

The prevalence of smartphone addiction and associated factors among Zimbabwean undergraduate students: a cross-sectional study

Sidney Muchemwa (✉ muchysidd@gmail.com)

University of Zimbabwe

Pamela I.A. Moyo

University of Zimbabwe

Blessing Paradza

University of Zimbabwe

Omega Chipunza

University of Zimbabwe

Jermaine M. Dambi

University of Zimbabwe

Dixon Chibanda

Friendship Bench

Malinda Kaiyo-Utete

University of Zimbabwe

Short Report

Keywords: Smartphone Addiction, Depression, COVID-19-related anxiety, Zimbabwe

Posted Date: July 12th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1845947/v1>

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Abstract

Objective: Smartphones are an invaluable daily tool, with over a third of the world having mobile access to the internet. There has been a concurrent upsurge in smartphone use among university students, and despite these benefits, excessive use of smartphones is highly prevalent. Smartphone addiction/problematic mobile phone use is a behavioural addiction that leads to severe impairment and distress. The ongoing COVID-19 pandemic has led to an exponential increase in smartphone usage, further exacerbating the burden of smartphone addiction. This study aims to determine the prevalence of smartphone addiction and its associated risk factors among Zimbabwean university students. Data were collected from 380 undergraduate students and analyzed through descriptive statistics, bivariate statistics, and binary logistic regression.

Results: The prevalence of smartphone addiction in our study population was 54.2%. After controlling for potential covariates, social media usage (OR 2.7: CI 1.2 – 5.9), using a smartphone for entertainment (OR 2.2: CI 1.2 – 4.0), the experience of coronavirus-induced anxiety (OR 1.1: CI 1.0 – 3.2) and an experience of an adverse event (OR 1.8) were associated with increased smartphone addiction. The use of smartphones for academic work was protective against smartphone addiction (OR .38: CI .19 - .77).

Background

Smartphones are an invaluable daily tool, with over a third of the world having mobile access to the internet [1]. There has been a concurrent upsurge in smartphone use among university students [2]. For university students, smartphone use offers many unique opportunities for learning, entrepreneurship and social interaction [3]. Despite these benefits, "excessive" or "compulsive" use of smartphones is highly prevalent. Smartphone addiction/problematic mobile phone use is a behavioural addiction similar to internet gambling, shopping, or video game addiction; it leads to severe impairment or distress [4]. Smartphone addiction can be defined as an inability to regulate one's use of a gadget, the presence of withdrawal symptoms after a period of use, and the inability to scale-down excessive usage [5]. The global estimate of smartphone addiction in the general population is 27.0% (CI: 22.7-31.7) [6] and around 22% (CI: 18.0 – 26.0) in university students [7]. A descriptive cross-sectional study (N=442) showed an 80% prevalence of smartphone addiction amongst Benin university students measured using the adapted Smartphone Addiction Scale Questionnaire [8]. This was significantly higher than the prevalence of smartphone addiction amongst Egyptian students (N= 780), which was 53.6%, as measured using the Problematic Phone Use Scale [9]. Poor sleep quality, lower self-esteem, higher social and academic stress, perceived low support from family and friends and poor communication skills are known salient risk factors for developing smartphone addiction [7–10].

Unfortunately, problematic smartphone usage leads to stress, anxiety, poor academic outcomes and reduced sleep, productivity, and health-related quality of life (HRQoL) [7, 11–15]. The ongoing COVID-19 pandemic has led to an exponential increase in smartphone usage, further exacerbating the burden of smartphone addiction [16]. For instance, social media usage and news seeking have increased by up to

54.6%, with 85% of the participants using their phones for over six (6) hours [16]. Also, coronavirus-induced strict isolation, emergency remote teaching, uncertainty, and interruption in learning activities have perpetuated the vicious cycle of problematic smartphone usage and poor mental health problems in university students [17]. Collectively, the smartphone usage upsurge has exacerbated the burden of CMDs on university students, who are already a vulnerable population [18]. Despite the potential effects of smartphone addiction and the COVID-19 pandemic on the mental health functioning of tertiary students, a paucity of information exists in low-income settings. This study aims to determine the prevalence of smartphone addiction and its associated factors among Zimbabwean university students. Study outcomes may inform the development of bespoke interventions harnessing the utility of digital platforms.

Methods

Study design

A cross-sectional study.

Setting

The study was conducted at the University of Zimbabwe (UZ). The UZ is the largest state university in Zimbabwe, offering various degree programs, with a population of 17 718 undergraduates.

Participants

All full-time, registered undergraduates from ten faculties were eligible for participation [19].

Sampling and sample size calculation

The sample size was estimated using STATA, based on a prevalence of 18.4% from a Nigeria [20]. Six hundred participants were required at a 95% confidence interval and a 5% margin of error. Participants were consecutively recruited into the study.

Instrumentation

Sociodemographic questionnaire

A sociodemographic questionnaire was used to collect information such as gender, age, program, level of study, drinking and smoking history, food, and financial adequacy.

Smartphone Addiction Scale – Short version (SAS-SV)

The SAS-SV is a 10-item smartphone addiction outcome measure [21]. Each item is rated on a 6-point scale, ranging from 1 (strongly disagree) to 6 (strongly agree). The cumulative score range is 10 to 60; scores ≥ 33 suggest smartphone addiction [21, 22] It is brief and easily administered and has cross-cultural validity [23].

The Patient Health Questionnaire (PHQ-4)

The PHQ-4 was used to assess the levels of anxiety and depression. Each item is scored out of 4, from 0 (not at all) to 3 (nearly every day), giving a total score range of 0-12. Scores are rated as; normal (0-2), mild (3-5), moderate (6-8) and severe (9-12). The PHQ-4 is a short, easy-to-administer screening tool with robust psychometric performance [24].

Coronavirus Anxiety Scale (CAS)

The CAS is a validated self-report COVID-19-associated dysfunctional anxiety. It has five questions rated on a 5-point Likert scale ranging from not at all=0 to nearly every day=4. The score range is 0-12, with scores ≥ 9 suggesting probable dysfunctional coronavirus-related anxiety. The CAS is a reliable tool (Cronbach $\alpha=0.9$) with robust diagnostic performance [25].

EQ5D-5L

The EQ-5D 5L is a generic and psychometrically-robust HRQoL measure [26]. Health is assessed in five dimensions, i.e., mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Problems severity is rated on a 5-Point Likert Scale ranging from 1= not at to 5=all the time. The EQ-5D 5L also includes a visual analogue scale, ranging from 0 (worst health imaginable) to 100 (best health imaginable) [26, 27].

Procedure/Ethical considerations

The study was carried out from May to July 2021. The study team approached prospective individuals and explained the study aims and procedures. Autonomy was ensured; students only participated in the study upon willingly signing a consent form. There was no use of names or information to maintain confidentiality. Participants expressing emotional distress and or at risk of smartphone addiction were referred to the students' wellness clinic for additional care.

Data analysis

Descriptive statistics (e.g., means and frequencies) were used to describe participants' characteristics, prevalence, and frequencies of responses to the standardised outcome measures. Bivariate statistics (e.g., chi-square and t-tests) and binary logistic regression were used to evaluate factors associated with smartphone addiction.

Results

Most participants: were females (56.3%), in their second year (34.2%), used their phones for communication (85.8%), were in a relationship (50.5%), had somewhat adequate finances (45.8%), had experienced no adverse event in the past month (80.8%), were non-smokers (89.5%), consumed alcohol (62.1%) and did not use substances (92.1%) - See Table 1.

<Insert Table 1 here>

Corelationships between study variables

There was a weak negative correlation between the smartphone addiction scores and HRQoL ($r = -.187$; $p < .001$). There was no statistically significant linear relationship between smartphone addiction with anxiety, depression, and COVID-19-related anxiety - See Additional File 1.

Factors associated with smartphone addiction

In bivariate analysis, being in the third or fourth year, lower financial adequacy and alcohol consumption were associated with the risk of developing smartphone addiction - See Table 2.

<Insert Table 2 here>

Logistic regression analysis

After controlling for potential covariates, social media usage (OR 2.7: CI 1.2 – 5.9), using a smartphone for entertainment (OR 2.2: CI 1.2 – 4.0), the experience of coronavirus-induced anxiety (OR 1.1: CI 1.0 – 3.2) and an experience of an adverse event (OR 1.8) were associated with increased smartphone addiction. Using smartphones for academic work was protective against smartphone addiction (OR .38: CI: .19 - .77) - See Table 3.

<Insert Table 3 here>

Discussion

The prevalence of smartphone addiction in our study population was 54.2%: this is significantly higher than most global estimates [28, 29]. Two similar studies on Nigerian (N=398) and Cameroonian (N=634)

university students, using the Smartphone Addiction Scale-Short version, yielded prevalence rates of 18.4% [20] and 21.0 % [30], respectively. Nevertheless, our results are comparable to findings from studies on university students from Saud Arabia (N=2367) [29] and Egypt (N=700) [31]. The prevalence of smartphone addiction was 48% [29] and 44.7% [31], respectively. Methodological differences can partially explain the huge disparities. For instance, the differential use of outcome measures and definitions of smartphone addiction may account for the differences. Our study was conducted at the height COVID-19 pandemic, which saw an increase in online learning and the introduction of cheaper university student internet data packages [32]; this may have resulted in greater smartphone usage. Elsewhere, a Jordanian undergraduates survey (N=6157), shows that most of the participants (85%) greatly increased their smartphone usage during the COVID-19-induced lockdowns , with 42% using their smartphones for more than six hours a day [16]. In our study, experience of COVID-19-related anxiety was associated with increased smartphone usage. This is unsurprising as the COVID-19 pandemic was associated with a lot of uncertainty and information-seeking behaviours [17]. In this study, using smartphones for social media (OR 2.7) and entertainment (OR 2.2) was associated with increased levels of smartphone addiction. The versatility of smartphones, including applications that provide gaming, video watching, social contact and online messaging, can propel smartphone addiction [33]. In low-resource settings, usage of social media platforms such as Facebook and WhatsApp is prevalent [33]. For instance, WhatsApp usage accounts for over 20% of time spent on smartphones daily, with some university students spending more than three hours daily on WhatsApp [33, 34]. A cross-sectional survey of Iranian university students (N=383) also showed that smartphone addiction was high in internet service and social networking users [35]. The increased social media usage in low-resource settings is also attributable to increased digital penetration. Using a smartphone for academic work was associated with lower smartphone addiction scores. A cross-sectional study exploring the smartphone usage patterns for Pakistani medical students (N=270) revealed that students mostly used smartphones to browse the internet to find medical information (100%), share educational material (90%), and taking notes (79%), were at a lower risk of addiction [36]. More productive use of a smartphone seems to be protective of smartphone addiction.

In this study, students who experienced an adverse event were likelier to develop smartphone addiction. These findings follow a meta-analysis in a sample of 2780 nursing students showing a strong association between high social distress and smartphone addiction ($r=0.163$, $p<0.028$) [7]. In the wake of an adverse event, increased smartphone usage can be a positive coping mechanism because of the need for communicating with close family and friends for social support [37]. Conversely, increased smartphone usage can also be a maladaptive coping strategy. Increasing smartphone usage can temporarily divert one's attention from an adverse event through increased usage of social media and other smartphone utilities. Unfortunately, the increased usage may evolve into problematic smartphone usage beyond resolving the adverse event [38, 39].

We hypothesised that participants at risk of smartphone-addiction participants were more likely to experience poor mental health. Our study outcomes show that increased smartphone usage was associated with poorer HRQoL. Increased smartphone usage can have physical (e.g. fatigue, poor sleep)

and psychological (e.g. withdrawal symptoms) effects, thus negatively affecting HRQoL [7, 11, 12]. Contrary to other studies, our study revealed a null association between smartphone addiction, anxiety and depression. This was surprising as literature shows that students with smartphone addiction are up to five times more likely to develop depression and anxiety (OR 5.0: CI: 3.3 - 7.5). [30]. We used the PHQ-4 which were not validated in the research setting and population. The cut-off points gleaned from literature may not have adequate diagnostic accuracy. Further studies are needed to explore the relationship between anxiety, depression, and smartphone addiction.

Conclusions

Overall, our results suggest a high burden of smartphone addiction in university students from a low-income country. Given the multilevel effects of smartphone addiction, there is a need for bespoke interventions. Future studies are needed to disentangle the long-term effects of increased smartphone usage on university students' mental and academic outcomes.

Limitations

Results from this study should be taken with caution because the participants were consecutively recruited from one centre; this may limit generalizability. Also, using mental health screening tools not validated in the research setting may have led to measurement bias, thus affecting prevalence estimates. Future studies should formally validate the mental health screening tools and benchmark performance against a gold standard. Third, only full-time undergraduate students were included in this study; it is unknown to what extent these findings can be generalised to part-time and postgraduate students. Data were obtained by self-report; measurement bias is a high possibility. A strength of this study is that data were collected from a relatively large sample (N=380); this may enhance the study's internal validity.

List Of Abbreviations

CAS- Coronavirus Anxiety Scale

CMDs- Common Mental Disorders

COVID-19-Coronavirus disease of 2019

EQ-5D 5L- European Quality of Life Five Dimension, and EuroQol five-dimensional

HRQoL- Health Related Quality of Life

PHQ-4 -Patient Health Questionnaire

SAS-SV Smartphone Addiction Scale Short-Version

Declarations

Ethics approval and consent to participate

Ethical approval for the study was granted by the University of Zimbabwe Directorate and the Joint Research and Ethics Committee for the University of Zimbabwe, Faculty of Medicine and Health Science & Parirenyatwa Group of Hospitals (Ref: JREC 238/2021). All methods were carried out in accordance with the Joint Research and Ethics Committee guidelines and regulations. Participants were treated as autonomous agents and were requested to sign written consent before participation. Randomised participant ID numbers were used to preserve confidentiality. Data were stored securely, only the researchers had access to the information gathered, and participants could voluntarily withdraw from the study without any consequences.

Consent for publication

Not applicable as the manuscript does not contain any data from any individual person.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request. The datasets will be availed onto online repositories once all manuscripts related to the study have been published online.

Competing interests

All the authors declare no competing interests.

Funding

Not applicable

Authors' contributions

- Sidney Muchemwa (SM) - developed the concept and design of the study, collected the data and drafted the first version of the manuscript. SM prepared all prerequisite processes for article submission, submitted the manuscript and is the corresponding author
- Pamela I.A Moyo (PIAM) - developed the concept and design of the study, collected the data and drafted the first version of the manuscript.
- Blessing Paradza (BP) - developed the concept and design of the study, collected the data and drafted the first version of the manuscript
- Omega Chipunza (OC) - developed the concept and design of the study, collected the data and drafted the first version of the manuscript
- Jermaine M. Dambi (JMD) - developed the concept and design of the study, conducted the data analysis and statistical interpretation and revised the first to fifth versions of the manuscript

- Malinda Kaiyo-Utete (MKU) - critically appraised/peer-reviewed and made substantive contributions to the second to fifth versions of the manuscript in preparation for submission to the journal.
- Dixon Chibanda (DC) - critically appraised/peer-reviewed and made substantive contributions to the second to fifth versions of the manuscript in preparation for submission to the journal.
- All authors read and approved the final manuscript.

Acknowledgements

We would want to acknowledge participants for their invaluable participation especially. The data were collected as part of SM, PIAM, BP and OC's undergraduate thesis, which JMD supervised.

Author's ORCID information

- Sidney Muchemwa <https://orcid.org/0000-0003-0121-5356>
- Jermaine M. Dambi <https://orcid.org/0000-0002-2446-7903>
- Pamela I.A. Moyo <https://orcid.org/0000-0001-8337-5972>
- Blessing Paradza <https://orcid.org/0000-0003-1479-0667>
- Omega Chipunza <https://orcid.org/0000-0002-6695-0776>
- Malinda Kaiyo-Utete <https://orcid.org/0000-0001-7450-0858>

Dixon Chibanda <https://orcid.org/0000-0003-2505-8607>

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Tables

Table 1: Participant characteristics; N=380

Variable	Attribute	n (%)	%
Gender	Female	214 (56.3)	43.7
	Male	166	
Year of study	1	113	29.7
	2	130	34.2
	3	36	9.5
	4	101	26.6
Smartphone usage	Academic work	309	81.3
	Social media	326	85.8
	Communication	317	83.4
	Entertainment	282	74.2
	Other	13	3.4
Relationship status	In a relationship	192	50.5
	Not in a relationship	173	45.5
	Other	15	3.9
Perceived financial adequacy	Very inadequate	40	10.5
	Inadequate	84	22.1
	Somewhat adequate	174	45.8
	Adequate	73	19.2
	Very adequate	9	2.4
Adverse event	Yes	73	19.2
	No	307	80.8
Smoking	No	40	89.5
	Yes	340	10.5
Alcohol intake	Yes	236	62.1
	No	144	37.9
Substance Usage	No	30	92.1
	Yes	350	7.9
PHQ-4 (anxiety & depression)	Normal range (≤ 5)		
	At risk (≥ 6)		
	Mean (SD)	2.8 (SD 2.2)	
Coronavirus Anxiety Scale (CAS)	Normal range (≤ 8)		
	At risk (≥ 9)		
	Median (Q1-Q3)	1.0(0.0-2.0)	
Smartphone Addiction Scale (SAS)	Normal range (≤ 32)	45.8	
	At risk (≥ 33)	54.2	
	Mean (SD)	33.8(10.1)	
EQ-5D 5L Utility score	Mean (SD)	.83 (SD .007)	
EQ-5D 5L Utility score	Mean (SD)	74.3 (SD 18.8)	

Table 2: Determinants of mental health

Variable	Statistic	p-value
Gender	t (df=378) = -.130	.897
Year of Study	H (3, N= 380) = 8.122	.044
Marital Status	X^2 (df=2) = 1.056	.590
Financial Adequacy	H (4, N= 380) = 24.222	.0001
Chronic Condition	t (df=378) = -0.887	.376
Adverse Event	t (df=378) = -1.818	0.070
Smoking History	t (df=378) = - 0.481	.631
Drinking History	t (df=378) = 3.165	.002
Substance usage	t (df=378) = -1.209	.227

Table 3: Determinants of mental health

	B	SE.	Wald	df	Sig.	Exp(B)	95% CI for EXP(B)	
							Lower	Upper
Smartphone usage (hours)	.001	.000	5.303	1	.021	1.001	1.000	1.001
social media (1)	1.011	.389	6.752	1	.009	2.748	1.282	5.890
Academic work (1)	-.960	.353	7.374	1	.007	.383	.192	.766
Communication (1)	.091	.383	.056	1	.813	1.095	.516	2.321
Entertainment (1)	.786	.302	6.758	1	.009	2.195	1.213	3.970
PHQ4Score	.000	.050	.000	1	.992	1.000	.907	1.104
CAS Score	.149	.060	6.189	1	.013	1.161	1.032	1.306
Adverse event (1)	.595	.294	4.104	1	.043	1.814	1.020	3.227
Drinking Status (1)	-.005	.231	.000	1	.984	.995	.633	1.565
Constant	-1.593	.482	10.909	1	<.001	.203		

Supplementary Files

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