

Investigating Nomophobia as a Predictor of Smartphone Addiction among Nigerian Pre-service Mathematics Teachers

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Abstract:

Nomophobia and smartphone addiction are behavioural disorders that are maladaptive and affect 21st-century digital natives anywhere, everywhere. This study investigated nomophobia as a predictor of smartphone addiction among Nigerian pre-service mathematics teachers within the framework of quantitative methodology of non-experimental correlational research design. The participants consisted of 300 pre-service mathematics teachers randomly selected from the Department of Science and Technology Education, University of Lagos, Nigeria. Four research questions were answered in the study using the statistical tools of frequency, percentage, mean, standard deviation, Pearson product-moment correlation coefficient, and multiple regression analysis. Results showed that majority of the pre-service mathematics suffered from nomophobia and smartphone addiction. There was a positive relationship between smartphone addiction and nomophobia and nomophobia was a significant predictor of smartphone addiction among pre-service mathematics teachers. These findings nonetheless, show the need for more research on nomophobia as a predictor of smartphone addiction among the youths. Based on these findings it was concluded that universities and parents in Nigeria should find a way of reducing the prevalence of nomophobia and smartphone addiction in pre-service mathematics teachers in the country.

Keywords: Nomophobia, Smartphone addiction, Pre-service Mathematics Teachers

Introduction

Uninterrupted advancement in technology has altered the mode by which people administer and accomplish their everyday undertakings. Particularly, Information and Communication Technology (ICT) has become an essential element of our societal collaborations, labour undertakings, and schooling. Yet, the advent of microelectronic implements with greater computational abilities has facilitated the spread of low-priced portable devices in which smartphones are regarded as the newest ICT advancement (Oulasvirta, Rattenbury, Ma, & Raita, 2012). Apart from using smartphones for making calls and conveying messages, they facilitate the right to use the internet thereby ensuring their ubiquitous use for other services. Smartphones enhance 3D picturing, amplified and cybernetic genuineness applications, exemplifying the essence of adopting these implements in education. This modern practise enables students with supplemented learning skill to pre-emptively interrelate with online reading materials and showcase the actions in education milieus that might have proven incredible. Accordingly, smartphones are platforms that maximize current education methods to educators and learners like cooperative, personal and malleable learning (Crompton, Olszewski, & Bielefeldt, 2016; Akkoyunlu, 2018; Ak & Yildirim, 2018). Smartphone adoption is prevalent, and higher than the population in some cultures (Pavithra, Madhukumar, & Mahadeva, 2015) with greater number of youths in the world utilize the internet via different modes, with the portable implements. Aside that youths are noted for adopting novel technologies swiftly, smartphone is seen as a prestige icon in the technology prone culture (Argumosa-Villar, Boada-Grau, & Vigil-Colet, 2017). The Premium Times Newspaper (2020) revealed the affirmation of the Nigerian Communication Commission that internet users in Nigeria increased to 111,632,516 in December 2018 from the 108,457,051 recorded in November 2018, showing an increase of 3,175,465 new subscribers. With this, the number of smartphone users also increased astronomically. The number of smartphone users in Nigeria is predicted to rise to more than 140 million by 2025. Presently, evaluations from diverse origins put the number of smartphone users in Nigeria at roughly 25 and 40 million.

However, social networks have become more virulent on the internet, with young and old becoming competent smartphone users. In spite of the positive contribution of smartphones to our lives, youths are more vulnerable to technology slavery as they are prone to losing sight of the authentic world in their attempt to becoming virtual users of smartphones (Dongre, Inamdar, & Gattani, 2017). Globally, being addicted to smartphones has a negative impact called nomophobia, which can have a serious debilitating effect on students. Nomophobia is the acronym of the English “no mobile phone phobia” which means pathological fear of being without a mobile phone interaction or the anxieties smartphone users experience. The acronym nomophobia was invented in a 2008 study carried out by the UK Post Office on anxieties that mobile phone users suffer (SecurEnvoy, 2012) and findings showed that 53% of users of mobile phones suffered from nomophobia (Mail Online, 2008) in which more men than women were more prone to nomophobia. Explicitly, nomophobia is described as *the fear of not being able to use a smartphone or a mobile phone and/or the services it offers...the fear of not being able to communicate, losing the connectedness that smartphones allow, not being able to access information through smartphones, and giving up the convenience that smartphones provide* (Yildirim & Correia, 2015). Nomophobia is on the rise analogous to increase in smartphone pervasiveness (Broughton, 2015; Adnan & Gezgin, 2016) and its prevalence is largely reported among youths (Kaur & Sharma, 2015; Pavithra & Madhukumar, 2015). As a behavioural obsession with smartphones, exhibited by psychosomatic and somatic indicators of addiction, nomophobia impacts a person's life emotionally and somatically in a deleterious manner. Indications that portray nomophobia comprise an extreme utilization of a smartphone, by keeping it perpetually switched on, culminating in anxiety sensation when there is no network coverage. Further indications comprise the tradition of unceasingly viewing the smartphone screen for possible messages or missed calls, a condition tagged “*ringxiety*”, and the deceitful consciousness of earshot that a smartphone is ringing or vibrating, a condition termed “phantom vibration syndrome” (Bragazzi & Del, 2014). Globally, evidence suggests the increasing pervasiveness of nomophobia behaviour among younger generations as the anxiety associated with it demoralizes individuals from focusing on their everyday schedules (Dixit et al., 2010).

One other negative consequence of unconsciously using smartphones is smartphone addiction or obsession. This condition is defined as an instinct dependence syndrome associated with awkward utilization of smartphones (Kwon, Kim, Cho & Yang, 2013) with no existing standards for articulating smartphone obsession (Park & Lee, 2012). Smartphone addiction has been found to affect people's conversation modes, collaboration and hangout practices negatively (Pavithra, Madhukumar, & Mahadeva, 2015; Gezgin, Sumuer, Arslan, & Yildirim, 2017; Gezgin, Hamutoglu, Samur, & Yildirim, 2018). Smartphone

addiction has deleterious effect on handlers' sleeping configurations, academic attainment and achievement (Duke & Montag, 2017) and impact negatively on students' cognitive and somatic well-being (Bian & Leung, 2015; Spitzer, 2015). Nomophobia, an eclectic pathology of the modern digital and numerical ecosphere (King, Valença & Nardi, 2010), denotes tautness, distress, dread, and apprehension that happens once people are without their phones or digital devices (Bragazzi & Del Puente, 2014) is linked to smartphone addiction (Yildiz Durak, 2018). It is evident that nomophobia is one of the sources of smartphone addiction, and youths who are prone to smartphone addiction have the tendency to be nomophobic (Yildiz Durak, 2018). Thus, there is a latent association between smartphone addiction and nomophobia (Yildiz Durak, 2017). Though smartphone-addicted people showed varied clinical features when compared to people who are nomophobic, both conditions have similar behavioural configurations. For example, they feel nervous when out of network or when utilization of smartphone is forbidden. They are in constant touch with social network sites and engage in less face-to-face communication and value virtual communications (Kaplan Akilli & Gezgin, 2016; Gezgin, 2019). The extant literature revealed that youths are more prone to high-tech-biased psychological addictions than older people (Wang, Tao, Fan, Gao, & Wei, 2017; Alavi, Maracy, Jannatifard, Ojaghi, & Rezapour, 2014). Thus, both smartphone addiction and nomophobia are pathological conditions found in the youths who are mostly digital natives. Literature revealed that there is paucity of research on the relation between nomophobia and smartphone addiction among the digital natives (Semerci, 2019; Yildiz Durak, 2017) with no study demonstrating this relationship in the Nigerian research space. Thus, more investigations that are empirical are needed to ascertain the relationship between nomophobia and smartphone addiction among the Nigerian youths. Pre-service mathematics teachers are parts of the Nigerian youths who are digital natives and are more accustomed to ICT in their daily lives and for educational purposes. In the Nigerian research space, it is yet to be established on one hand whether the Nigerian pre-service mathematics teachers are both smartphone addicts and nomophobic and on the other hand determine the predictive influence of nomophobia on smartphone addiction. In essence, this study investigated nomophobia as a predictor of smartphone addiction among Nigerian pre-service mathematics teachers.

Research Questions

The following research questions were answered in this study:

RQ1. What is the level of smartphone addiction among pre-service mathematics teachers?

RQ2. What is the level of nomophobia among pre-service mathematics teachers?

RQ3. What is the relationship between pre-service mathematics teachers' nomophobia and smartphone addiction?

RQ4. What is the predictive influence of pre-service mathematics teachers' nomophobia on their smartphone addiction?

Methods

Research Design

In this study, a quantifiable method within the framework of a non-experimental correlational research design was adopted (Ilogu, 2008). This design evaluated relationships without adjusting the autonomous variables or randomly apportioning partakers to varied circumstances. Hence, assisting us to explore the association between nomophobia and smartphone addiction of pre-service mathematics teachers.

Participants

The target population comprised all the 453 pre-service mathematics teachers listed for the 2018/2019 academic session in the Department of Science and Technology Education, University of Lagos, Nigeria. Through simple random sampling technique, a sample of 300 pre-service mathematics teachers was randomly selected from the population. A simple random sampling technique is a methodical and organized process of choosing from a population that guarantees that there is an equal chance for each member of the population to be selected. The sample consisted of 150 males and 150 females in which 60% were Christians and 40% Muslims. Their age ranged between 16 and 24 years ($M= 19.1$ years, $SD= 0.55$).

Instruments

Two instruments were used for data collection in this study: Nomophobia Questionnaire (NMP-Q) and Smartphone Addiction Scale Short Version (SAS-SV). The NMP-Q created by Yildirim and Correia (2015) was adopted for measuring pre-service mathematics teachers' nomophobia. The questionnaire is made up of 20 items anchored on a 6-point Likert type scale and consisted of four dimensions viz: "Not being able to access information" 4 items, "Losing connectedness" 5 items, "Not being able to communicate" 6 items, and "Giving up convenience" 5 items. The reliability coefficients of the dimensions were .94, .87, .83, and .81 correspondingly. In the present study, Cronbach alpha coefficient was used to determine the internal consistency of the questionnaire and reliability coefficient of .95 was computed for the entire questionnaire while the sub-scales' coefficients of internal consistency were .89, .85, .95, and .93 correspondingly as listed earlier.

The SAS-SV created by Kwon, Kim, Cho and Yang (2013) and containing 10 items was adopted for this study. The SAS-SV is a psychometrically sound instrument containing five content areas: (1) 'daily-life disturbance', (2) 'withdrawal', (3) 'cyberspace-oriented relationship', (4) 'overuse', and (5) 'tolerance' with a Cronbach alpha coefficient of 0.911 (Kwon et al., 2013). The SAS-SV is anchored on six-point Likert scale (1: "strongly disagree", 2: "disagree", 3: "weakly disagree", 4: "weakly agree", 5: "agree", and 6: "strongly agree"). The minimum score on the scale is 10 while the maximum score is 60. The cut-off value for males was 31 and 33 for females (Kwon et al., 2013). Individuals who recorded scores higher than the cut-off values are regarded as high-risk for smartphone addiction. In the present study, the Cronbach alpha coefficient was used to determine the internal consistency of the scale and a reliability coefficient of .94 was computed for it.

Procedure

The researcher and 4 research assistants were involved in the collection of data for the study. The two instruments, NMP-Q and SAQ were administered to the participants in regularly scheduled classes in the Department of Science and Technology Education, University of Lagos for data collection.

Data Analysis

Data collected were condensed and analysed using mean, standard deviation, Pearson product-moment correlation and multiple regression analysis (Ilogu, 2008). SPSS was used for the coding of the numerical data and data analysis. Alpha was set at 0.05 level of significance.

Results

Research Question One: What is the level of smartphone addiction among pre-service mathematics teachers?

For the smartphone addiction scale, the score ranged from 10 to 60. A score of 35 is the middle point so higher scores point toward a high smartphone addiction. Of the 300 pre-service mathematics teachers, 66 (22%) had scores lower than 35 ($M=28.00$, $SD=0.00$, score range: 28, 95%CI= 28) while 234 (78%) had scores greater than 35 ($M=39.59$, $SD=2.77$, score range: 36-44, 95%CI= 39.23–39.95). A large proportion of these pre-service mathematics teachers had high prevalence of smartphone addiction. However, the overall $M=37.04$, $SD=5.39$, score range: 28-44, and 95%CI= 36.43–37.65 for the entire sample showed a high prevalence of smartphone addiction of pre-service mathematics teachers.

Research Question Two: What is the level of nomophobia among pre-service mathematics teachers?

For the nomophobia questionnaire, the score ranged from 20 to 120. A score of 70 is the middle point so higher scores point toward a high nomophobia. Of the 300 pre-service mathematics teachers, 108 (36%) had scores lower than 70 ($M=67.06$, $SD=8.02$, score range: 40-69, 95%CI= 66.48–67.63), 45 (15%) had scores equalled 70 ($M=70$, $SD=0$, score range: 70, 95%CI=70) while 147 (49%) had scores greater than 70 ($M=79.65$, $SD=8.76$, score range: 70-83, 95%CI= 78.86–80.44). A large proportion of these pre-service mathematics teachers had high prevalence of nomophobia. However, the overall $M=73.96$, $SD=8.12$, score range: 40-83, and 95%CI= 73.18–74.76 for the entire sample showed a high prevalence of nomophobia of pre-service mathematics teachers.

Research Question Three: What is the relationship between pre-service mathematics teachers' nomophobia and smartphone addiction?

Table 1. Mean, standard deviation, and intercorrelations among dimensions of nomophobia, total nomophobia and smartphone addiction of pre-service mathematics teachers for total sample (n=300)

Variable	Variable					
	1	2	3	4	5	6
1. Smartphone addiction	1.00					
2. NBAI	.283*	1				
3. LCON	.628*	.446*	1			
4. NBTC	.643*	.628*	.733*	1		
5. GUCO	.423*	.884*	.269*	.488*	1	
6. Nomophobia	.509*	.859*	.659*	.764*	.762*	1
Mean	37.04	4.93	4.53	4.03	5.63	33.96
Standard deviation	5.39	0.76	0.23	0.10	0.98	6.96
N	300	300	300	300	300	300

**Correlation is significant at the 0.01 level (2-tailed). NBAI=Not being able to access information; LCON=Losing connectedness; NBTC=Not being able to communicate; and GUCO=Giving up convenience.

Table 1 showed the relationships among dimensions of nomophobia, nomophobia and smartphone addiction of pre-service mathematics teachers. The results of the Pearson product-moment correlation coefficient showed that there were significant positive correlations among the dimensions of nomophobia, aggregate nomophobia, and smartphone addiction.

Research Question Four: What is the predictive influence of pre-service mathematics teachers' nomophobia on their smartphone addiction?

The predictors (NBAI=Not being able to access information; LCON=Losing connectedness; NBTC=Not being able to communicate; and GUCO=Giving up convenience) as contained in Table 2 mutually produced a coefficient of multiple regression of .895 and a multiple correlation square of .802 to the explanation of discrepancy in pre-service mathematics teachers' smartphone addiction. The implication is that 80.2% of the overall disparity in smartphone addiction was explained by the blend of the four predictors. The analysis of variance of the multiple regression data produced an F -ratio value ($F_{(4, 295)} = 298.48; p < .001$) significant at 0.001 level. This showed that the regression model is a good fit of the data. The outcomes of the marginal contributions showed that GUCO was the most potent significant positive contributor to the prediction of pre-service mathematics teachers' smartphone addiction ($\beta = .13, t = 21.59, p = .000$). NBAI made the next significant positive contribution to the prediction of pre-service mathematics teachers' smartphone addiction ($\beta = 1.38, t = 21.47, p = .000$). LCON made the next significant positive contribution to the prediction of pre-service mathematics teachers' smartphone addiction ($\beta = .54, t = 13.66, p = .000$). NBTC made the least significant positive contribution to the prediction of pre-service mathematics teachers' smartphone addiction ($\beta = .51, t = 11.58, p = .000$). The standardized coefficients revealed that the regression model: Smartphone addiction $_{predicted} = 10.02 + (2.70 \times NBAI) + (1.28 \times LCON) + (2.49 \times NBTC) + (3.41 \times GUCO)$.

Table 2. Model summary, coefficient and t-value of multiple regression analysis of nomophobia dimensions and the outcome measure (smartphone addiction)

Model summary					
Multiple R= .895;		Multiple R ² = .802;		Multiple R ² (Adjusted) = .799	
Standard Error Estimate= 2.41718;		F=298.484, p<.001;		df1=4; df2=295	
Model	Unstandardized coefficients		Standardized coeff.	t	Sig
	B	Std Error	Beta		
Constant	10.02	1.00		10.01	.00
NBAI	2.70	.13	1.38	21.47	.00
LCON	1.28	.09	.54	13.66	.00
NBTC	2.49	.22	.51	11.58	.00
GUCO	3.41	.16	.13	21.59	.00

NBAI=Not being able to access information; LCON=Losing connectedness; NBTC=Not being able to communicate; and GUCO=Giving up convenience.

Discussion

This study showed that the pre-service mathematics teachers displayed a high prevalence of smartphone addiction (Mean=37.04, SD=5.39). This result was in agreement with previous finding. Sohn, Rees, Wildridge, Kalk, and Carter (2019) found a high prevalence of smartphone addiction among children and young people. The result of the high prevalence of smartphone addiction in the Nigerian sample did not agree with the result of Liang and Leung (2018) who showed that smartphone addiction in Hong Kong and Mainland China was low. Also, the result was in agreement with that of Buctot, Kim and Kim (2020) which revealed a very high prevalence of smartphone addiction among Filipino adolescents. This high prevalence of smartphone addiction among Nigerian pre-service mathematics teachers can be ascribed to their uncontrollable use of smartphones which culminated in their addiction. According to AlBarashdi, Bouazza, Jabur and Al-Zubaidi (2016) people are more prone to smartphone addiction because of psychosomatic and emotive problems such as downheartedness, lonesomeness, impulsivity, social anxiety, and interference. Although clinical tests were not conducted on the Nigerian sample to know the level of complicity in these problems, Nigerian pre-service mathematics teachers might be addicted to smartphone usage to ward off these problems.

The finding of high prevalence of nomophobia (Mean=33.96, SD=6.96) recorded in the present study conformed to the findings of previous studies (Kaur & Sharma, 2015; Pavithra & Madhukumar, 2015) that found a high prevalence of nomophobia in young generation. This finding agreed with the finding of Veerapu, Philip, Vasireddy, Gurralla, & Kanna (2019) which showed that India students have high prevalence of nomophobia. Gezgin, Sumuer, Arslan, and Yildirim (2017) found that Turkish pre-service teachers showed high prevalence of nomophobia in which they feel uneasy about not being able to connect and not being able to gain right of entry to information. The high prevalence of nomophobia recorded in this study may be due to mobile phone addiction by the pre-service mathematics teachers. This is because a pre-service mathematics teacher who is physically and cognitively reliant on mobile phone will find it difficult to stop the obsession. This is further buttressed by a high prevalence of smartphone addiction recorded with the present study sample. Also, the pre-service mathematics teachers might have experienced nomophobia because of feeling of insecurity, privation of self-control and discipline, feeling bored and impatient.

The finding of a significant positive relationship between nomophobia and smartphone addiction obtained in the present study revealed that there is a latent association between smartphone addiction and nomophobia (Yildiz Durak, 2017). Although smartphone-addicted people might show varied clinical features when compared to people who are nomophobic, both conditions have similar behavioural configurations. These analogous behavioural configurations might be responsible for the relationship between nomophobia and smartphone addiction recorded in this study. So, a pre-service mathematics teacher who showed a high smartphone addiction would invariably show a high nomophobia.

The results shown in Table 2 revealed that 80.2% of the discrepancy in pre-service mathematics teachers' smartphone addiction could be explained by the four independent variables (NBAI=Not being able to access information; LCON=Losing connectedness; NBTC=Not being able to communicate; and GUCO=Giving up convenience) altogether. However, 19.8% of the discrepancy in smartphone addiction was not explainable through the existing data. Thus, other predictors might exist which the study did not investigate and could contribute to the explanation of variance in pre-service mathematics teachers' smartphone addiction. These results are in agreement with the results of previous studies on the predictive influence of nomophobia on smartphone addiction (Semerci, 2019). These results imply that nomophobia might cause smartphone addiction in pre-service mathematics teachers as Semerci (2019) found that nomophobia was the strongest predictor of smartphone addiction in secondary school students. Thus, an increase in the prevalence of nomophobia could increase the prevalence of smartphone addiction among pre-service mathematics teachers.

Conclusion

This study has shown that the prevalence of both nomophobia and smartphone addiction among the pre-service mathematics teachers. Also, nomophobia is predictive of smartphone addiction in which the relationship between pre-service mathematics teachers' nomophobia and smartphone addiction is strong. With these findings, there is a need to reduce the prevalence of smartphone addiction and nomophobia in the Nigerian pre-service mathematics teachers. Nomophobia and smartphone addiction can be maladaptive and can interfere with pre-service mathematics teachers' lives, change the rules for social interactions, shake the pre-service mathematics teachers' fitness and happiness, and can even impact negatively on

pre-service mathematics teachers' academic achievement. The severity of smartphone addiction and nomophobia is common among youths in Nigeria of which the pre-service mathematics teachers are a part. As a behavioural addiction, pre-service mathematics teachers suffering from both nomophobia and smartphone addiction may have the symptoms of tolerance building, withdrawal, loss of control, and preoccupation with the addiction (LaRose, Lin & Eastin, 2003).

However, various strategies can be employed in combatting nomophobia and smartphone addiction in pre-service teachers. First, it may be worthwhile to do away with the programs that promote the addiction, engage in constructive self-fulfilling undertakings, augment social networking, and decrease the utilization of smartphone progressively. Second, universities in Nigeria can reduce these behavioural addictions in students by disconnecting the Internet network in the classroom except when teaching online, amplify leisure programmes, and deliver psychotherapy and treatment programmes for the addiction. Third stakeholders in the education industry in the country such as parents could also help curb these addictions in future teachers and others by educating them on the danger of smartphone addiction, promote ethical social interaction that builds confidence within the family, and set a boundary for their wards' smartphone airtime bills.

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