

Smartphone addiction, selected psychological status and clinical variables among undergraduates in a Nigerian population

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Background. The use of smartphones in our current digital society has resulted in the development of musculoskeletal and emotional symptoms among undergraduates.

Objectives. To determine the correlations among smartphone addiction, selected psychological status and clinical variables among undergraduates in the College of Medicine, University of Lagos, Nigeria.

Methods. A cross-sectional survey was conducted among 837 undergraduates (500 females, 337 males). Questionnaires comprising a smartphone addiction scale, depression, stress and anxiety scale, neck disability index and shoulder pain disability index were used to collect self-report measures. Assessment of selected anthropometric variables (weight, height and body mass index (BMI)) was done. Pearson's correlation coefficient and Spearman's ρ were used to determine the correlation between variables at an α value of $p < 0.05$.

Results. The outcome of this study revealed that more than half, 447 (53.4%), of the undergraduates were addicted to smartphone use. Eighty (9.6%) participants had severe depression, 155 (18.5%) had severe anxiety while 59 (7%) were severely stressed. It was observed that there was a significant relationship ($p < 0.05$) but a weak correlation between smartphone addiction, psychological status, pain-related disability of neck and shoulder, BMI and weight.

Conclusion. Smartphone addiction is prevalent among undergraduates, and is correlated with their psychological status, selected anthropometric variables and pain-related disability of the neck and shoulder. It is recommended that undergraduates be enlightened on the impact of smartphone addiction on psychological health and the musculoskeletal system.

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Young adults and students, including undergraduates, have displayed the habit of using smartphones for long periods of time.^[1] Neupane^[2] reported that 79% of the population between the ages of 18 - 44 years had their phones with them almost all the time, with only 120 minutes of their waking day not spent holding their smartphones. Students have been found to look at or give attention to their smartphones regardless of the environment. This situation may be interpreted as smartphone addiction.^[3]

Despite the benefits that the smartphone has brought to people's lives, this device can lead to serious problems, depending on its usage at different times and places.^[3] One major problem caused by smartphone usage is the likelihood of behavioural addiction. In this case, individuals cannot prevent themselves from performing the relevant behaviour, and may show tension and unrest when faced with prohibition.^[4] Excessive use of smartphones can influence psychological health, including levels of depression and chronic stress, which can result in increased suicidal attempts.^[5]

Musculoskeletal disorders have also been reported to be a potential risk for smartphone users.^[1] The neck and shoulders are particularly vulnerable to discomfort and abnormal posture due to smartphone use.^[6] Musculoskeletal discomforts that frequently occur are caused by repetitive movements by smartphone users, with minimal muscle tension caused by lengthy hours of exposure. Abnormal postures lead to fatigue, which can cause reduced physiological function and disturbance of the autonomic nervous system and musculoskeletal system, leading to stress and headaches.^[7] Undergraduate students habitually experience a great amount of stress, and the presence of smartphone addiction may worsen their stress levels. Rosenberg *et al.*^[8] reported that smartphone functions such as calling, sending and receiving text messages and browsing the internet have previously been defined as sedentary behaviours. Zou *et al.*^[9] reported a high prevalence of obesity among students addicted to smartphone usage.

Since there is dearth of literature on this topical area in an African setting, there is a need to determine the correlations among smartphone addiction, psychological status, pain-related disability of the neck and shoulder and selected anthropometric variables among undergraduate students in a Nigerian population.

Methods

This correlation study was conducted between May and October 2019. The participants were 835 undergraduates selected from a total of 1 822 at the College of Medicine, University of Lagos (CMUL), South West Nigeria, using a multistage sampling technique. The sample was drawn from all departments in CMUL, consisting of three faculties (the Faculty of Basic Medical Sciences, Faculty of Clinical Sciences and Faculty of Dental Sciences). In each of the degree programmes (Bachelor of Medicine and Surgery (MBBS), Bachelor of Dental Surgery (BDS), Bachelor of Physiotherapy, Bachelor of Science in Pharmacology, Bachelor of Science in Physiology, Radiography and Medical Laboratory Sciences (MLS)), a proportionate sampling technique was employed to determine the number of male and female students needed for each level, having determined these numbers from a list of the student distribution stratified according to levels and gender for each programme. The students who were involved were students from 2nd to 6th level for both MBBS and BDS, 2nd to 5th level for physiotherapy and MLS, and 2nd to 4th level for both physiology and radiography.

The inclusion criteria for the present study were undergraduates of CMUL who used smartphones. Excluded were undergraduates with a history of neck and shoulder pathology.

Before conducting the study, permission was obtained from the health research and ethics committee of CMUL (ref. no. CMUL/HREC/06/19/541). The participants were informed about the scope of the study, and signed informed written consent forms and were assured of the anonymity of their data. Participants who met the criteria for inclusion were assessed for the demographic variables weight and height, and their body mass index (BMI) was calculated using these. Participants were then requested to complete questionnaires (the short-version smartphone addiction scale (SAS-SV),^[1] depression anxiety stress scale (DASS),^[10] shoulder pain disability index (SPADI)^[11] and neck disability index.^[12]

Data analysis

Statistical Package for Social Sciences version 25 was used for analysis. Data were summarised with descriptive statistics of frequency and percentages. Inferential statistics (Spearman's rank correlation and Pearson's correlation coefficient) were used to find correlation among the variables. The level of significance was set at $p < 0.05$.

Results

A total of 837 undergraduate students participated in this study. Of these, 486 (58.1%) were female. The majority (581 (69.4%)) of respondents were within the age range of 21 - 23 years. Most (521 (62.2%)) respondents were of normal weight, with BMIs between 18.5 and 24.9 kg/m² (Table 1).

Table 1. Demographic data

Variable	n (%)
Age (years)	
18 - 20	185 (22.1)
21 - 23	581 (69.4)
24 - 26	71 (8.5)
Total	837 (100)
Sex	
Female	486 (58.1)
Male	351 (41.9)
Total	837 (100)
Weight (kg)	
42 - 62	351 (41.9)
63 - 82	459 (54.8)
83 - 102	27 (3.2)
Total	837 (100)
Height (m)	
1.5 - 1.6	206 (24.6)
1.61 - 1.7	426 (50.9)
1.71 - 1.8	205 (24.5)
Total	837 (100)
BMI (kg/m ²)	
<18.5	36 (4.3)
18.5 - 24.9	521 (62.2)
25.0 - 29.9	263 (31.4)
≥30	17 (2.0)
Total	837 (100)

BMI = body mass index (<18.5 kg/m² = underweight; 18.5 - 24.9 kg/m² = normal weight; 25.00 - 29.90 kg/m² = overweight; ≥30 kg/m² = obese).

Outcome variables

Table 2 shows that slightly more than half (447 (53.4%)) of respondents are excessive smartphone users, with a score >30. Fifty-four (6.5%) respondents had severe pain-related disability of the neck. One hundred and sixty (19.1%) respondents had mild pain-related disability of the shoulder, and only 6 (0.70%) had severe pain-related disability of the shoulder.

Eighty (9.6%) respondents were severely depressed, while 39 (4.90%) had extremely severe depression. Fifty-nine (7%) respondents were severely stressed. One hundred and fifty-five (18.5%) had severe anxiety, and 149 (17.80%) had extremely severe anxiety (Table 3).

Smartphone addiction and pain-related disability of the neck and shoulder

A significant relationship but weak correlation ($r=0.09$, $p=0.014$; $r=0.13$, $p=0.001$) existed between smartphone addiction and pain-related disability of the neck and shoulder among the respondents (Table 4).

Smartphone addiction and psychological status

It was observed that there was a significant relationship ($p=0.001$) but a weak correlation (depression $r=0.15$, anxiety $r=0.12$, stress $r=0.13$) between smartphone addiction and psychological status of the respondents (Table 5).

Table 2. Outcome variables

Variable	n (%)
SAS	
≤30	390 (46.6)
>30	447 (53.4)
Total	837 (100)
NDI	
0 - 4	186 (22.2)
5 - 14	372 (44.4)
15 - 24	189 (22.6)
25 - 34	54 (6.5)
>34	36 (4.3)
Total	837 (100)
SPADI	
0 - 20	638 (76.2)
21 - 50	160 (19.1)
51 - 80	33 (3.9)
>81	6 (0.7)
Total	837 (100)

SAS = smartphone addiction scale (<30 = non-excessive; >30 = excessive); NDI = neck disability index (0 - 4 = no disability; 5 - 14 = mild; 15 - 24 = moderate; 25 - 34 = severe disability; >34 = completely disabled); SPADI = shoulder pain and disability index (0 - 20 = no disability; 21 - 50 = mild disability; 51 - 80 = moderate disability; 81 and above = severe disability).

Table 3. Frequency distribution of psychological status scores of respondents

Variable	n (%)
Depression*	
0 - 9	415 (49.6)
10 - 13	144 (17.2)
14 - 20	159 (19.0)
21 - 27	80 (9.6)
≥28	39 (4.7)
Total	837 (100)
Stress†	
0 - 14	544 (65.0)
15 - 18	97 (11.6)
19 - 25	132 (15.8)
26 - 33	59 (7.0)
≥34	5 (0.6)
Total	837 (100)
Anxiety‡	
0 - 14	304 (36.3)
15 - 18	80 (9.6)
19 - 25	149 (17.8)
26 - 33	155 (18.5)
≥34	149 (17.8)
Total	837 (100)

*Depression (0 - 9 = normal; 10 - 13 = mild; 14 - 20 = moderate; 21 - 27 = severe; ≥28 = extremely severe).

†Stress (0 - 14 = normal; 15 - 18 = mild; 19 - 25 = moderate; 26 - 33 = severe; ≥34 = extremely severe).

‡Anxiety (0 - 14 = normal; 15 - 18 = mild; 19 - 25 = moderate; 26 - 33 = severe; ≥34 = extremely severe).

A significant relationship ($p=0.001$) but a weak correlation (depression $r=0.25$, $r=0.19$, stress $r=0.19$, $r=0.20$, anxiety $r=0.40$, $r=0.17$) was found between psychological status and pain-related disability of neck and shoulder among the respondents (Table 5).

Table 4. Correlation between smartphone addiction and pain-related disability of neck and shoulder

Variable	SPADI, r	NDI, r
SAS	0.13	0.09
p -value*	0.001	0.014

SPADI = shoulder pain and disability index; NDI = neck disability index; SAS = smartphone addiction scale.
* $p < 0.05$.

Smartphone addiction, pain-related disability of neck and shoulder, psychological status and selected anthropometric variables

It was observed that there was a significant relationship but weak correlation (height $p=0.002$, $r=0.11$, weight $p=0.001$, $r=0.11$ and BMI $p=0.045$, $r=0.07$) between smartphone addiction and selected anthropometric variables among the respondents (Table 6).

It was observed that there was a significant relationship between psychological status (depression, stress and anxiety) and selected anthropometric variables (weight $p=0.001$, $p=0.001$, $p=0.001$; BMI $p=0.009$, $p=0.002$, $p=0.001$), but there was a weak correlation between psychological status and selected anthropometric variables (weight $r=0.13$, $r=0.16$, $r=0.20$). BMI displayed a strong correlation ($r=0.90$) with depression, but a weak correlation with anxiety and stress ($r=0.11$, $r=0.12$) among the respondents.

Discussion

This study was conducted to evaluate correlations between smartphone addiction, psychological status, pain-related disability of the neck and shoulder and selected anthropometric variables among undergraduates at CMUL. The prevalence of smartphone addiction, depression, anxiety and pain-related disability of the neck and shoulder in this study was above average. Some studies^[13-16] have reported varying prevalences. This may be due to the type of environment, courses studied and level of addiction to smartphones.

This study showed that there was a significant correlation between smartphone addiction and psychological status (depression, stress and anxiety) among the participants. This is consistent with the results of a study by Tangmunkongvorakul *et al.*^[17] among undergraduate students.

In this study it was observed that the relationship between smartphone addiction and pain-related disability of the neck among participants was significant, with a weak correlation. This is consistent with the results of a study by Al Alabdulwahab *et al.*^[18] among adolescents in Saudi Arabia. Another study by Shah and Sheth^[19] in India recorded a strong correlation between smartphone addiction and a musculoskeletal condition referred to as text neck syndrome. The increase in pain-related disability of the neck related to smartphone use is due to the poor positioning assumed by respondents, which tends to reduce the craniovertebral angle and increase forward head posture: the greater the forward head posture, the greater the pain-related disability of the neck.^[20]

It was found in the present study that there was a significant relationship between smartphone addiction and pain-related disability of the shoulder. This may be due to the slouching or slumping position assumed by undergraduates while using

Table 5. Correlation between smartphone addiction, pain-related disability of neck and shoulder and psychological status

Variable	Depression, <i>r</i>	<i>p</i> -value*	Stress, <i>r</i>	<i>p</i> -value	Anxiety, <i>r</i>	<i>p</i> -value*
SAS	0.15	0.001	0.13	0.001	0.12	0.001
SPADI	0.19	0.001	0.20	0.001	0.17	0.001
NDI	0.25	0.001	0.19	0.001	0.40	0.001

SPADI = shoulder pain and disability index; NDI = neck disability index; SAS = smartphone addiction scale.
**p*<0.05.

Table 6. Correlation between smartphone addiction, pain-related disability of neck and shoulder, psychological status and selected anthropometric variables

Variable	Height, <i>r</i>	<i>p</i> -value*	Weight, <i>r</i>	<i>p</i> -value	BMI, <i>r</i>	<i>p</i> -value*
SAS	0.11	0.002	0.11	0.001	0.07	0.045
NDI	0.02	0.539	0.06	0.081	0.05	0.128
SPADI	-0.01	0.794	-0.09	0.794	-0.11	0.002
Depression	0.06	0.069	0.13	0.001	0.09	0.009
Stress	0.12	0.001	0.16	0.001	0.11	0.002
Anxiety	0.14	0.001	0.20	0.001	0.12	0.001

BMI = body mass index; SAS = smartphone addiction scale; NDI = neck disability index; SPADI = shoulder pain and disability index.
**p*<0.05.

smartphones, which put direct strain on the shoulder. This is in line with a report by Alruzayhi *et al.*^[13] among Saudi Arabian youths. Another study by Mushroor *et al.*^[21] on the impact of smartphones and mobile devices on human health and life also reported a high rate of shoulder disability caused by handheld devices. The result concurs with the findings of a study by Akodu *et al.*^[6] on smartphone addiction and scapular dyskinesis among undergraduates.

The present study reported a significant correlation between smartphone addiction and selected anthropometric variables. This is in line with results of the study by Akodu *et al.*^[6] among undergraduates in Lagos, Nigeria, where it was reported that excessive smartphone users engage in sedentary lifestyles, which predisposes them to weight gain and obesity. A study by Zou *et al.*^[9] in China reported a high prevalence of obesity among students who were addicted to smartphone usage.

It was shown in the present study that there was a relationship between psychological status and pain-related disability of the neck. This may be due to the level of pain the individual experiences, which may cause psychological disturbances. This result is in line with the results of a study by Dimitriadis *et al.*^[22] who reported depression occurring as a result of neck pain. This study reported a significant relationship between psychological status and pain-related disability of the shoulder. This result agrees with the outcome of a study by Martinez-Calderon *et al.*^[23] conducted in Spain, which showed the influence of psychological factors on the prognosis of chronic shoulder pain.

The present study reported a significant correlation between psychological status and selected anthropometric variables (height, weight and BMI). This is congruent with a study by Legey *et al.*^[24] who reported a significant relationship between mental health and BMI.

This study also reported no significant relationship but a weak correlation between pain-related disabilities of the neck and

shoulder and selected anthropometric variables. This is consistent with the results of a previous study by Akodu *et al.*^[6]

Conclusion

There was an above-average prevalence of smartphone addiction, depression, stress, anxiety and pain-related disability of the neck and shoulder among undergraduates of CMUL. There was also a correlation between smartphone addiction, psychological status, anthropometric variables and pain-related disability of the neck and shoulder. Therefore smartphone addiction should be frequently assessed in all individuals, and good advice and psychotherapy should be given to individuals who are addicted to smartphones.

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