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Examination of Association between Mobile Phone Usage and Daytime Sleepiness in Delhi Millennial

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Abstract

Purpose: *Mobile usage is an indispensable activity for the youth nowadays. Its excessive usage can lead to certain unwelcomed consequences. Amongst some of such problems is daytime sleepiness in youth studying in schools and colleges or at workplace due to incessant usage of mobile phones, especially at night. Epworth Sleepiness Scale (ESS) is a renowned scale firstly proposed by Dr. Johns and further modified to study the daytime sleepiness for human race. This study aims at examining the relationship between the mobile usage habits of youth studying at a B-school in Delhi and their ESS scores.*

Design/methodology: *It is a descriptive research which has been conducted using an adapted questionnaire used by Nathan, N. and Zeitzer, J. to study the association between mobile phone usage and daytime sleepiness in students in a Californian high school. In the current study, convenience sampling has been used by distributing the questionnaires to students at a management college in Delhi. The sample size taken is 113. A pre-test was conducted on 20 students giving Cronbach's alpha=.798 making the questionnaire reliable. Also, face validity and content validity was tested by academicians. Descriptive analysis including frequency was used for demographical factors and ESS scores. Descriptives were further provided as the mean□±□SD for age and for number of text messaged and/or the phone calls made or received on daily basis. For inferential analysis, Pearson's coefficient of correlation and multiple regressions were used to test the degree of association between ESS and the independent variables (mobile usage).*

Limitations: *Resource limitation is an unavoidable factor. It being a sample study concerned with one college can be replicated as a census study covering more colleges.*

Findings/implications: *Multivariate regression analysis indicated that ESS was significantly associated with the average number of call per day and the expectation of being accessible via mobile phones. The findings threw light on the association between the mobile (disruptive technology) usage behaviour and daytime sleepiness amongst the students at the stipulated management college in Delhi. It would be helpful in assessing the impact of the disruptive technology on students and hence, measures can be devised to curb those factors. Further scope of research is created to fill the gaps of current research.*

Keywords: *Epworth Sleepiness Scale, mobile usage, demographical factors, multiple regressions, disruptive technology.*

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INTRODUCTION

Epworth Sleepiness Scale (ESS) was first developed by Dr. Johns during his research on "daytime sleepiness" amongst his patients for developing sleep medicine. He named this scale after Epworth Hospital in Melbourne where he had established his sleep center. This scale was developed in the year 1990 and was further refined in the year 1997[1]. ESS questionnaire aims at obtaining ratings on a 4-point Likert scale (0-3) from the respondents of their usual chances of dozing off or having fallen asleep when engaged in 8 different activities; sitting and reading, watching TV, sitting inactively at a public place, as a passenger in a vehicle for an hour without break, lying down to rest in the noon, sitting and talking to someone, sitting after lunch without any alcohol and sitting in car that has stopped in traffic for a while (Johns, 2002). The responses on these activities are summated to obtain the score on ESS. The normal score ranges from 2-10 whereas scores from 11-24 imply increasing level of excessive daytime sleepiness (EDS) (Johns and Hocking, 1997; Sanford et al, 2006).

Mobile phones are no more a luxury but a necessity for Indian youth. The predictions made in the last decade by industry researchers and corporate heads are all falling in line with the increasing usage of mobile phone amongst the millennial. Sandip Das, Head, Orange phones in Mumbai stated that the population under 25 years is in majority in India and is tech savvy. Also, Sunil Sinha, a consultant at National Council for Applied Economic Research documented young Indians to create huge market for services and mobiles being one of them.[2]

According to a study conducted by the global research firm, TNS, it was examined that in India, millennial spend almost 2.2 hours per day on mobile driven digital access.[3] Young population is found to spend maximum time on chatting (wtsuping) followed by listening to music, internet browsing, entertainment purposes etc. (Akanferi, Aziale and Asampana, 2014). About 70% of the urban youth in India owns a mobile phone (Bamzai, 2007). Infact, Telecom Regulatory Authority of India (TRAI) has claimed that mobile phone is the only way that connects more than half the Indian population (TRAI, 2008-09). Empirical research regarding mobile phones needs attention in India as it is the world's largest democracy with billions of people living here and mobile phone usage being popular amongst the youth (CIA, 2009). Also, mobile phone characteristics including texting, etc. are related to sleep disturbances (Gold, J.E., et al, 2015). Various studies have shown that mostly adolescents use mobile phones and suffer from sleep deprivation (Nehra, R, et al, 2012).

Considering, the wide usage of mobile phones by Indian youth, this study aims at studying the relationship between mobile usage by Generation Y (born between 1980 and 1990) and the daytime sleepiness on Epworth sleepiness scale.

Literature review

Kawada, T., et al (2017) investigated the relationship between the usage of mobile phones and diurnal type scale and sleep habit among the students aged 18-30 years in Japan. A cross-sectional study was carried using self- administered questionnaire on a sample size of 531 university students. It was found that most of the students had their own mobile phones. Around half the respondents admitted using phone within 30minutes duration per usage and 180 students used it 5-6 hours per usage. There was no significant difference observed in the diurnal type scale scores due to the durations of usage per usage. Tamura, H., et al (2017) conducted another research

1. http://epworthsleepinessscale.com/about-the-ess/
2. Dhillon Amrit (April 20, 2004), Indian Youth at the wheel in drive for cultural change, The Observer, New Delhi.
3. https://www.nextbigwhat.com/india-youth-mobile-usage-297/

in Japan to study the relationship between mobile phone use and insomnia and depression in adolescents. Out of the 295 students surveyed, 58.6% of them were found to use phone for 2 hours per day and 10.5% used it for over 5 hours per day. Use of mobile for over 5 hours/day was associated with insomnia but not depression.

Nasirudeen, A., et al (2017) conducted an empirical study to examine the relationship between social media usage and daytime sleepiness in tertiary students in Singapore using a cross sectional, quantitative research design. It was found that most common means to use social media was smart-phones. Singapore students spent more time on social media than foreign students and thus, experienced more day time sleepiness. Deepali, A., et al (2015) observed that increased mobile usage in medical students aggravated their daytime sleepiness.

Nathan, N., & Zeitzer, J. (2013) studied the relationship between nocturnal usage of mobile phones and daytime sleepiness in the high school students in California using Epworth Sleepiness Scale (ESS). Regression analysis of the data proved that ESS was associated significantly with female, need to be accessible over mobile phone all the time and the past attempt to reduce the usage. Troxel, W.M. (2015) focused on studying the texting behaviour of teens and found that texting was very much prevalent at night with 70% of the respondents admitted doing it. Patel, A. & Rathod, H. (2011).also documented through a primary research that most of the student respondents in rural Gujarat used phones during evenings. Subba, S.H., et al (2013) found ringxiety associated with increased mobile usage in medical students in South India.

Carter, B., et al (2016), through the meta analysis of 467 previous studies to investigate the effects of portable media devices on the sleep outcomes of kids revealed that nocturnal use of mobile phones was significantly related to the excessive daytime sleepiness. (Hale, L., & Guan, S., 2015) also systematically reviewed scientific literature to examine the relationship between time spent onscreen and sleep outcomes on school kids and adolescents which revealed that they are adversely related as per 90% of the studies.

Previous research regarding mobile usage and daytime sleepiness has been conducted for various countries, majorly outside India. Most of the studies have taken respondent base as the students in high schools or medical students. Despite the growing number of young individuals, limited examination has been done in the stipulated context in urban India. Considering, these research gaps, the current study aims at studying the association between mobile phone usage and daytime sleepiness using ESS among the Generation Y in urban India.

Research methodology

Obj.1: To examine the relationship between number of calls and sleepiness (ESS).
Obj.2: To examine the relationship between number of text messages and sleepiness (ESS).
Obj.3: To examine the relationship between frequency of being awakened by mobile at night and sleepiness (ESS).
Obj.4: To examine the relationship between staying up late for mobile usage and sleepiness (ESS).
Obj.5: To examine the relationship between accessibility via mobile phone and sleepiness (ESS).
Obj.6: To examine the relationship between stress due to mobile phones and sleepiness (ESS).
Obj.7: To examine the relationship between excess mobile usage and sleepiness (ESS).
Obj.8: To examine the relationship between failed attempt to cut down mobile usage and sleepiness (ESS).
HO1: Sleepiness is positively related to the number of calls made/received per day.
HO2: Sleepiness is positively related to the number of text messages sent/received per day.
HO3: Sleepiness is positively related to the frequency of being awakened by mobile at night.
HO4: Sleepiness is positively related to staying up

late for mobile usage.

Ho5: Sleepiness is positively related to accessibility via mobile phone.

HO6: Sleepiness is positively related to stress due to mobile phones.

HO7: Sleepiness is positively related to excess mobile usage.

HO8: Sleepiness is positively related to failed attempt to cut down mobile usage.

Following a literature review exploratory research design, this research continues as a descriptive research. The target population has been taken from a management college affiliated to Guru Gobind Singh Indraprastha University, Delhi based on convenience sampling. The sample size taken is 113. An adapted questionnaire[1] with some modification has been used which was previously used to investigate association between mobile usage and daytime sleepiness amongst teenagers in California high school. A pre-test was also conducted using this questionnaire on 20 students at JIMS, Kalkaji, New Delhi. Cronbach's alpha was 0.798 making it reliable. Face and content validity was also tested by academicians and experts in this area. SPSS 20 has been used as the analysis software. Descriptive analysis has been done using means, frequencies and cross-tabs. Inferential analysis has been done using multiple regressions in order to test the hypothesis.

Data analysis and interpretation

Table 1 describes the composition of the sample with average age being 20.16 years and comprising of 69.03% as males and 30.07% as females. The degree of association of average number of calls and text messages per day has been found to be significant as eta squared is less than 0.05.

Table 1: Descriptive analysis of demographic variables

Age (Mean ± S.D.)	Gender	N	Average calls made/received per day (Mean ±S.D.)	Eta squared (Calls*gender)	Average text messages made/received per day (Mean ±S.D.)	Eta squared (Texts*gender)
20.16 ± .91	Male Female	78 35	10.10±9.10 295.06±1688.70	0.02	96.97±277.03 101.77±208.98	0.001

Table 2 represents the descriptive analysis for Epworth Sleepiness Scale score and other variables of mobile usage in terms of their means and standard deviations.

Table 2: Descriptive analysis of Part-a and b.

	Mean	Std. Deviation
Epworth Sleepiness Scale score	6.7080	2.94801
Average calls made/received per day	98.36	939.829
Average text messages made/received per day	98.46	256.957
How often have you been awakened by your mobile phone?	1.54	1.310

1. Nathan, N. & Zeitzer, J. (2013), A survey study of the association between mobile phone use and daytime sleepiness in California high school students, BMC Public Health, 13, pp. 840.

How often have you stayed up late than you wanted because of mobile?	1.96	1.420
To what extent are you expected by those around to be accessible via mobile?	2.08	.918
To what extent you feel accessibility via mobile phones stressful?	.84	.676
Do you or someone around you feels you use the mobile too much?	1.30	.461
Have you tried but failed, to cut down mobile use?	1.50	.520

Table 3 has documented that maximum number of students depicted "Higher Normal Daytime Sleepiness" (52.2%) followed by Lower Normal sleepiness (36.3%), then mild excessive (8.8%) and the least represented moderate excessive sleepiness (2.7%). None showed secure excessive daytime sleepiness. ESS score between 0-10 is considered normal and beyond 11 can bring concerns if left unchecked.

Table 3 : Frequency (%) analysis of the Epworth Sleepiness Scale score

Range of ESS score	Interpretation	Frequency (N)	Percentage (%)
0-5	Lower Normal Daytime Sleepiness	41	36.3
6-10	Higher Normal Daytime Sleepiness	59	52.2
11-12	Mild Excessive Daytime Sleepiness	10	8.8
13-15	Moderate Excessive Daytime Sleepiness	3	2.7
16-24	Secure Excessive Daytime Sleepiness	0	0

Table 4 represents the Pearson's coefficient and level of significance between the ESS score and the mobile usage variables (IV) depicted as A, B, C, D, E, F, G and H. Correlation between ESS score and average number of calls made/received per day was found to be positive with value .233. On further using the statistical test procedure, the significance value since is lower than .05 ($p<.05$), it indicates correlation is significant at 5% level. Similarly, correlation between ESS and expectation of others for the student being accessible via phone was positive with value .180. Since, $p<.05$, thus, this correlation is statistically significant at 5% level. For all other independent variable, $p>0.05$, thus no statistically significant relationship is observed.

The R-square value as shown in Table 5 is an accepted value for behavioral sciences analysis as it is between .10-.20. In social sciences research, a value between (.10-.20) of R square is acceptable (Gaur A.S. & Gaur, S.S, 2012).

Table 4 : Correlation for ESS scores with independent variables or predictors: A, B, C, D, E, F, G and H.

Pearson's Correlation

	Epworth Sleepiness Scale (ESS)	Average calls made/received per day (A)	Text messages made/received per day(B)	How often have you been awakened by your mobile phone? (C)	How often have you stayed up late than you wanted because of mobile? (D)	To what extent are you expected by those around to be accessible via mobile? (E)	To what extent you feel accessibility via mobile phones stressful? (F)	Do you or someone around you feels you use the mobile too much? (G)	Have you tried but failed, to cut down mobile use? (H)
ESS-Pearson's coefficient (r)	1.000	.233	-.021	.111	.119	.180	.035	-.040	-.049
Significance(1-tailed)(p)		.006	.412	.122	.105	.028	.358	.337	.304
(A) Pearson's coefficient (r)	.233	1.000	.335	-.109	.005	-.111	.023	-.062	.092
Significance(1-tailed)(p)	.006		.000	.126	.481	.120	.403	.258	.167
(B) Pearson's coefficient (r)	.111	-.109	.089	1.000	.471	.187	-.094	-.168	-.102
Significance(1-tailed)(p)	.412	.000		.174	.000	.165	.491	.053	.110
(C) Pearson's coefficient (r)	.119	.005	.322	.471	1.000	.153	-.192	-.325	-.290

Significance(1-tailed)(p)	.122	.126	.174		.000	.024	.162	.038	.141
(D) Pearson's coefficient (r)	.180	-.111	.092	.187	.153	1.000	.064	-.142	-.048
Significance(1-tailed)(p)	.105	.481	.000	.000		.053	.021	.000	.001
(E) Pearson's coefficient (r)	.035	.023	.002	-.094	-.192	.064	1.000	.127	.027
Significance(1-tailed)(p)	.028	.120	.165	.024	.053		.251	.067	.308
(F) Pearson's coefficient (r)	-.040	-.062	-.153	-.168	-.325	-.142	.127	1.000	.330
Significance(1-tailed)(p)	.358	.403	.491	.162	.021	.251		.091	.386
(G) Pearson's coefficient (r)	-.040	-.062	-.153	-.168	-.325	-.142	.127	1.000	.330
Significance(1-tailed)(p)	.337	.258	.053	.038	.000	.067	.091		.000
(H) Pearson's coefficient (r)	-.049	.092	-.116	-.102	-.290	-.048	.027	.330	1.000
Significance(1-tailed)(p)	.304	.167	.110	.141	.001	.308	.386	.000	

Table 5: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.381[a]	.146	.080	2.82793

a. Predictors: (Constant),A,B,C,D,E,F,G,H.

Table 6 documents that the model is fit at 5% level of significance as p<.05.

Table 6 : Model Fitness (ANOVA[a])

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	141.654	8	17.707	2.214	.032[b]
	Residual	831.709	104	7.997		
	Total	973.363	112			

a. Dependent Variable: ESS

b. Predictors: (Constant), A, B, C, D, E, F, G, H.

Table 7 represents that there exists a positive association between the sleepiness score (ESS) and the IV factors; average number of calls made/received per day and the expectation of others around to be accessible via phone. This association is statistically significant as p<0.05. Thus, HO1 and HO5 are accepted. Other hypotheses are rejected as the other variables are not positively related to the daytime sleepiness (ESS) since p>.05. Thus, HO2, HO3, HO4, HO6, HO7 and HO8 are not accepted.

Table 7 : Multiple regression analysis (Coefficients[a])

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	4.748	1.439		3.298	.001
	Average calls made/received per day	.001	.000	.339	3.410	.001
	Text messages made/received per day	-.002	.001	-.199	-1.929	.056
	How often have you been awakened by your mobile phone?	.171	.236	.076	.727	.469

1	How often have you stayed up late than you wanted because of mobile?	.245	.241	.118		.312
	To what extent are you expected by those around to be accessible via mobile?	.659	.304	.205		.032
	accessibility via mobile phones stressful?	.173	.408	.040	.425	.672
	Do you or someone around u feels u use d mobile too much?	.309	.645	.048	.478	.633
	Have u tried but failed, to cut doen mobile use?	-.387	.564	-.068	-.687	.494

a. Dependent Variable: ESS

Derived Model:

Epworth Sleepiness Scale = 4.748 +.001(Average calls) +.659(Accessibility Expectation)

Results and Findings

The major findings by the current study documented that daytime sleepiness is students is positively related to the average number of calls made or received per day and the expectation of others to have the student accessible via mobile phones. Hence, higher the number of calls and the stipulated expectation, higher would be the ESS score and eventually, higher daytime sleepiness would be witnessed in the students. The analysis documented that the maximum number of students showed "Higher Normal Daytime Sleepiness" (52.2%) followed by Lower Normal sleepiness (36.3%), mild excessive daytime sleepiness (8.8%) and the minimum represented moderate excessive sleepiness (2.7%). None of them showed secure excessive daytime sleepiness. This implies that majority of the students fall in the category of normal score of daytime sleepiness which would not result in any severe health problems, provided the score doesn't rise over a period of time. The ones belonging to the mild and moderate excessive daytime sleepiness are at comparatively higher risk of maintaining concentration and other health issues (Johns, 2002). Gratefully, none belonged to the category of secure excessive daytime sleepiness or beyond which is considered to be hazardous. As depicted from hypothesis testing, high average number of calls made/received and higher expectation of the known ones of the student to be accessible via mobile could be the statistically significant reasons attribute to the higher sleepiness score.

Conclusion and Sociological implications

Higher usage of mobile phones for making or receiving calls and being accessible through this disruptive technology is one of the reasons for higher Epworth Sleepiness Scale score in Generation Y. Higher ESS score in turn affects the rhythm of their biological cycle, concentration level, attention span and productivity in regard to the various activities performed during the day. In order to curb this, it is important to have the facts in hand through

primary research as documented by the current study. Having identified the level of impact these factors related to mobile usage have on millennial daytime sleepiness, measure can be taken to curb them or decline the usage through some well defined measures. A stringent approach can be adopted by parents at home and teachers in the educational institutes to keep a check on excessive usage and discourage it. Another way is a direct interaction with the respondents which reflects upon the side-effects of such insane usage on their health and move with participative cooperation. It is an important sociological issue being faced by the young generation as never before in our country had any disruptive technology been available so widely and easily on a user-friendly platform.

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