)	117(45.2)	165(43.0)	
>3am-6am	30(4.6)	19(7.3)	11(2.9)	
4.Naps				
Yes	350(54.4)	118(45.6)	232(60.4)	<0.01
No	293(45.6)	141(54.4)	152(39.6)	

Table 3: Consumption of caffeinated beverages and cigarette smoking

Stimulants	Frequency of consumption	Sleep quality n (%)		p-value	Sleep latency n (%)		p-value
		Good sleep quality	Poor sleep quality		<30 mins	≥30 mins	
Coffee	0-3 times/week N = 530	205(38.7)	325(61.3)	0.355	367(69.2)	163(30.8)	0.04
	≥4 times/week N = 113	49(43.4)	64(56.6)		67(59.3)	46(40.7)	
Tea	0-3 times/week N = 297	124(41.8)	173(58.2)	0.280	212(71.4)	85(28.6)	0.051
	≥4 times/week N = 346	130(37.6)	216(62.4)		222(64.2)	124(35.8)	
Energy drinks	0-3 times/week N = 541	223(41.2)	318(58.8)	0.040	383(70.8)	158(29.2)	<0.05
	≥4 times/week N = 102	31(30.4)	71(69.6)		51(50.0)	51(50.0)	
Carbonated soft drinks	0-3 times/week N = 519	213(41.0)	306(59.0)	0.103	352(67.8)	167(32.2)	0.718
	≥4 times/week N = 124	41(33.1)	83(66.9)		82(66.1)	42(33.9)	
Others	0-3 times/week N = 632	252(39.9)	380(60.1)	0.145	427(67.6)	205(32.4)	0.783
	≥4 times/week N = 11	2(18.2)	9(81.8)		7(63.6)	4(36.4)	
Cigarette smoking	Smokers N = 98	27(27.6)	71(72.4)	0.009	55(56.1)	43(43.9)	0.009
	Non-smokers N = 545	227(41.7)	318(58.3)		379(69.5)	166(30.5)	

Figure 1: Frequency of technological devices used in the hour before bedtime.



Caffeine Consumption:
Overall, 548 respondents (85.2%) consumed at least one type of caffeinated beverage once during the previous month. Tea was the most frequently consumed stimulant beverage (63.8%), followed by carbonated soft drinks (43.2%), coffee (35%), and energy drinks (29.8%).

Frequency of consumption
Of the 643 participants who consumed energy drinks greater or equal to 4 times per week 69.6% had poor sleep quality whereas 58.8% of those who consumed < 3 times per week had poor sleep. No significant association was found between other beverages and PSQI. On the other hand, frequency of consumption of tea, coffee and energy drinks was found to significantly increase sleep latency by ≥30 minutes when consumed ≥ 4 times per week compared to 3 times or less per week consumption (Table 3).
No relation was found with sleep duration.

Time of consumption
Time of consumption of stimulant beverages was found to have a significant relation with PSQI and bedtime of the respondents. Late- night consumption of stimulant beverage led to poor sleep quality as demonstrated by 77.9% of late- night consumers having poor sleep quality compared to 57.1% of those who were not (p-value<0.01). Also, majority of those participants (61.3%) consuming beverage in the morning had bedtimes before 12(p-value=0.003) whereas majority of the late- night consumers (67.3%, p-value <0.05) had their bedtimes delayed until after midnight.

Smoking:
Smokers (15.2%), who smoked during the previous month, showed poor sleep quality (72.4%) compared to 58.3% of non-smokers who had poor sleep quality (p- value 0.009). Also, more smokers showed delayed sleep latency as compared to non-smokers (p- value 0.009) (Table 3). Furthermore, majority (80%) of respondents who woke up during the night to smoke displayed poor sleep quality and delayed sleep.

Technological Devices:
98.25% of the participants had at least one technological device in their bedrooms, with 53% (N=341) having at least 3 devices in their bedrooms. Mobile phones were found to be the most frequently used device in the hour before bedtime, followed by computer/laptops and television. (Figure 1) Those respondents who watched television (p-value 0.007), used mobile phones (p-value 0.012) or listened to music (p-value 0.001) in the hour before bedtime ≥ 4 times per week during the previous month had a greater tendency of having a sleep onset latency of greater than 1 hour compared to those who used those devices ≤3 times. Also, increased television, DVD and music player usage had increased prevalence of poor sleep quality. 61.6% of those who used mobile phones more frequently had poor sleep compared to 56.4% of the people who used it less frequently, though the association was not significant.

Presence of videogames in bedroom had a significant relation with PSQI. 72.9% of those who had video games in their bedrooms had poor sleep quality compared to 58.6% who did not (p-value 0.012). Content viewed on television or activities performed online were not found to have any significant relation with sleep quality or other sleep variables. Type of music listened to in the hour before bedtime was found to have a significant relation with sleep latency. 38.7% of heavy music listeners reported sleep onset latency of >30 minutes, whereas 29.9% of light music listeners and those who did not listen to any music had delayed sleep (p value 0.028).
43.1% of the respondents reported mobile phone being the major device affecting their sleep. Yet, 78.4% said their sleep was never or rarely disturbed by any incoming call or text message. 36.2% of the participants admitted that their sleep was frequently or always affected by the use of technological devices.

Academics:
GPA and study onset time of the participants were not found to have any significant relation with sleep quality or its variables. 35.9% of the students who attended university regularly reported a sleep onset latency of >30mins compared to the 29.6% of the ones who attended 2-4 times and 21.9% who attended once or less per week (p- value 0.038).

Majority (75.6%) agreed that admission in university had altered their sleeping habits, while 54.7% of students reported that they always or frequently sacrificed their nocturnal sleep for studies and assignments. 39.2% of students admitted that they had difficulty sleeping due to anxiety for studies or academic stress.

Discussion

Poor sleep quality as determined by PSQI global score of greater than 5 was prevalent among majority of the university students, as was found in a prior study conducted among medical students of Karachi (Surani et al., 2015) and college students in North America (Lund et al., 2010), as well as among Lebanese (Kabrita et al., 2014) and Chinese university (Suen, Tam, & Hon, 2010) students. Also, majority of the participants slept between 9- 12 am, a habit that was similar to the majority of German university students (72.4%) who went to bed between 10 pm and 12 am. On the other hand, unlike German students (Angelika A Schlarb, Dominika Kulessa, & Marco D Gulewitsch, 2012), most of whom (84.1%) fell asleep within 30 minutes, majority of University students of Karachi had delayed sleep latency of ≥ 30 minutes.

Consumption of caffeine, cigarette smoking and sleep:

Caffeine, a well-known adenosinergic receptor antagonist, is one of the most widely consumed psychoactive substance mostly taken to restore low levels of wakefulness, modulate the activities of brain and improve task performance. Our study reveals that caffeine consumption is prevalent among the undergraduate university students of Karachi. Majority of the poor sleepers are tea consumers, though it did not reach statistical significance, which corroborate with a similar study (Hindmarch et al., 2000). The study also revealed that 3 out of 10 respondents consumed energy drinks, which is found to be strongly associated with sleep quality. This is in general agreement with prior studies (Aslam et al., 2013; Lemma et al., 2012; Reissig, Strain, & Griffiths, 2009; Velez et al., 2013). Besides caffeine, which is the main stimulant of energy drink, it may also contain other stimulating ingredients. The amino acid, taurine, a frequent ingredient in energy drinks, is thought to increase the effects of caffeine (Rath, 2012).

Out of all the sleep quality variables, only sleep latency is found to be associated with frequency of caffeine consumption (tea, coffee, energy drinks), no other sleep parameters approached significance. Majority of the respondents who said that they consumed beverages right after wake up had early bedtimes, that is, before midnight, while more than half of the late night consumers reported going to bed after midnight. More than three fourth of the late night consumers are poor sleepers. Thus, morning consumption is not found to be associated with sleep quality whereas late night consumption showed significant impact on sleep. The results are in accordance with previous findings (Drake et al., 2013). However, this result is contrary to some previous studies that found no association between caffeine use and sleep quality (Brick, Seely, & Palermo, 2010; Lund et al., 2010). Investigators have shown that caffeinated beverages have a dose-dependent negative effect on sleep onset, sleep time, and sleep quality (Hindmarch et al., 2000). However, we did not have information regarding dose of caffeine consumption to confirm previous findings.

Smokers demonstrated considerably more often than never smokers an overall reduced sleep quality represented by a PSQI global score of above 5. This was consistent with the results of previous researches (Araujo et al., 2014; Cohrs et al., 2014). Furthermore, the finding of a disturbed sleep latency with a higher number of smokers reporting an increased time to fall asleep is in accordance with studies reporting smokers to have more difficulty getting to sleep (Botello-Harbaum, Haynie, Murray, & Iannotti, 2011; Cohrs et al., 2014; McNamara et al., 2014) On the other hand, variables such as sleep duration and bedtime did not show any significant association with smoking. No significant association was found between the number of cigarettes smoked per day and sleep quality or sleep duration, as was found in a prior research (Cohrs et al., 2014). However, our study found that increased sleep latency was found to be associated with a decreased number of cigarettes smoked (Table 3). A possible reason could be the role of other confounding factors affecting sleep.

Electronic media and sleep:

We studied the effect of technology usage on sleep of young adults. Considering the extent to which media devices have infiltrated our day to day lives, it was not surprising to find that there was an association found between the frequency of use of television, cell phone and music player, and the sleep onset latency. Those who used these devices ≥ 4 times per week had more chance of having sleep latency of greater than one hour, compared with those people who used the devices ≤ 3 times per week. This finding is consistent with that of previous studies (U. Bhatti et al., 2015; Gradisar et al., 2013; Polos et al., 2015) which found that the stimulating activities performed on interactive devices (cell phones, computers, video games) in the hour before bedtime were associated with difficulty falling asleep. It is possible that the cognitive and physiological arousal resulting from their usage

inhibits normal sleep initiation (Ivarsson, Anderson, Åkerstedt, & Lindblad, 2009; Weaver, Gradisar, Dohnt, Lovato, & Douglas, 2010). It has been found that evening exposure to LED-backlit computer screens, despite increasing the cognitive functioning, can suppress melatonin and interfere with our normal sleep cycle (Cajochen et al., 2011). A recent research further highlighted the positive correlation between poor sleep quality and greater texting and iPod dependence (Ferraro, Holfeld, Frankl, Frye, & Halvorson, 2015).

An interesting finding was that the type of music listened to in the hour before bedtime was significantly associated with sleep onset latency. Individuals who preferred listening to heavy music reported greater difficulty in falling asleep as compared to those who listened to light music or none at all. Studies show that while soothing music is conducive to relaxation and falling asleep (de Niet, Tiemens, Lendemeijer, & Hutschemaekers, 2009) and can improve sleep quality in insomniacs (Harmat, Takacs, & Bodizs, 2008), music can also elevate the heart rate and thus play a role in maintaining arousal and causing difficulty in falling asleep (Bonnet & Arand, 2000).

Even though 43.1% of the entire sample reported cell phones to be the device which most affected their sleep, majority (78.4%) claimed that their sleep was never or rarely disturbed by an incoming call or text. In light of a research conducted among Americans (Gradisar et al., 2013) which found that 10% of all the participants went to bed with the cell phone ringer turned on and consequently had difficulty returning to sleep after an awakening, a possible reason for the present finding could be that those participants left their ringer turned off.

Academics and sleep:

Sleep problems in university students might lead to suppressed academic performance (Genzel et al., 2013; Haraszti, Ella, Gyongyosi, Roenneberg, & Kaldi, 2014; Lund et al., 2010). One cannot remain refreshed and alert in university after insufficient or poor sleep the night before. Our findings showed that 6 of 10 participants regularly attended the university during past month. Of those, majority of the students went to bed before midnight. However, more than half of the students, who attended the university $\leq$ 1 time per week, went to bed after midnight which reached significance. An overwhelming 39.2% of students stated that academic stress negatively impacted their sleep. This is consistent with the results of a previous study (Lund et al., 2010). Prior studies also reported that later bedtimes are more likely to affect one's academic performance than short sleep duration (Genzel et al., 2013; Haraszti et al., 2014).

Limitations of the study:

Our study has certain limitations. The non-longitudinal and cross-sectional nature of the study made it impossible to infer causality i.e. what came first. Data collection was done using self-reported questionnaires which might lead to recall bias. Respondents were inquired about their past month only, without taking into consideration their academic schedules, which could have influenced on their sleep quality ratings. Sleep quality was assessed using PSQI having cut-off value 5, below which are good sleepers and above are poor sleepers. This grouping leads to substantial heterogeneity among large group of poor sleepers, hiding essential correlations. Finally, we asked the respondents about frequency of consumption of stimulants without asking them brands (companies) and dose of consumption (in grams or milligrams). It might be possible that caffeine content varied for beverages/stimulants of different brands. Future researches must use sleep/health diaries for subjective measures or actigraph for objective measures so that their self-report biasing might be eliminated.

Conclusion

In summary, poor sleep quality is prevalent among college students of Karachi, Pakistan. Despite the aforementioned limitations, we found evidence that behavioural habits like consumption of caffeinated drinks, smoking, and technology use can adversely affect sleep to various extents. Considering these factors are the zeitgeist of youth, and have many benefits if used wisely, interventions can be made to ensure that students are benefited more than harmed by them. College students in Karachi, indeed all over Pakistan, need to be made aware of the impact their activities have on their sleep. Emphasis needs to be placed on the fact that it isn't simply how often they perform these activities, but also the time that is important and with proper education we can hope for students to adjust their schedule such that due importance is given to night time sleep.

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Conflicts of interest

All authors declare that they have no conflict of interest.

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