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Nomophobia, Smartphone Addiction, Depression, and Anxiety as Predictors of Internet Addiction among Nigerian Preservice Mathematics Teachers

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ABSTRACT

Smartphones and the internet can be very beneficial to their users but if not used properly, also pose great risks to their users. These devices, if used properly, even help in making teaching and learning of perceived 'tough' subjects such as mathematics easier. However, smartphone addiction, nomophobia, and internet addiction are now prevalent among modern-day individuals, most especially the younger generation. This poses a problem for the effective teaching and learning of mathematics in Nigeria. This study investigated nomophobia, smartphone addiction, depression, and anxiety as predictors of internet addiction among Nigerian preservice mathematics teachers. The participants consisted of 300 pre-service mathematics teachers randomly selected from the Department of Science and Technology Education, University of Lagos, Nigeria. Seven 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. The results showed a high prevalence of nomophobia and moderate prevalence of smartphone addiction and internet addiction among preservice mathematics teachers. There was a positive relationship between nomophobia, smartphone addiction, anxiety, depression, and internet addiction, of which all were significant predictors of internet addiction. Based on these findings, it was concluded that universities and parents in Nigeria should reduce the prevalence of nomophobia, smartphone addiction, depression, anxiety, and internet addiction in pre-service mathematics teachers in the country.

Keywords: anxiety; depression; internet addiction; nomophobia; pre-service mathematics teachers; smartphone addiction

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1. INTRODUCTION

Since its introduction in Nigeria and other developing nations in the late 1990s, smartphones have become an indispensable part of daily life and a useful source of information, and their use has grown tremendously in the previous decade. In 2016, the number of mobile devices was estimated at 7.1 billion, more than the population of our planet at the time. According to a study published by S. O'Dea [1], the number of Smartphone users in Nigeria is expected to grow to more than 140 million by 2025. This is because these devices present great opportunities and comforts to their users by performing many functions and facilitating the accomplishment of tasks. As a result, smartphones have indisputably become an integral part of modern life. While smartphone mobility has obvious advantages and helps people meet their basic needs [2]. It may also cause some of the issues that come with using a smartphone. Smartphones have been linked to compulsive checking habits in studies [3], that smartphone use can lead to compulsiveness and discomfort [4] [5] as well as the fact that smartphones can be lead to addictive behaviors among users [6] [7]. Users have an increasing need to spend more time on their phones to feel pleased, and this has led to the development of habits of constant mandatory monitoring, which can have a severe impact on daily life. Smartphone addiction is so common that it's already being treated like hard drugs addiction. This addiction to mobile phones has given rise to the term 'Nomophobia'.

The term ‘nomophobia’ is an abbreviation for no-mobile-phone phobia, the term originated during a study by the UK Post Office which commissioned YouGov, another UK-based research organization to look at anxieties suffered by mobile phone users in 2008. Nomophobia is defined as “the fear of being out of mobile phone contact” [8]. International Business Times’ definition defines the term thus: “Nomophobia or no-mobile-phone-phobia is anxiety which people face when they feel they could not get signal from a mobile tower, run out of battery, forget to take the phone with them or simply do not receive calls, texts or email notifications for a certain period. In short, it is a psychological fear of losing mobile or cell phone contact Smartphone addiction, on the other hand, is the state of being enslaved to a smartphone and its functions. Al-Barashidi, Bouazza & Jabur [9] see smartphone addiction as a phenomenon in which a person becomes so interested in their smartphone use that they disregard other crucial aspects of their lives. Internet may be seen as a global connection of computers that allows users to share information in various forms such as text, images, and videos.

According to Choi, Kim, Ahn, Song and Youn [10] a huge amount of smartphone functions cannot be performed without access to the internet (such as education, entertainment, social networking, and information sharing) cannot be performed without access to the internet, which means there is a strong correlation between the internet and smartphone usage. The Internet, however, tends to distract its users. Users frequently spend more time on the internet than they intended, which can have an impact on their overall productivity in other aspects of life. The term "internet addiction" refers to a condition in which a person gets unduly reliant on the internet to cope with life's difficulties. According to the American Psychiatric Association [11], internet addiction can include three or more of the following;

- The user constantly increases the amount of time he/she spends on the internet to achieve the same level of fulfillment.
- Inability to gain access to the internet causes the user to experience withdrawal symptoms, and eventually being able to use the internet relives these symptoms.
- The user engages the internet as a form of coping mechanism for negative emotions such as guilt, depression, and anxiety.
- The user spends a large amount of time doing other internet-related activities (such as researching internet vendors, internet books).
- The user spends a huge amount of time on the internet to the extent that other aspects of life (such as relationships, work, school, and leisure pursuits) are neglected so they can spend even more time on the internet.
- The user does not mind losing jobs, relationships, or other important aspects of life in favor of the internet.

In a study carried out by Statista, Nigeria had 92.3 million internet users in 2018, a figure which is expected to grow to 187.8 million in 2023. The Global State of Digital in 2019 report discovered that there are 98.39 million internet users in Nigeria, which is about 50% of the country’s population. According to a study by the United Kingdom (UK)-based SecurEnvoy, an estimated 66% of the population is at risk of suffering nomophobia, and equating that to the 101, 077, 658 active lines in Nigeria, could mean that an estimated 66, 711, 250 subscribers may be at risk of nomophobia. Nomophobia is structured in four main dimensions; fear or nervousness of not being able to communicate with other people, fear of losing connectedness, fear of not being able to have immediate access to information, and fear of giving up the conveniences provided by mobile phones. Studies have shown that smartphone addiction has negative effects on individuals' as physical, mental, and emotional health. Mobile phone addiction may lead to academic problems, low job productivity, physical issues, as well as depression, anxiety, and other mental health problems. In addition, it is affecting interpersonal relationships, creating a distance from the physical world and making individuals more attached to the virtual world, mostly among the younger generation. King, Valenca and Nardi [12] have also reported that smartphones provide individuals with a false sense of security, citing that smartphones make many feel that they can reach everyone unconditionally on demand. Tindell & Bohlander [13] researched college student smartphone use in class and discovered that the majority (95%) of students carry their phones to class and set them to vibrate while in class (91%). While waiting for class to start, almost all of the students (97%) reported sending or receiving text messages. Approximately 92% admitted to sending or receiving a text message during class. This causes decreased interest in the activities going on in the classroom, consequently, causing decreased academic achievement.

The concept of "Fear of Missing Out"(FoMO) describes people's fears about not being able to learn about the new information that they think is significant. FoMO is characterized by a need to be constantly linked with

what others are doing and is identified by a pervasive concern about what others may be doing regarding situations from which one is absent [14]. Relating this to smartphone use, FoMO can be seen as an apprehension state in which individuals stay glued to their smartphones because they want to stay informed about the most recent trends or developments, and the inability to access the digital environment has the potential to cause anxiety. According to Durak [15], increased online communication has resulted in nomophobia, as it may result in the inability of an individual to develop necessary social skills and also psychological problems. Even though smartphone addiction and nomophobia may appear to be related, they are not the same. Relevant variables such as demographic variables, psychological difficulties, academic achievement, and technology usage [16] have also been considered related factors for nomophobia when examining the risk factors for smartphone addiction. In this study, these variables were also investigated as predictors of internet addiction among Nigerian preservice mathematics teachers.

This study investigated the relationship between smartphone addiction, nomophobia, and internet addiction and the levels to which nomophobia, smartphone addiction, depression, and anxiety act as predictors of internet addiction among Nigerian preservice mathematics teachers. The following research questions were answered in this study:

1. What is the prevalence of nomophobia and smartphone addiction among Nigerian preservice mathematics teachers?
2. Is there a significant relationship between nomophobia and smartphone addiction of Nigerian preservice mathematics teachers?
3. Is there a significant relationship between smartphone addiction, anxiety, and depression of preservice mathematics teachers?
4. Is there a significant relationship between nomophobia, anxiety, and depression?
5. What is the prevalence of internet addiction among Nigerian preservice mathematics teachers?
6. Do variables related to the subjects including demographic variables, psychosocial problems, academic performance, and technology usage predict internet addiction significantly?
7. What is the predictive influence of preservice mathematics teachers' nomophobia and smartphone addiction on their internet addiction?

2. RESEARCH METHOD

Research Design

For this study, the correlational research design was adopted. The study used this type of design to conduct an in-depth research investigation on the population being studied.

Participants

The target population comprised all the 437 pre-service mathematics teachers listed for the 2019/2020 academic session in the Department of Science and Technology Education, University of Lagos, Nigeria. Through a simple random sampling technique, a sample of 300 pre-service mathematics teachers was randomly selected from the population. The sample consisted of 146 males and 154 females. Their age ranged from 16 and 30 years.

Instruments

Five instruments were used for this study:

Nomophobia Questionnaire (NMP-Q): The NMP-Q is a 20-item scale developed by Yildirim and Correia [17]. It comprises four factors; not being able to communicate, losing connectedness, not being able to access information, giving up convenience. Each NMP-Q item is scored on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree), resulting in a total score. Furthermore, the NMP-Q score is translated into a level of nomophobia (out of a total score between 20 and 140) with 20 indicating absence, 21-59 indicating a mild level, 60-99 indicating a moderate level, and >= 100 indicating a severe level (out of a total score between 20 and 140) [14].

Smartphone Addiction Scale – Short Version: Kwon, et al. [18] Smartphone Addiction Scale-Short Version (SAS-SV) is a revised version of the Smartphone Addiction Scale (SAS). SAS-SV looks at smartphone addiction and generates a total score that indicates the degree of the problem; higher scores imply more serious addictions. There are ten items based on a six-point Likert scale (1: "strongly disagree," 2: "disagree," 3: "weakly disagree," 4: "weakly agree," 5: "agree," and 6: "strongly agree") which are to be added together.

Internet Addiction Test: Young developed the Internet Addiction Test (IAT) to assess the presence and severity of teenagers' and adults' self-reported addicted internet use. The IAT includes 20 items that assess online which are associated with uncontrollable internet use. The items are scored on a 5-point Likert scale, with 0 denoting the least extreme behavior and 5 denoting the most extreme conduct. Scores 0 to 30 indicate a normal IA level, 31 to 49 suggest a mild IA level, 50 to 79 indicate a moderate IA level, and 80 to 100 indicate a severe IA level.

Patient Health Questionnaire *(PHQ-9)*: The Patient Health Questionnaire is a 9-item abbreviated version of the full Patient Health Questionnaire that is used to detect depression. Each item is scored on a scale of 0 (never) to 3 (almost every day) for how persistent symptoms have been in the last two weeks, with a total score ranging from 0 to 27. A total score of 0–4 indicates minor depression, 5–9 mild depression, 10–14 moderate depression, 15–19 moderately severe depression, and 20–27 severe depression, respectively [19].

Generalized Anxiety Disorders Scale (GAD-7): This 7-item Generalized Anxiety Disorders Scale was created as a primary care screening tool for generalized anxiety disorder (GAD). Each item is given a score ranging from 0 (not at all) to 3 (very well) (nearly every day). The total number of possible scores varies from 0 to 21, with cutoff scores of 5, 10, and 15 indicating mild, moderate, and severe anxiety, respectively.

Procedure

The researcher and 3 research assistants were involved in the collection of data for the study. The instruments were administered to the participants in regularly scheduled classes in the Department of Science and Technology Education, University of Lagos for data collection.

Method of Data Analysis

Data collected were analyzed using mean, standard deviation, Pearson product-moment correlation, and multiple regression analysis. SPSS was used for the coding of numerical data and data analysis.

3. RESULT AND ANALYSIS

3.1 RESULT

Research Question 1: What is the prevalence of nomophobia and smartphone addiction among Nigerian preservice mathematics teachers?

Table 1. Means and standard deviations of nomophobia and smartphone addiction.

	N	Mean	SD
NMP	300	68.32	14.641
SPA	300	27.95	7.199

**SPA- Smartphone addiction, NMP- Nomophobia*

Nomophobia Prevalence: The nomophobia questionnaire scores ranged from 20 to 100, giving a middle point of 60, meaning that scores higher than 60 signify a high nomophobia level. 300 preservice teachers (respondents) were sampled and it was found that 28.7% (86) had a nomophobia score less than 60 and 71.3% (214) had scores from 60 to 100. 0verall mean of the scores was 68.32 with a standard deviation of 14.641, and 95% confidence interval of the mean was found to be (66.66,69.98). This shows a high prevalence of nomophobia among preservice mathematics teachers.

Smartphone Addiction Prevalence: The smartphone addiction scale had scores ranging from 10 to 50, giving a middle point of 30. This means that scores higher than 30 indicate a high level of smartphone addiction. Out of the 300 respondents, it was found that 60.33% (181) had SAS scores lower than 30, and 39.67% (119) had scores lower than 30. The overall mean of the scores was 27.95, with standard deviation 7.199, and 95% confidence interval for the mean found to be (27.13,28.77). This shows a moderate prevalence of smartphone addiction among preservice mathematics teachers.

Research Question 2: Is there a significant relationship between nomophobia and smartphone addiction levels of Nigerian preservice mathematics teachers?

Table 2. Correlations of nomophobia and its four dimensions with smartphone addiction.

	N	Mean	SD	r	P
NBAI	300	14.70	3.311	0.276	0.000
GUC	300	17.02	3.930	0.422	0.000
NBAC	300	21.18	5.510	0.369	0.000
LOC	300	15.61	4.662	0.470	0.000
NMP	300	68.32	14.641	0.447	0.001

**SPA- Smartphone addiction, NBAI- Not being able to access information, GUC- Giving up convenience, NBAC- Not being able to communicate, LOC-Losing connectedness, NMP- Nomophobia*

The Pearson's correlation coefficient of smartphone addiction scores with the dimensions of nomophobia was found to be; Not being able to access information- 0.276, giving up convenience- 0.422, not being able to communicate- 0.369, losing connectedness- 0.470. This shows that dimension 'Losing connectedness' has the strongest relationship with smartphone addiction, followed by 'Giving up convenience', then 'Not being able to communicate' and 'Not being able to access information' having the weakest relationship. However, the Pearson's correlation coefficient of the overall nomophobia and smartphone addiction scores is 0.447 at a significance level of 0.001. This means there is a significant, moderate positive correlation between both variables.

Research Question 3: Is there a significant relationship between smartphone addiction, anxiety, and depression?

Table 3. Correlations of depression and anxiety with smartphone addiction

	N	Mean	SD	r	p
DEP	300	21.76	8.085	0.433	0.000
ANX	300	17.43	6.162	0.404	0.000

**DEP- Depression., ANX- Anxiety*

The Pearson's correlation coefficient of smartphone addiction and depression scores was found to be 0.433 at a significance level of 0.000. This shows evidence of a significant, moderate, positive relationship between both variables. The Pearson's correlation coefficient of smartphone addiction and anxiety scores were found to be 0.404 at a significance level of 0.000. This shows a significant, moderate, and positive relationship between both variables.

Research Question 4: Is there a significant relationship between nomophobia, anxiety, and depression?

Table 4. Correlations of nomophobia and its dimensions with depression

	Mean	SD	R	p
NBAI	14.70	3.311	0.091	0.058
GUC	17.02	3.930	0.217	0.023
NBAC	21.18	5.510	0.116	0.000
LOC	15.61	4.662	0.313	0.001
NMP	68.32	14.641	0.209	0.000

** NBAI- Not being able to access information, GUC- Giving up convenience, NBAC- Not being able to communicate, LOC-Losing connectedness, NMP- Nomophobia*

For nomophobia and depression scores, the Pearson's correlation coefficients for the different dimensions were found to be; 'Not being able to access information'- 0.091, 'Giving up convenience'- 0.217, 'Not being able to communicate'-0.116, 'Losing connectedness'- 0.313. This implies the 'Losing connectedness' has the strongest relationship with depression, although weak on its own. 'Not being able to access information' has a very weak positive statistically insignificant relationship with depression, and the weakest relationship when compared to other dimensions. However, overall nomophobia and depression scores gave a Pearson's correlation coefficient of 0.209, showing a weak positive relationship between the variables.

Table 5. Correlations of nomophobia and its dimensions with anxiety

	Mean	SD	R	p
NBAI	14.70	3.311	0.045	0.217
GUC	17.02	3.930	0.207	0.000
NBAC	21.18	5.510	0.125	0.016
LOC	15.61	4.662	0.260	0.000
NMP	68.32	14.641	0.181	0.001

** NBAI- Not being able to access information, GUC- Giving up convenience, NBAC- Not being able to communicate, LOC-Losing connectedness, NMP- Nomophobia*

The Pearson's correlation coefficients for the dimensions of nomophobia and anxiety scores were found to be; 'Not being able to access information'- 0.045, 'Giving up convenience'- 0.207, 'Not being able to communicate'- 0.125, 'Losing connectedness'- 0.260. All the dimensions had statistically significant relationships except 'Not being able to access information' with a significance level of 0.217. However, overall nomophobia and anxiety gave a Pearson's correlation coefficient of 0.181, showing a weak positive relationship between the variables. Finally, results showed a high, positive, and significant relationship between anxiety and depression scores with a Pearson's correlation coefficient of 0.672 and a significance level of 0.000.

Research Question 5: What is the prevalence of internet addiction among Nigerian preservice mathematics teachers?

Internet Addiction Test scores ranged from 20 to 100, giving a middle point of 60. Out of the 300 respondents, it was found that 193(64.3%) had scores lower than 60 and 107(35.7%) had scores above 60. The overall mean of the scores was 55.35 with standard deviation 13.567 and 95% confidence interval for the mean given as (53.81, 56.89). The results show a moderate level of internet addiction among preservice mathematics teachers.

Table 6. Mean and standard deviation of internet addiction

	N	Mean	SD
IAS	300	55.35	13.567

**IAS – Internet Addiction Score*

Research Question 6: Do variables related to the subjects including demographic variables, psychosocial problems, academic performance, and technology usage predict internet addiction levels significantly?

The result of the multiple regression analysis (Table 7) carried out showed an adjusted R square value of 0.049 which means 4.9% of the variation in internet addiction can be explained by a blend of smartphone ownership duration, internet access status, daily duration of smartphone usage, CGPA and age. The analysis of variance of the multiple regression data produced an F-ratio value ($F_{(5, 294)} = 4.081$; $p<0.001$. This shows the model is a good fit for the data The standardized regression coefficients of the independent variables show that 'Internet Access Status' made an insignificant negative contribution to internet addiction with coefficient -0.100 at a significance level of 0.085, 'Duration of daily smartphone usage' made a significant positive contribution with coefficient 0.247 at a significance level of 0.000, 'Duration of smartphone ownership' made an insignificant negative contribution with coefficient -0.074 at a significance level of 0.211, 'CGPA' made an insignificant negative contribution with coefficient -0.023 at a significance level of 0.693, and 'Age' made an insignificant negative contribution with coefficient -0.038 at a significance level of 0.515.

Table 7. Regression coefficients of demographic and psychosocial variables on internet addiction

Model Summary

Multiple R= 0.255; Multiple R^2= 0.065; MultipleR^2(Adjusted)=0.049; Std. Error of Estimate =13.230; df1 = 5; df2 = 294 F= 4.081, p<0.001;

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	54.135	5.706		9.487	.000
Age	-.824	1.263	-.038	-.653	.515
DDSU	3.289	.785	.247	4.192	.000
SMOD	-1.203	.959	-.074	-1.254	.211
IAS	-1.510	.874	-.100	-1.728	.085
CGPA	-.318	.805	-.023	-.395	.693

**DEP – Depression, ANX- Anxiety, SMOD – Smartphone Ownership Duration, IAS- Internet Access Status, DDSU- Daily Duration of Smartphone Usage, CGPA- Cumulative Grade Points Average*

However, of all the aforementioned variables, only the variation caused by the daily duration of smartphone usage was statistically significant with p value of 0.000. This means that 1 standard deviation (1.019) increase in the daily duration of smartphone usage is associated with 0.247 times 1 internet addiction standard deviation (0.247×13.567 = 3.3510) increase in internet addiction. The standardized coefficients revealed that the regression model: Internet addiction predicted = 54.135 + (3.289 × DDSU).

Table 8. Regression coefficients of psychosocial variables on internet addiction

Model Summary

Multiple R= 0.547; Multiple R^2= 0.299; MultipleR^2(Adjusted)=0.247 Std. Error of Estimate = 11.396; df1 = 2; df2 = 297 F= 63.367, p<0.000;

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	33.771	2.098		16.095	.000
DEP	.738	.110	.440	6.703	.000
ANX	.317	.144	.144	2.194	.029

**DEP – Depression, ANX- Anxiety*

The result of the multiple regression analysis carried out showed an adjusted R square value of 0.247 which means 24.7% of the variation in internet addiction can be explained by a blend of depression and anxiety. The analysis of variance of the multiple regression data produced an F-ratio value ($F_{(2, 297)}$ = 63.367; p=0.000. This shows the model is a good fit for the data. The standardized regression coefficients of the independent variables show that 'Depression' made a positive significant contribution with coefficient 0.440 at a significance level of 0.000, and 'Anxiety' also made a positive significant contribution with a coefficient 0.144 at a significance level of 0.029. This means that 1 standard deviation (8.085) increase in depression is associated with 0.447 times 1 internet addiction standard deviation (0.447 × 13.567 = 6.0644) increase in internet addiction, and 1 standard deviation (6.162) increase in anxiety is associated with 0.144 times 1 internet addiction standard deviation (0.144 × 13.567 = 1.9536) increase in internet addiction. The standardized coefficients revealed that

the regression model: Internet addiction predicted = 33.771 + (0.738 × DEP score) + (0.317 × ANX score). In conclusion, of all considered demographic variables, only the daily duration of smartphone addiction predicts internet addiction significantly. Also, depression and anxiety predict internet addiction, but depression has a greater predictive influence than anxiety.

Research Question 7: What is the predictive influence of preservice mathematics teachers' nomophobia and smartphone addiction on their internet addiction?

Table 9. Regression coefficients of smartphone addiction, dimensions of nomophobia on internet addiction

Model Summary

Multiple R= 0.768; Multiple R^2= 0.589; MultipleR^2(Adjusted)=0.582; Std. Error of Estimate =8.767; df1 = 5; df2 = 294 F= 84.401, p<0.000;

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	12.287	2.791		4.402	.000
SPA	1.152	.082	.611	14.100	.000
NBAI	-.282	.197	-.069	-1.432	.153
GUC	.187	.191	.054	.980	.328
NBAC	.044	.134	.018	.330	.742
LOC	.697	.149	.239	4.664	.000

**SPA- Smartphone addiction, NBAI- Not being able to access information, GUC- Giving up convenience, NBAC- Not being able to communicate, LOC-Losing connectedness.*

Regression analysis of smartphone addiction and the 4 dimensions of nomophobia against internet addiction gave an adjusted R Square value of 0.582. This means that 58.2% of the variation in internet addiction scores can be explained by a blend of these factors at a significance level of 0.000. . The analysis of variance of the multiple regression data produced an F-ratio value ($F_{(5, 294)}$ = 84.401; p<0.000). This shows the model is a good fit for the data Individually, the standardized regression coefficients of the variables showed that 'Smartphone Addiction' made a significant positive contribution with a coefficient 0.611 at a significance level of 0.000, 'Not being able to access information made an insignificant negative contribution with coefficient -1.432 at a significance level of 0.153, 'Giving up convenience' made an insignificant positive contribution to internet addiction with coefficient 0.054 at a significance level of 0.328, 'Not being able to communicate' made an insignificant positive contribution with coefficient 0.143 at a significance level of 0.742 and 'Losing connectedness' made a significant positive contribution with coefficient 0.239 at a significance level of 0.000. The regression coefficients show that of the four dimensions of nomophobia, only 'losing connectedness' had a significant predictive influence on the internet addiction scores of respondents. This means that 1 standard deviation (4.662) increase in 'losing connectedness' is associated with 0.239 times 1 internet addiction standard deviation (0.239×13.567 = 3.2425) and 1 standard deviation (7.199) increase in smartphone addiction is associated with 0.611 times 1 internet addiction standard deviation (0.611×13.567 = 8.2894) increase in internet addiction. The standardized coefficients revealed that the regression model: Internet addiction predicted = 12.287 + (1.152 × SPA) + (0.697 × LOC).

Overall nomophobia together with smartphone addiction however gave an unstandardized regression coefficient 0.165 which means that there is a 0.166 increase in internet addiction scores per unit increase in nomophobia scores.

Table 10. Regression coefficients of smartphone addiction and overall nomophobia on internet addiction

Model Summary		
Multiple R= 0.752; Std. Error of Estimate =8.979; df1 = 2; df2 = 297	Multiple R^2= 0.565; F= 192.809, p<0.000;	MultipleR^2(Adjusted)=0.562;

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	9.530	2.688		3.545	.000
SAP	1.232	.081	.654	15.284	.000
NMP	.166	.040	.180	4.197	.000

Regression analysis of overall nomophobia scores and smartphone addiction scores against internet addiction scores showed an adjusted R Square value of 0.562, this means that 56.2% of the variance of internet addiction is explained by overall nomophobia scores and smartphone addiction scores. The analysis of variance of the multiple regression data produced an F-ratio value ($F_{(2, 297)}$ = 192.809; p<0.000). The standardized regression coefficients showed 'Smartphone Addiction' had a significant positive contribution with coefficient 0.654 at a significance level of 0.000, and 'Overall Nomophobia' had a significant positive contribution with coefficient 0.180 at a significance level of 0.000.

This means that 1 standard deviation (7.199) increase in smartphone addiction is associated with 0.654 times 1 internet addiction standard deviation (0.654×13.567 = 8.8728) increase in internet addiction, according to this model, and 1 standard deviation (14.641) increase in overall nomophobia is associated with 0.180 times 1 internet addiction standard deviation (0.180×13.567 = 2.4421) increase in internet addiction. The standardized coefficients revealed that the regression model: Internet addiction predicted = 9.530 + (1.232×SPA) + (0.166 × NMP). The results show that nomophobia and smartphone addiction have a predictive influence on internet addiction, although smartphone addiction has a higher predictive influence on internet addiction than nomophobia.

3.2. ANALYSIS

This study has shown there is a high prevalence of nomophobia among preservice mathematics teachers (Mean 68.32, S.D 14.641). The result was in agreement with Dongre, Inamdar, and Gattani [20] who found a high prevalence of nomophobia among young people. Also, Mallya, Kumar and Mashal [21] found a high prevalence of nomophobia in their study on first year medical students. Awofala [22] in his study also discovered a high prevalence of nomophobia among Nigerian preservice mathematics teachers. This high level of nomophobia among Nigerian preservice mathematics teachers may be due to negative symptoms that the individuals experience.

The prevalence of smartphone addiction among Nigerian preservice mathematics teachers according to the findings of this study was moderate (Mean =27.95, SD=7.199). A lot of previous studies concerning smartphone addiction show evidence of a high prevalence of smartphone addiction, especially among the youths. Studies by various researchers have shown a high prevalence of smartphone addiction among youths [22]. Shankar, Karan and Mahendra [23] in their study discovered that 40.93% of Indian youths were addicted to their smartphones. Also, there is a significant relationship between smartphone addiction, nomophobia, anxiety, and depression. This is in agreement with previous studies that show that psychological problems are related to nomophobia and smartphone addiction [24]. This study has revealed a higher prevalence of nomophobia than smartphone addiction. This suggests that many users are more afraid of not having their phones to perform various activities they might have on their smartphones and still not being glued to it all the time.

Moderate prevalence of internet addiction among preservice mathematics teachers was also discovered in this study (Mean= 55.35, SD=13.567). This is in agreement with the results of previous research done on this topic. Kerasioti, Pliakou, Vlachou, Aspiridis, Blanas & Tselios [25] in their study discovered a moderate prevalence of internet addiction among university students. However, a study by Yilmaz, Yilmaz, Teker and Keser [26] showed a low prevalence of internet addiction among University students in Turkey.

Concerning predictors of internet addiction, this study revealed that anxiety, depression, smartphone addiction, and nomophobia are significant predictors. Ineme, Ineme, Akpabio and Osinowo [27] in their study, also recognized that high depressive symptoms indicate high internet addiction. A South Korean study showed that factors contributing to high level smartphone addiction also contribute to Internet addiction [28]. Yin,

Yahaya, Sangryeol, Maakip, Voo and Maalip [29] also recorded a high relationship between smartphone addiction, nomophobia, and internet addiction. The fear of losing connectedness to the online environment motivates individuals to spend more time on the internet to the extent that they become addicted to it. A lot of smartphone functions are realized on the internet and so the more the smartphone is used, the higher the level of internet addiction. In addition, psychosocial problems such as anxiety, depression, and loneliness contribute to high internet addiction.

4. CONCLUSION

It was concluded from this study that nomophobia, smartphone addiction, and internet addiction prevalence among Nigerian preservice mathematics teachers are problematic. Also, nomophobia, smartphone addiction, and depression have a predictive influence on internet addiction. It is important to curb these problems as they can significantly affect preservice mathematics teachers' lives, health, social function, and even their quality of teaching when they eventually go into the teaching field. This will in turn affect the quality of students' produce and eventually affect the level of development of the nation as a whole. Some measures that can be put in place to reduce the prevalence of nomophobia, smartphone addiction, and internet addiction are:

1. Programs that positively engage preservice mathematics teachers should be put in place so they do not always have to run to their smartphones and the internet to relieve boredom.
2. Preservice mathematics teachers should be sensitized to the dangers of excessive smartphone and internet use to reduce their dependence.
3. Parents and stakeholders in education should set boundaries for preservice mathematics teachers, and this should not be done with force but by logically explaining the consequences of excessive smartphone and internet use.
4. Therapy and treatment programs should be made available for preservice mathematics teachers to help them reduce the negative emotions they experience, and also help those who already suffer from nomophobia, smartphone addiction, and internet addiction.

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