Internet Addiction, Problematic Smartphone Use and Psychological Health of Nigerian University Undergraduates

ABSTRACT

Aim: This study examined Internet Addiction (IA) and Problematic Smartphone Use (PSU) as predictors of severities of anxiety, depression and psychological distress among university undergraduates in Nigeria.

Study design: Exploratory /Descriptive survey design.

Place and Duration of Study: Redeemer's University Nigeria, between April and August 2018.

Methodology: A total of 854 university undergraduates made up of 342 males and 512 females, *mean age* 20.5 years, were purposively selected from four universities in Osun state, southwestern Nigeria. Internet Addiction Test (IAT), Smartphone Addiction Scale – Short Version (SAS-SV), Beck Anxiety Inventory (BAI), Centre for Epidemiological Studies Depression Scale (CES-D) and General Health Questionnaire (GHQ-12) were used for data collection.

Results: Observed prevalence of studied variables among respondents are: Internet Addiction (IA) 48.6%, Problematic Smartphone Use (PSU) (47.4%), anxiety disorder (50.6%), depression (49.8%) and psychological distress (47.6%). IA independently and significantly predicted severities of anxiety disorder (R^2 = .01, *P* = .025), depression (R^2 = .057, *P* = .000) and psychological distress (R^2 = .105, *P* = .000). PSU independently and significantly predicted severities of depression (R^2 = .073, *P* = .000) and psychological distress (R^2 = .094, P = .000). However PSU failed to significantly predict severity of anxiety disorder (R^2 = .00, P = .650) among the participants.

Conclusion: High prevalence of IA, PSU, anxiety disorder, depression and psychological distress exist among the participants. IA is a significant independent predictor of anxiety, depression and psychological distress. PSU is a significant independent predictor of depression and psychological distress but is not a significant predictor anxiety disorder among Nigerian undergraduates.

Keywords: Internet addiction, problematic smartphone use, psychological health.

1. INTRODUCTION

Psychological distress is widely used as an indicator of the mental health of the population in public health, in population surveys and in epidemiological studies and, as an outcome, in clinical trials and intervention studies. Psychological distress is mostly seen as a state of emotional suffering characterized by symptoms of depression (e.g., lost interest; sadness; hopelessness) and anxiety (e.g., restlessness; feeling tense) [1]. These symptoms often attached to somatic symptoms (e.g., insomnia; headaches; lack of energy) most often vary across cultures [2, 3]. Decker [4]; Burnette and Mui [5], conceptualized Psychological Distress (PD) as lack of enthusiasm, problems with sleep (trouble falling asleep or staying asleep), feeling downhearted or blue, feeling hopeless about the future, feeling emotional. Mirowsky and Ross [1] opined that psychological distress is the unpleasant subjective state of depression and anxiety (being tense, restless, worried, irritable and afraid), which has both emotional and physiological manifestation. What constitutes psychological distress is broad and ranges from mild to extreme. The extreme levels are considered as mental illness such as schizoaffective disorder [1]. Psychological distress is also viewed as the deviation from some objectively healthy state of being. It implies maladaptive patterns of coping. It is mild psychopathology with symptoms that are common in the community. It is negative feelings of restlessness, depression, anger, anxiety, loneliness, isolation and problematic interpersonal relationships [5].

Internet Addiction (IA) had been widely debated in medical literature [6] as a sort of psychopathology [7] that affects large number of people [8]. People engage in a variety of activities on the internet some of which are addictive [9]. According to Sally [10], psychologists characterized internet addiction into two categories viz the uncontrollable and the damaging use of the Internet. Kandell [11] defines Internet Addiction as "a psychological dependence on the Internet". According to Rice [12] and Douglas, Mills,

Niang, Stepchenkova, Byun, Ruffini, Lee, Loutfi, Lee, Atallah, and Blanton, [13], Internet addicts exhibit tendencies towards obsessive use of the Internet in such a way that it interferes with their ability to lead normal life. Park [14] defined mobile phone addiction as exhibiting effects of "tolerance and withdrawal," such as paying larger phone bills to get more talking time or experiencing anxiety in the absence of one's mobile phone.

Anxiety and depression have been found to be related to Problematic Smartphone Use (PSU) [15, 16] and anxiety severity [16; 17]. Several factors account for the association between mental health symptoms and problematic Smartphone use. According to Kim, Seo, and David [18] Smartphone use aimed at alleviating negative emotion mediated the relationship between depression severity and problematic use. Elhai, Levine, Dvorak, & Hall, [17] discovered that behavioral activation mediated relations between depression and problematic Smartphone use. Increased habit formation of checking one's phone for message notifications led to increased problematic Smartphone use [19]. Furthermore, van Deursen et al. [20]. Habitual Smartphone use mediates correlations between self-regulation and problematic smartphone use. Thus, increases in Smartphone use frequency may serve as a mechanism accounting for relations between poor mental health and problematic Smartphone use.

Research has revealed an association between smartphone addiction and gambling addiction [21]. Gambling addiction seen as the most well-known behavioral addiction has been categorized within "substance-related and addictive disorders" in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) [21]. Internet gaming disorder has also been listed in the research criteria of the DSM-5 [21]. Smartphone addiction consists of four main components: compulsive phone use, behaviors such as repeated checking for messages or updates; tolerance, longer and more intense bouts of use; withdrawal, feelings of agitation or distress without the phone; and functional impairment, interference with other life activities and face to face social relationships [22].

Majority of Nigerian university undergraduates heavily use the internet and smartphone technology in carrying out their academic work, as well as both social and non-social activities. In some European, Asian and American countries, studies have been carried out on the relationship between internet addiction, Smartphone use and mental health of selected population. There is however a dearth in such and related phenomenon among African population Nigerian samples in particular. This study aims to determine patterns of anxiety disorder, depression, psychological disorders, internet addiction and problematic smartphone use, and to ascertain the extent to which internet addiction and PSU independently predict severities of anxiety disorder, depression and psychological distress among undergraduates in Osun state, southwestern Nigeria.

2. MATERIAL AND METHODS

2.1 Participants

A cross sectional survey design was employed in the study. The population comprised of university undergraduates from two public and two private owned universities in Osun state Nigeria. A random sampling technique was used to select the four institutions while a purposive sampling technique was adopted to select participants across the colleges, programmes, levels of study and gender. A total of 854 undergraduates participated in the study.

2.2 Measures

A battery of four instruments was adapted and used as tools for data collection.

Internet Addiction Test (IAT) by Young [23] is a twenty item instrument developed for measuring the problematic use of internet. IAT takes about five minutes to administer. Participants rate each item on a six point Likert scale ranging from 0 = "Does not apply" to 5 = "Always" to show their online behavior. All items are scored directly. The items are summed up the higher the score the grater the level of addiction. Grand score of 20 – 49 points indicates average on-line user and a control over internet usage. Grand score of 50 – 79 points indicates occasional or frequent problems because of the Internet. A grand score of 80 – 100 points indicates that Internet usage is causing significant problems in one's life.

Smartphone Addiction Scale- Short Version (SAS-SV) [24] is a revised version of the Smartphone Addiction Scale (SAS), a self-analytic scale used to differentiate smartphone addicts based on a Korean self-analytic program. SAS-SV examines for smartphone addiction. It consists of 6 factors (loss of control, daily-life disturbance, disregard for consequence, withdrawal, preoccupation and tolerance) which are accessed through 10 items, based on self-reporting six-point Likert scale (1: "strongly disagree", 2: "disagree", 3: "weakly disagree", 4: "weakly agree", 5: "agree", and 6: "strongly agree"). The cut-off value

for males was 31 and 33 for females [25]. Those who scored higher than the cut-off values are considered as high-risk for smartphone addiction. A total mean was 25.26 the internal consistency reliability and concurrent validity of SAS-SV were certified with Cronbach's α correlation coefficient of 0.91 [24]. The correlation coefficients of corrected item total ranged from 0.50 to 0.80 and are well within the satisfactory range. SAS-SV has an identified Cronbach's α reliability correlation coefficient of .87.
Validity and reliability of SAS-SV was carried out for Nigerian population through a pilot study. Concurrent validity showed a significant positive correlation between SAS-SV and BFAS (r = .58 *P*= .05). The reliability for the Nigerian sample as observed through the pilot study showed a Cronbach α correlation coefficient of .77, a Spearman-Brown correlation coefficient of .92, and a Guttman Split-Half correlation coefficient of .80.

Beck Anxiety Inventory (BAI) [26] is a 21 item scale for measuring degree of anxiety. BAI takes about five minutes to administer. Participants rate each item on a four point Likert scale ranging from 0 = "Not at all" to 3 = "It bothers me a lot". Each column is scored, followed by the scores of the columns to get the grand total. A grand sum between 0 – 21 indicates very low anxiety. Although this score is usually a good thing. It is a possible indicator that the respondent is unrealistic in either the assessment which would be denial or that respondent has learned to "mask" the symptoms commonly associated with anxiety. Too little "anxiety" could indicate detachment from self, others, or the environment. A grand sum between 22 – 35 indicates moderate anxiety. A grand sum that exceeds 36 is a potential cause for concern which requires clinical interventions. To determine the psychometric properties for a Nigerian sample, validity and reliability of BAI was carried out through pilot study. Through a concurrent validity a significant positive correlation was found between BAI and Zung Self –rate Anxiety Scale (SAS) [27] (r =.514 *P*= .01). The reliability showed a Cronbach α correlation coefficient of .91, a Spearman-Brown correlation coefficient of .81, a Guttman split-Half correlation coefficient of .81. This makes the BAI valid and reliable for Nigerian sample.
Center for Epidemiologic Studies Depression Scale (CES-D), NIMH [28] is a twenty item instrument developed for measuring levels of depression. CES-D takes about five minutes to administer. Participants rate each item on a four point Likert scale ranging from 1 = "Rarely or none of the time (less than 1 day)" to 4 = "Most or all of the time (5-7 days)". The scoring of positive items (4, 8, 12, and 16) is reversed. Possible range of scores is zero to 60, with the higher scores indicating the presence of more symptomatology. Scores less than 15 indicate absence of the experience of high levels of depressive symptoms at the time of test administration. Score of 15-21, shows mild to moderate symptom of depression. Score of over 21, indicates possibility of major depression. To determine acceptable psychometric properties for a Nigerian sample, concurrent validity and reliability of CES-D was carried out through pilot study. Significant Positive correlation was found between CES-D and WHO Major Depression Inventory (MDI) [29, 30] (r =.48 *P* =.01). The obtained reliability showed a Cronbach α correlation coefficient of .76, a Spearman-Brown coefficient of .51, and a Guttman Split-Half coefficient of .51. This makes CES-D valid and reliable for a Nigerian sample.
General Health Questionnaire (GHQ-12) by Goldberg and Williams [31] was designed to assess psychological distress in population surveys and epidemiological studies, and to screen for non-psychotic mental disorders in clinical settings. GHQ which initially contained 60 items describing depression, anxiety and somatic symptoms and social impairment now exists in four additional versions that differ by the number of items (12, 20, 28 and 30). The 12 items of the GHQ-12 measure factors as; able to concentrate; lost sleep over worry; playing a useful part in society; capable of making decisions; constantly under strain; couldn't overcome difficulties; enjoy normal activities; face up to problems; unhappy and depressed; losing confidence in yourself; thinking of yourself as worthless; feeling reasonably happy. GHQ has widespread use and recognition as an indicator of distress [32]. The items use a 4-point severity/frequency scale (0-3) to rate the extent to which respondents have experienced each symptom over the past two weeks; the expressions "recently" and "during the last few weeks" are occasionally used instead of the two weeks reference period. The items scores can be added to create a total score of distress. The GHQ scales have been validated with clinical [33] and non-clinical samples [34]. The GHQ-12 was shown to be measurement invariant (i.e., to measure the same construct) across gender [35] and between adults and adolescents [36]. GHQ-12 has been used by many Nigerian investigators [37].

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2.3 Data Analysis

Collected data was analyzed using the Statistical Package of Social Sciences (SPSS) version 23. Descriptive statistic (frequency count and percentages) were used to organize, summarize and describe the demographic characteristics of respondents, while inferential statistic (linear regression analysis) was employed to test the hypotheses.

2.4 Demographic Characteristics of Participants.

Of the participants 342 (40%) were male while 512 (60%) were females. 350(41%) were ≤ 19 years while 504(59%) were ≥ 20 years. The mean (± SD) age of the participants is 20.48 ± 2.82 indicating that majority of them were young adults. 203 (23.8%) of the participants were from Obafemi Awolowo University (OAU), 260(30.4%) were from Osun State University (UNIOSUN), 215(25.2%) were from Redeemer's University (RUN); and 176(20.5%) were students of Bowen University (BU) all in Osun state Nigeria. Overall 463 (54.3%) were students of public institutions of learning (OAU and UNIOSUN), while 391 (45.7%) were students in private institutions of learning (RUN and BU). Distribution according to levels of study showed that 177 (21.1%) of the participants are in the first year (100 level) of study; 199 (23.7%) are in the second year (200 level) of study; 157 (18.7%) are in the third year (300 level) of study; 321 (36.5%) are in the fourth year and above (400 level plus) in their study in the selected universities.

3. RESULTS

Table 1 reveals a 48.6% prevalence of internet addiction among university undergraduate out of which 18.5% were at pathological level. Patterns of PSU show a 47.4% prevalence of which 15.1% were at the severe / pathological level. This result shows a high prevalence of internet addiction, problematic smartphone use among the university undergraduates of which a corresponding high percent of them are at the pathological level.

Table 1. Patterns of IA and PSU among Nigerian university undergraduates.

Variables	N= 854		
	Prevalence (%)		
	Not Applicable (%)	Moderate (%)	Severe / Pathological (%)
Internet Addiction	51.4	30.1	18.5
PSU	52.6	32.3	15.1

Pattern of the domains of PSU summarized in table 2 shows a 39.7% prevalence of withdrawal out of which 19.8% of the respondents reported severe level. This is followed by loss of control (43.5%) with 11.3% at the severe (pathological) level, next is daily life disturbance (43.7%) out of which 10.3% were at the severe (pathological) level, disregard for consequence was 42.6% of which 9.4% were at the severe (pathological) level. Furthermore, 45.4% prevalence for preoccupation is observed among the sample, out of which 9.2% were at the (pathological) severe level and finally 37.0% prevalence of tolerance of which 8.9% were at the (pathological) severe level. This result shows a high prevalence of the factors of PSU among university undergraduates in Osun state Nigeria, of which a corresponding high percent of them are at the pathological level.

Table 2: Patterns of the domains of Problematic Smartphone Use (PSU)

	N= 854
	Prevalence (%)

Factors of PSU	Not Applicable (%)	Moderate (%)	Severe / Pathological (%)
Withdrawal	60.3	19.9	19.8
Loss of control	56.5	32.2	11.3
Daily life disturbance	56.3	33.4	10.3
Disregard for consequence	57.4	33.2	9.4
Preoccupation	54.6	36.2	9.2
Tolerance	63.0	28.1	8.9

The patterns of severity of anxiety among the respondents show 50.6% prevalence out of which 16.1% were at severe (pathological) level; depression 49.8% of which 10.8% were at (pathological) severe level while psychological distress had a prevalence of 47.6% of which 11.8% were at the pathological level. This result shows a high prevalence of anxiety, depression and psychological distress among the university undergraduates, of which a corresponding high percent of them were at the pathological level (see table 3).

Table 3. Patterns of severities of anxiety disorder, depression and psychological distress among Nigerian University undergraduates.

Variables	N =854		
	Prevalence (%)		
	Not Applicable (%)	Moderate (%)	Severe / Pathological (%)
Anxiety	49.4	34.5	16.1
Psychological distress	52.4	39.0	11.8
Depression	50.2	39.0	10.8

A linear regression analysis was conducted to determine the extent to which IA independently and significantly predicted severity of anxiety disorder among the undergraduates. Results indicated that IA independently and significantly predicted the severity of anxiety among the sample ($R^2 = .01$, $P = .025$). The analysis summarized in table 4 suggests that 1% variance in the severity of anxiety disorder is explained by the IA.

Table 4: Linear Regression Analysis of severity of anxiety by IA among Nigerian University undergraduates

						N = 854	
	B	**β**	**t**	**sig**	R^2	**F**	***P***
Constant	19.01		11.73	.000			
IA	.07	.077	2.25	.025	.01	5.05	.025

A linear regression analysis was carried out to determine the degree to which IA independently and significantly predicted severity of depression among the participants. Result indicated that IA independently and significantly predicted the severity of depression among the sample, (R^2 = .057, *P* = .000). The analysis summarized in table 5 suggests that 5.7% variance severity of depression is explained by internet addiction among the university undergraduates.

Table 5: Linear Regression Analysis of severity of depression by IA among respondents

						N = 854	
	B	**β**	**t**	**sig**	R^2	**F**	***P***
Constant	35.59		30.35	.000			
IA	.15	.24	7.12	.000	.057	50.76	.000

A linear regression was conducted to determine the degree to which internet addiction independently and significantly predicted severity of psychological distress of the participants. Results indicated that Internet addiction independently and significantly predicted the severity of psychological distress among the sample, (R^2 = .105, *P* = .000). The analysis summarized in table 6 suggests that 10.5% variance of severity of psychological distress among the participants is explained by the internet addiction.

Table 6: Linear Regression Analysis of level of psychological distress by internet addiction

						N = 854	
	B	**β**	**t**	**sig**	R^2	**F**	***P***
Constant	22.37		26.39	.000			
IA	.154	.324	9.97	.000	.105	99.30	.000

A linear regression was conducted to determine the level to which PSU independently and significantly predicted severity of anxiety of the participants. Results indicated that PSU failed to significantly predict the severity anxiety among the participants, (R^2 = .00, P = .650). The analysis in table 7 suggests that 0% variance in severity of anxiety disorder is explained by the PSU among the participants.

Table 7. Linear Regression Analysis of severity of anxiety disorder by PSU.

	N = 854

	B	β	t	sig	R^2	F	P
Constant	21.76		13.09	.000			
PSU	.02	.016	.454	.650	.00	.21	.650

A linear regression was conducted to determine the extent to which PSU independently and significantly predict severity of depression of the respondents. Results indicated that PSU independently and significantly predicted the severity of depression among the participants, (R^2 = .073, P = .000). The analysis in table 8 suggests that 7.3% variance severity of depression is explained by the PSU the among university undergraduates.

Table 8: Linear Regression Analysis of severity of depression by PSU

						N = 854	
	B	β	t	sig	R^2	F	P
Constant	34.24		28.63	.000			
PSU	.29	.27	8.16	.000	.073	66.63	.000

A simple linear regression was conducted to ascertain the degree to which PSU independently and significantly predicted severity of psychological distress of university undergraduates in Osun state Nigeria. Results indicated that PSU independently and significantly predicted the severity of psychological distress among the sample, (R^2 = .094, P = .000). The analysis in table 9 suggests that 9.40% variance of severity of psychological distress among the participants is explained by the problematic smartphone use.

Table 9: Linear Regression Analysis of level of psychological distress by PSU

						N = 854	
	B	β	t	sig	R^2	F	P
Constant	22.45		25.30	.000			
PSU	.25	.31	9.34	.000	.094	87.28	.000

4. DISCUSSIONS

This study observed a 48.6% prevalence of internet addiction, 47.4% rate of PSU, a 50.6% prevalence of anxiety, 49.8% prevalence of depression and 47.6% prevalence of psychological distress among the undergraduates, depicting a high rate of psychopathological symptoms. These prevalence rates are higher than 29% and 20% for internet addiction and depression respectively returned by Okwaraji, Aguwa, Onyebueke and Shiweobi-Eze [38] on a study carried out among selected Nigerian undergraduates.

This finding supports previous findings. In a similar study on Chinese medical students, Chen, Liu, Ding, Ying, Wang & Wen [39] reported a 29.8% prevalence of smartphone addiction using the same SAS measure used in this study. The finding is higher rate than the 24.8% prevalence among South Korean junior high school students [24] and the prevalence rates among university students and staff in Spain (12.8%) and in Belgium 21.5% [40]. Among students in a Swiss vocational school the prevalence is 16.9% [41] and 21.3% among Chinese undergraduates [42]. The prevalence of 47.4% found in this

present study is higher than the Chinese, South Korean and European samples. These discrepancies could be due to the different instruments, classification methods used, or differences among the participants in the different studies. Also, the prevailing socio-economic situation in Nigeria with regards to poverty, poor learning conditions and environments, unemployment and so on could also be extraneous factors accounting for the psychological health status of the youth which inadvertently may increase the rate of internet addiction and (or) PSU among Nigerian samples. Nonetheless, the high prevalence rate identified in the current study is an indication of potential public health concern posed by smartphone use among Nigerian university undergraduates.

The World Health organization (WHO) reported that an estimated 154 million people suffer from depression, and 25 million people suffer from schizophrenia [43]. About 64 million Nigerians suffer from psychological disorder [44]. Nearly half the world's populations (especially young people) are affected by mental illness with an impact on their self-esteem, relationships and ability to function in everyday life [45]. According to Kessler, Avenevoli, & Merikangas [46], adolescents are at the greatest risk of a range of mental-health conditions during their transition from childhood to adulthood due to the host of physical, psychological and emotional changes which occur during this stage of life.

Internet addiction was found to be a significant predictor of severity of anxiety disorder among the university undergraduates. This finding supports previous studies [47, 16]. Internet and Smartphone overuse may lead to depression, anxiety disorder and, sleep problems [16]. Research on internet addiction and psychological problems is still emerging. In DSM-V American Psychiatric Association [21] highlighted some of the signs of depression to include deep sorrow or grief, insomnia, loss of appetite, hopelessness, and unpleasant mood, and irritability, self-dislike and suicidal tendencies. Yang [48] posited that low self-esteem, low motivation, fear of rejection and the need for confirmation from others which are commonly observed in depressive people may result in frequent use of the internet and that the interactive functions of the internet may lead to internet addiction in individuals with these characteristics [49]. Internet addiction has been reported to be associated with a number of psychological disorders including anxiety disorders, shyness, personality disorders depression and suicide among young people [50, 51, 52].

Internet addiction was found to statistically predict the severity of depression among the participants. This supports previous studies which returned strong positive correlation between internet addiction and depression [53; 54]. Increased usage of the internet for communication leads to smaller social circles, dissolution of communication with family members, and even clinical problems such as depression [55]. Othman & Lee [56] also found that depression was significantly associated with Internet Addiction which also is consistent with other studies from South Korea [57], China [58], Norway [59], UK [60] and USA [61]. In an assessment of Nigerian university undergraduate sample [38] found significant positive relationship between internet addiction and depression. They further reported that 20.0% and 4.5% of the undergraduates were found to be mildly and moderately depressed respectively. This pattern of finding is also in line with previous reports which have documented many psychological problems arising from internet addiction by university undergraduates including depression. For instance Ozgul, Ozlem, Alaettin, and Ozalp [51] reported high prevalence of depression in a sample of internet addicted university students who took part in their study. The pattern of association between internet addiction and depression among university undergraduates observed in this study corroborates previous reports [51].

Furthermore, this study reveals that internet addiction is a significant predictor of severity of psychological distress among Nigerian university undergraduates. This finding is consistent with those of previous studies with respect to the over-use of internet and its relationship to depression, anxiety, poor sleep quality and other forms of psychopathology. For instance it has been reported that problematic use of the internet is associated with sleep problems, such as subjective insomnia and poor sleep quality [62; 63]. Excessive internet and smartphone use can trigger psychopathology and sleep disturbances, [47]. Excessive smartphone use at night could keep one up late, thus impairing sleep and influencing stress and depression [47] smartphone overuse may lead to depression, anxiety and, sleep problems [16]. Other evidence suggests a two-way directional relationship, in which technology addiction leads to psychopathology, and psychopathology further drives problematic use [64].

PSU was not found to significantly predict severity of anxiety disorder among participants. Previous studies report contradicting findings on the relationship between PSU and anxiety. Some research findings show that anxiety was not associated with internet addiction [65; 60] while some affirm a positive relationship between anxiety and PSU [16, 15]. According to Akin & Iskender, [66] there are few research evidences to demonstrate the relationship between smartphone addiction and anxiety.

PSU was found to significantly predict severity of depression among the university undergraduates. Empirical studies show that problematic smartphone use often results in depression. This finding support previous research findings [17]. High mobile phone usage positively correlated with subsequent stress, sleep difficulties, and depression [7]. Depression was also found to be higher in groups that overused smartphones than in normal user groups [16]. This is also in line with the position of Kim, Seo, & David [18] that Smartphone use aimed at alleviating negative emotion facilitates the relationship between depression severity and problematic use. Studies on demonstrated that smartphone addiction related positively to decrease in social interactions, depression, loneliness, and lower self-esteem [67, 55; 66]. This finding is also consistent with other studies that have found a positive relationship between depression and smartphone addiction [55; 68]. Also depressed individuals are found to more likely to engage in problematic smartphone and internet use [69; 68].

PSU was found in this study to significantly predict psychological distress among the respondents. This finding is consistent with Casey [70] who reported that smartphone addiction may cause someone to manifest some psychological distress such as loneliness and depression. Ezoel & Toda [71] returned that Internet addiction is associated with mobile phone dependence and depression induced loneliness among Japanese students. Phone dependence cause loneliness by isolating individuals from the real world and deprive them of a sense of connecting with real world contacts [71]. Problematic smartphone use has direct link with many forms of psychopathology. People with high score loneliness also have higher chance of manifesting problematic smartphone use [72].

5. CONCLUSIONS

From the analysis and interpretations of our findings the following conclusions can be drawn. First there is a high prevalence of internet addiction, PSU, anxiety disorder, depression and psychological distress among university undergraduates of Osun state Nigeria. Secondly, internet addiction is a significant independent predictor of anxiety, depression and psychological distress among Nigerian university undergraduates. Thirdly, PSU is not a significant predictor anxiety disorder, although it is a significant independent predictor of depression and psychological distress among the university undergraduates.

6. RECOMMENDATION

Based on the result of this study it can be seen that there is a high prevalence of anxiety disorder, depression and psychological distress among the population, there is a need for university institutions to embark on mental illness preventive interventions measures such as provision of functional recreational activities and psycho-education at regular intervals. Making campus environments less stressing and more conducive for learning may also serve as preventive measures. Provision of psychological support facilities where students who have psychological issues can be identified and helped. This can be in form of setting up standard psychology clinics in all Nigerian universities where various psychological assessments can be conducted and psychological issues diagnosed and appropriate psychological therapies given. Also there is a need for general sensitization and school based awareness programmes on the negative impact of internet overuse and problematic smartphone use on the psychological health of undergraduates.

ETHICAL APPROVAL

This study carried out investigations that involved human elements, hence ethics of research for human subjects were observed. The researcher reviewed online regulatory and informational documents on human-subject protection and passed the examination on responsible conduct of human studies and was issued a Certificate for Bioethics and Research by the Nigerian National Code of Health Research Ethics. Moreover, the research intention and proposed procedures for carrying the research was subjected to scrutiny by the Internal Research Ethic Committee (IREC) of Redeemer's University, Ede, Osun State Nigeria. Also the approval of research committees of Obafemi Awolowo University, Ile Ife; Osun State University; and Bowen University, Iwo, Osun state Nigeria were sought before the research was embarked upon. The average age of respondents was eighteen years and therefore can make decisions of this magnitude for themselves, they were approached individually and explanation of what the study is all about was made to them Thus participants informed consent was gotten before the instruments were administered.

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DEFINITIONS, ACRONYMS, ABBREVIATIONS

IA	Internet Addiction
PSU	Problematic Smartphone Use
GHQ	General Health Questionnaire
IAT	Internet Addiction Test
SAS-SV	Smartphone Addiction Scale – Short Version
OAU	Obafemi Awolowo University
UNIOSUN	Osun State University,
RUN	Redeemer's University;
BU	Bowen University