

Effect of nomophobia on the anxiety levels of undergraduate students

Rija Mir, Mubeen Akhtar

Abstract

Objectives: The purpose of the study was to investigate the impact of restricting mobile phone use with time on the anxiety levels of undergraduate students having moderate nomophobia. The study also aimed to find whether cognitive and sensory distractions within the environment could delay anxious thoughts and subsequent rise in anxiety levels.

Method: Current research was based on a quasi-experimental design with non-equivalent control group, i.e., the participants were not randomly assigned to groups. The participants were 64 undergraduate students taken from a university located in Islamabad. The State trait anxiety inventory (STAI) and Nomophobia questionnaire (NMPO) were used. The study was carried out between August to December 2017. The data collected was analysed using general linear model to see the significant effect of time and treatment on the state anxiety levels at different time intervals.

Result: The findings from multivariate analysis revealed that the state anxiety increased significantly with time in participants having moderate nomophobia and who were not in contact with their mobile phones as hypothesized. However, cognitive and sensory distractions could only slightly delay the anxiety in fearful situations.

Conclusion: There is a significant effect of time and nomophobia on anxiety level of students who are separated from their mobile phone within the usual cognitive and sensory distractions in academic setting.

Keywords: Nomophobia, Mobile Phone Separation, Anxiety.

(JPMA 70: 1492; 2020) DOI: <https://doi.org/10.5455/JPMA.31286>

Introduction

Nomophobia has been observed as a growing fear and problematic consequence of mobile phone use in young adults. It is a term used to describe by combining phobia and no mobile phone use where the individuals might experience anxiety, discomfort, nervousness and anguish out of fear of not being in contact with their technology.¹ Other characteristics that individuals might show include spending most time using mobile phone (on average 34 times a day), always keeping it switched on, sleeping in bed with it, looking at the screen to check calls and messages, feeling anxious at the thought of losing or misplacing phone, or apprehensive when it is not charged, or has no signal coverage.²

In addition to emergence of discomforted behaviours in students due to strenuous mobile phone use, psychopathological consequences of using mobile phones have surfaced in literature findings. Spitzer³ advocated against the use of smartphones in educational settings by reporting its side effects from various countries. These include addiction, obesity, dissatisfaction, anxiety, depression, attention and empathy deficit disorders, aggression, personality disorders and loneliness. Moreover, the academic learning and behaviour along with student wellbeing has been negatively affected by the stress and distraction caused by excessive mobile phone use.⁴⁻⁸

Anxiety, an emotion described as feeling tensed and worrisome followed by changes in physiology such as increased heart rate or blood pressure and is widely researched with nomophobia. It is claimed that high dependency to mobile phones leads to temporary situational anxiety when the individual is no longer in contact with the mobile phone.^{1,9} Concomitantly, the association of anxiety with mobile phone use and presence of nomophobia was found to be significantly positively correlated in young adults enrolled in universities.¹⁰⁻¹²

It was noted that there have been very few experimental studies conducted to study the changes such as behavioural, physiological and emotional responses in individuals who are separated from their mobile phones.^{13,14} A recent meta analytic review focusing on the relationship between mobile phone use and anxiety revealed the scarcity of experimental studies to establish causality and implied the need for studying variables that might mediate the relationship.¹⁵

In particular, there have been none to study the participants with moderate to severe nomophobic tendencies. Moreover, past studies engaged the participants in a novel cognitive task within the experimental setting. In contrast, the current research intended to study the research participants within their natural setting to have a high level of ecological validity.

The study aimed to determine the mediating effect of having nomophobia in an individual and the subsequent

Department of Humanities, COMSATS University Islamabad, Pakistan.

Correspondence: Mubeen Akhtar. e-mail: mubeen.akhtar@comsats.edu.pk

anxiety levels when participants were separated from their mobile phones. Since there are very few empirical and experimental findings on the growing trend of nomophobia,¹⁶ thus, it is significant to explore causality and possible effect of nomophobia on anxiety levels. Mostly, the studies focused primarily on the mobile phone addiction and the related withdrawal symptoms whereas anxiety needs to be studied not as a withdrawal symptom of mobile phone addiction but because of situational fear or stress elicited by a specific situation such as nomophobia.

Furthermore, with respect to local scenario, there is a lack of indigenous findings from Pakistani population that could help to understand nomophobia and the possible causality between mobile phone separation and anxiety among young adults. The previous experimental designs focused on removing distraction from the environment where participants were seated,¹³ however, this study aimed to provide its participants the usual cognitive and sensory distractions found in academic settings to explore the impact on anxiety levels with extended time. In one of the previous study designs, it was proposed that extending the time duration might better help to investigate the impact of distractions on the possible cause of situational fear on anxiety.¹⁷

Therefore, the variables under study are nomophobia, time and mobile phone separation anxiety. Their relationship is hypothesised as follows:

H1: There is a significant effect of nomophobia on anxiety level of students separated from their mobile phone within the usual cognitive and sensory distractions in academic setting.

H2: There is a significant effect of time on anxiety level of students separated from their mobile phone within the usual cognitive and sensory distractions in academic setting.

Objectives

The study has following research objectives:

1. To determine the effect of nomophobia on anxiety level of students separated from their mobile phone within the usual cognitive and sensory distractions in academic setting.
2. To explore the effect of time on anxiety level of students separated from their mobile phone within the usual cognitive and sensory distractions in academic setting.

Method

The research design for the study was quasi experimental non-equivalent control group design, i.e., the participants were not randomly assigned to groups. Inclusion of control group added strength to the design by providing a reference comparison cluster. The dependant variable was measured for each interval consisting of a pre-test followed by three post-test time intervals of 1 hour, 1.5 hour and another 1.5 hour, making up 4-hour duration.

The participants (N = 64) divided equally in two groups (n=32), were undergraduate students recruited via purposive sampling (based on time and event) at a university in Islamabad. In literature, there exist several methods for determining the sample size. Experimental work on nomophobia in undergraduate students, published in recent past,^{14,18,19} has provided the guideline for sample size estimation for this study. Their age ranged from 17 years to 22 years with mean age of (19.3±1.06 years). The female students comprised 58(90.6%) of the sample whereas male students made up 6(9.4%). Demographic characteristics and univariate statistics of study variables are presented in Table-1.

The Nomophobia questionnaire¹⁶ was used to measure the severity of nomophobia among participants. It consists of 20 statements that are responded through a 7-point Likert scale with a range from strongly agree marked as 7 to strongly disagree valued 1. The items are scored and summed to determine the level of having nomophobia. The score obtained equal to 20 indicate absence of nomophobia. The scores obtained from 21 ≤ to < 60 on the questionnaire indicate having mild nomophobia. However, cut off scores from 60 ≤ to < 100 determine having moderate nomophobia whereas the scores 100 ≤ to < 140

Table-1: Demographic Characteristics of the Sample (n=64).

Variables	Category	Control group (n=32) Mean±SD	Experimental group (n=32) Mean±SD
Age (year)	-	19.5±0.92	18.75±1.07
Gender	Male	f = 2 (6.3%)	f = 4 (12.5%)
	Female	f = 30 (93.8%)	f = 28 (87.5%)
Mobile phone use (Hours/day)	Overall	3.80±3.56	2.47±1.08
	Social sites	4.22±3.81	3.28±1.76
	Information access	3.19±3.56	1.94±1.19
	Communication/Texting	3.38±4.33	2.37±1.64
	Entertainment	4.06±4.49	2.28±1.67
Opinion about the Use of mobile phones during class	Yes	f = 20 (62.5%)	f = 26 (81.3%)
	No	f = 12 (37.5%)	f = 6 (18.7%)
Nomophobia score	-	84.97±21.84	82.16±24.67
Anxiety score Pre-test	-	20.8±6.31	20.5±6.36
Anxiety score Post-test 1	-	20.2±5.82	20.0±4.83
Anxiety score Post-test 2	-	17.6±6.30	19.3±5.71
Anxiety score Post-test 3	-	18.2±6.71	22.6±6.65

indicate having severe nomophobia. In the current study the internal consistency of the tool was strong with Cronbach alpha value at 0.92. Previous studies also reported it as a sound tool with good psychometric properties.¹⁶

The state portion of state trait anxiety inventory- short form was used which measures the presence and severity of symptoms of anxiety.²⁰ It consists of 10 statements that are responded through a 4-point Likert scale such as not at all = 1, somewhat = 2, moderately so = 3 and very much so = 4. The statements 1, 3, 8 and 10 were reverse scored. The internal consistency of the scale was good with Cronbach's alpha value at 0.87 within this study. The reliability coefficient and construct validity of the scale have been claimed to be reasonably good.²⁰

A demographic data sheet was also provided to the participants consisting of variables such as age, gender, opinion poll about the use of mobile phone during class, and the number of hours spent on using mobile phone for various reasons.

The study took place in the regular lecture rooms which had identical furniture, seating pattern, wall clocks, windows, white board, room temperature and lighting. The only difference was the teachers who taught the courses and the type of class-fellows. There were no quizzes or tests during the 4-hour duration in either of the classes. The participants were asked to volunteer and take part in two studies as part of deception. One was informed as a survey study that focused on studying correlation of anxiety with other demographic variables while the other was a survey on mobile phone use. The participants filled the questionnaire on nomophobia once at pre-test interval along with demographics form. They filled the state anxiety forms at subsequent post-test intervals. The participants in condition group were asked to hand over their mobile phones for 4 hours. Throughout the study duration, participants carried on with their daily activities within the class.

The study protocols were approved by ethical review committee of the host institution (ref # CIIT-ISB/HUM/ERC-CPA/2018-8). The participants were clearly informed of their rights as part of the ethical considerations of the study. Informed consent was taken from all the research participants. They were assured of the confidentiality of their data and also briefed about their right to withdraw at any point during the study. After the study, the participants were debriefed about the true nature of the study and the reason to use deception. It was made sure that the study has no physical or psychological harm for the participants.

The general linear model was used to test the hypothesis with time and treatment as the independent variables and state anxiety as dependant variables within the subjects and between the groups. The analysis of covariance was used to analyse the changes in mean state anxiety scores with time. Significant main effects were also examined to study the trends of anxiety scores.

Results

The study tested the significance of mediating effect of nomophobia (hypothesis 1) and time (hypothesis 2) on the anxiety levels of students who were separated from their mobile phone. Both these hypotheses were supported by the data of the study. The result of multivariate analysis showed that the effect of nomophobia and treatment (mobile phone separation) was significant on anxiety scores at Roy's largest Root= 7.32, F (5, 8) =11.71^b, p = 0.00. The effect of time on anxiety levels was also significant such as Wilks' Lambda = 0.86, F (3, 57) =3.04^a, p= .04 (Table-2).

It was also proposed that state anxiety will be affected with time in users who are separated from their mobile phones in distracting environment. It was predicted that despite cognitive and sensory distraction, the attention to threat would still be given and the state anxiety would be subsequently affected with time. This was supported by the data because of the significant impact of participant's moderate nomophobia tendency, treatment and time on the state anxiety scores (Table-2) that led to increase in state anxiety scores.

Moreover, as presented in Table-1, the trends of state anxiety scores showed that there has been a greater increase in anxiety of participants who were separated

Table-2: Multivariate Analysis of Effect of Time, Treatment and Moderate Nomophobia Level on Levels of Anxiety within Subject.

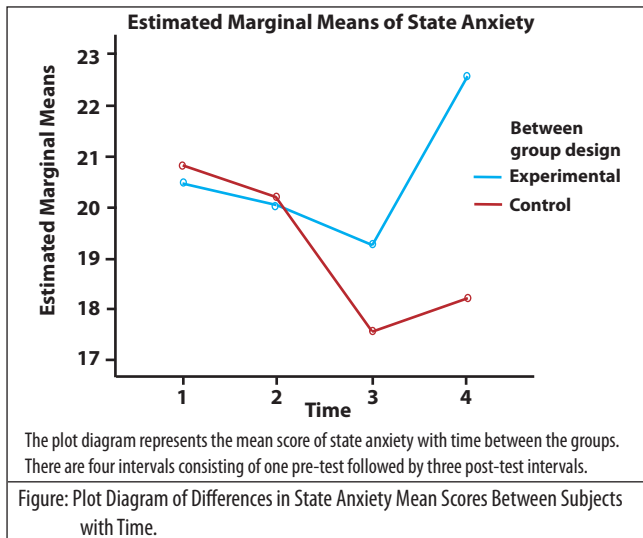
Effect		Value	F	df	Erro df	p-value	Partial Eta Square
Intercept	Wilks' Lambda	0.002	580	4	5.00	0.00	0.99
	Roy's Largest Root	464	580	4	5.00	0.00	0.99
Nomophobia	Wilks' Lambda	0.029	1.66	20	17.5	0.14	0.58
	Roy's Largest Root	7.32	11.71	5	8.00	0.00	0.88
Time	Wilks' Lambda	0.862	3.04	3	57.0	0.04	0.13
	Roy's Largest Root	0.160	3.04	3	57.0	0.04	0.13

Note: Treatment is mobile phone separation.

Table-3: Analysis of Homogeneity of Variance due to Simple Effect of Time, Nomophobia and Treatment on Anxiety Levels of Within Subject Factor.

Effect	Sum of Squares	df	Mean Squares	F	p-value	Greenhouse-Geisser	Huynh-Feldt
Time	61.5	2.33	26.4	0.98	0.39	0.01	0.01
Time X Nomophobia	25.2	2.33	10.8	0.40	0.70	0.01	0.01
Time X Treatment	225	2.33	96.3	3.58	0.02	0.06	0.06
Error	3702	59.0	62.8				

Note: Treatment is mobile phone separation.



from their mobile phones with $M = 22.6$ ($SD = 6.65$) as compared to participants who were not separated, with $M = 18.2$ ($SD = 6.71$). Therefore, trends from the findings further revealed that anxiety increases with time in participants who are separated from their mobile phones even in distracting environments (Figure).

Mauchly's test indicated that the assumption of sphericity had been violated $W = .61$, $X^2(5) = 28.13$, $p < 0.005$, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = 0.78$). Result presented in Table-3 show a significant effect of Time and Treatment on anxiety levels as reflected by Greenhouse-Geisser ($2.33, 138$) = 3.58 , $p = .02$, $\eta^2 = .06$.

Discussion

The current study intended to enhance the understanding of nomophobia with reference to cognitive and sensory distractions in the academic setting, anxiety state, time and mobile phone separation. Previous study designs focusing on mobile phone separation anxiety among students allowed participants to have their mobile phones nearby while the condition of restricting mobile phone use consisted of a small duration (1 Hour or less).^{13,14,17} Therefore, the current experimental study assessed the impact of having nomophobia and experiencing restriction of mobile phone use on state anxiety levels of undergraduate students in an extended 4-hour duration. The cognitive and sensory distractions in the environment refer to the regular class lectures, assignments or activities related to academics. Also, the interaction with other class fellows and the teacher would cause natural sensory stimulations that are considered as distraction and which are likely to divert attention of an individual or impact their anxiety levels.

The results reflected the significance of effect of time and nomophobia on the anxiety levels as hypothesized. It is observed that with time, the symptoms of anxiety do not subside when the individual is exposed to a situational fear. Instead, time prolongs the thoughts, feelings and any physiological reactions of the individual towards the threatening stimuli. Moreover, the increasing time intervals had significant effect on anxiety which shows that mobile phone separation with time does provoke the apprehensive thoughts of not being in contact with mobile phone. This could be attributed to fear of not being able to access information or fear of giving up convenience.¹⁶ Furthermore, the effect of having nomophobia was significant on the levels of anxiety of students. Having moderate nomophobia and being exposed to a situational fear i.e., mobile phone separation eventually causes elevated concerns and worrisome thoughts, tensed feelings and even physiological reaction such as sweat that do not arise in everyday or normal situations. These extreme reactions further affect anxiety levels that might increase more than the normal level. Thus, the predisposition of experiencing anxiety more than the usual threshold might be due to the tendency of having nomophobia in presence of threatening stimuli.

The proposition that anxiety levels would also be affected with time even in the presence of cognitive and sensory distractions within the environment of students was supported. The findings are statistically significant to support this notion. It was observed that, initially the state anxiety levels did show a slight decrease but eventually the anxiety levels of the participants separated from their mobile phones increased. In particular, the anxiety levels increased after the second post-test interval where the time had crossed 3 hours. The effect of having moderate nomophobia tendency in participants and mobile phone separation situation had significant effect within subjects with time.

The anxiety levels might have increased due to a number of reasons. Presence of nomophobia within the participants is one of the prime reasons for an increase in anxiety even after being exposed to various cognitive and sensory distractions. The anxious thoughts and fear of not being in contact with mobile phones could only be delayed for some time after which the participants could no longer stay calm. They reported of feeling anxious and worried after 3 hours. Mobile phones have become a part of one's identity more than ever before such as proposed by the extended self-theory.^{21,22} It provided a theoretical explanation that one's possession of an object eventually becomes a part of one's body which upon physical separation might result in anxiety or sense of loss. The

participants might have felt a sense of loss after being separated from their mobile phones for some time. In addition, mobile phone has become a source of information and a way of communication with others. The participants with moderate nomophobia might have felt anxious or worried when they feared of being out of touch with the events or conversations happening in their social circles, also known as fear of missing out (FoMO).²³ The findings corroborate with the experimental study¹⁷ where the fear of missing out mediated the anxiety levels. Moreover, a comprehensive meta-study revealed the need to further study the mediating effect of different variables on the relationship between mobile phone use with anxiety.¹⁵ The current findings statistically support that nomophobia mediated the anxiety levels which increased with time. The data seemed to coincide with numerous other experimental studies that claimed increase in anxiety or stress in participants separated from their mobile phones.^{13,14,19,23} Contrary to earlier studies, the trends of anxiety levels showed gradual increase that might be attributed to exposure of cognitive and sensory distractions within their environment which delayed the elevation of anxiety.¹³ Despite this, the anxiety was merely delayed for a few hours after which it increased, reflecting the grave consequences of mobile phone separation after a certain time period, such as 4 hours.

The findings of the study highlighted the implications of problematic mobile phone use within our society that might be evident once the individuals are separated from their phones. The findings could help student population, focusing on the young adult age group within their academic settings who are most vulnerable to this situational phobia. It is found that students within an academic setting (preferably university) who are in their usual environment might not be affected by separation from mobile phones for a minimum of 3 hours. Thus, in order to help those who might suffer from problematic mobile phone use (or mobile phone addiction), restricting use in class for a time period within this duration will not result in fear, stress or rise in their anxiety. This could aid in enhancing behavioural and emotional responses to separation of mobile phone and promote cognitive functioning during studying. Additionally, reducing the amount of time taken to use the mobile phone might improve academic performance and student wellbeing.^{7,8} The rise in anxiety levels after only a few hours of mobile phone restriction alarmingly indicated how serious and growing concern it has become. However, it should be addressed in educational settings where mobile phones are allowed by introducing systematic ways or rules to shape the behaviour of young adults.

It is plausible that a few limitations might have influenced the results obtained. Firstly, to establish good ecological validity, the environments for both groups, such as, cognitive and sensory distractions that participants were exposed to, might not be entirely similar. The type of subject being studied and the teacher might have influenced the state anxiety of the participants. Secondly, the sample did not adequately represent the male students who were less in number. Lastly, the state anxiety questionnaire was a self-report form that might not provide actual physiological symptoms of anxiety. The likelihood of participants reporting inadequate subjective feelings might have been a source of contamination in the study. However, if a technique that possibly measure the physiological changes attributed to anxiety is used, more objective levels of anxiety could be measured.

Conclusion

It was found through statistical analysis that there is a significant mediating effect of having nomophobia with time on separation anxiety in students in their routine academic setting. Thus, after a certain time period, students with moderate or severe nomophobia do feel anxious and stressed when separated from their mobile phone. These findings being contextually relevant in Pakistan, provides a foundation for addressing the pertinent concern of problematic mobile phone use, informs the need for generating public awareness of its related hazards, and identifies an at-risk population of students where initiation of suitable interventions will prove most beneficial. Clinical practice community needs to look for ways to manage nomophobia and dependency on mobile phones.

Disclaimer: None

Conflict of interest: The authors declare they have no conflict of interest.

Funding Sources: The research was not funded by any organization.

References

1. King AL, Valenca AM, Silva ACO, Baczynski T, Carvalho MR, Nardi AE. Nomophobia: Dependency on virtual environments or social Phobia? *Comp Hum Behav.* 2012; 29:140-4.
2. Bragazzi NL, Del Puente GA. A Proposal for including Nomophobia in the new DSM-V. *Psychol Res Behav Manag.* 2014; 7:155-60.
3. Spitzer M. M-Learning? When it comes to learning, smart phones are a liability, not an asset. *Trends Neurosci Educ.* 2015; 4:87-9.
4. Dietz S, Henrich C. Texting as a distraction to learning in college students. *Comp Hum Behav.* 2014; 36:163-7.
5. Lepp A, Barkley JE, Karpinski AC. The relationship between cell phone and academic performance in a sample of US college students. *SAGE Open.* 2015; 5:1-9.
6. Samaha M, Hawi NS. Relationships among smart phone addiction, stress, academic performance, and satisfaction with life. *Comp Hum Behav.* 2016; 57:321-5.

7. Yang Z, Asbury K, Griffiths MD. An exploration of problematic smartphone use among Chinese university students: Associations with academic anxiety, academic procrastination, self-regulation and subjective wellbeing. *Inter J Ment Health Addict*. 2019; 17: 596-614.
 8. Felisoni DD, Godoi AS. Cell phone usage and academic performance: An experiment. *Comp Educ*. 2018; 117:175-87.
 9. King ALS, Valenca AM, Silva AC, Sancassiani F, Machado S, Nardi AE. Nomophobia: Impact of Cell Phone Use inferring with symptoms and Emotions of Individuals with Panic Disorder Compared with a Control Group. *Clin Pract Epidemiol Ment Health*. 2014; 10:28-35.
 10. Harwood J, Dooley JJ, Scott AJ, Joiner R. Constantly connected-The effects of smart-devices on mental health. *Com Hum Behav*. 2014; 34:267-72.
 11. Tavalacci MP, Meyrignac G, Richard L, Dechelotte P, Ladner J. (2015). Problematic use of mobile phone and Nomophobia among French college students. *Eur J Pub Health*. 2015; 25:206-12.
 12. Yildirim C, Sumuer E, Adnan M, Yildirim S. A growing Fear: Prevalence of Nomophobia among Turkish college students. *Info Dev*. 2015; 32:1322-31.
 13. Cheever NA, Rosen LD, Carrier LM, Chavez A. Out of sight is not out of mind: The impact of restricting wireless mobile device use on anxiety levels among low, moderate and high users. *Comp Hum Behav*. 2014; 37:290-7.
 14. Hartanto A, Yang H. Is the smartphone a smart choice? The effect of smartphone separation on executive functions. *Comp Hum Behav*. 2016; 64:329-36.
 15. Vahedi Z, Saiphoo A. The association between smartphone use, stress, and anxiety: A meta analytic review. *Stress Health*. 2018; 34:347-58.
 16. Yildirim C, Correia AP. exploring the dimensions of Nomophobia: Development and validation of a self-reported questionnaire. *Comp Hum Behav*. 2015; 49:130-7.
 17. Schmidt C, Muench R, Schneider F, Breitenbach S, Carolus A. Generation "Always On" Turned Off. Effects of Smartphone Separation on Anxiety Mediated by the Fear of Missing Out. In C. Stephanidis (Eds.), *HCI International 2018 – Posters' Extended Abstracts*. HCI 2018. *Com Comp Info Sci*. 2018; 851:500-11.
 18. Sapacz M, Rockman G, Clark J. Are we addicted to our cell phones? *Comp Hum Behav*. 2016; 57:153-9.
 19. Konok V, Pogany A, Miklosi A. Mobile attachment: Separation from the mobile phone induces physiological and behavioral stress and attentional bias to separation-related stimuli. *Comp Hum Behav*. 2017; 71:228-39.
 20. Spielberg CD, Gorsuch RL, Lushene R, Vagg PR, Jacobs GA. State-trait anxiety inventory for adults. *Am Psychol Ass*. 1983.
 21. Belk RW. Possessions and the extended self. *J Consumer Res*. 1988; 15:139-68.
 22. Clark A. *Supersizing the mind*. In: Clark A, eds. *Embodiment, action, and cognitive extension*. USA: Oxford University Press, 2008.
 23. Przybylski AK, Murayama K, DeHaan CR, Gladwell V. Motivational, emotional, and behavioral correlates of fear of missing out. *Comp Hum Behav*. 2013; 29:1841-8.
-