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SMARTPHONE ADDICTION AND SLEEP QUALITY OF UNDERGRADUATE STUDENTS IN PUBLIC UNIVERSITIES IN IMO STATE, NIGERIA

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ABSTRACT

The study examined the relationship between smartphone addiction and sleep quality of undergraduate students in Imo state. In line with its objectives, two hypotheses were formulated which guided the study. The population comprised of all undergraduate students in Imo State and Conchran formula for unknown population was used to obtain a sample size of 385 students who were proportionately sampled. Instrument for data collection were researcher-made instruments titled "Smartphone Addiction Scale" (SAS) and "Sleep Quality Scale" (SQS) with 15 and 10 items respectively. Before administration, they were both validated by specialist in Educational Psychology and Measurement and Evaluation. Its reliability was further tested using a test-retest method on undergraduate students in Federal University of Agriculture Umudike in Abia State on a two weeks interval. The result was correlated using Pearson Product Moment Correlation and an index of .81 was realized which was appropriate for the study. The data collected was analysed using a p-val to test the significance of the relationship between smartphone addiction and sleep quality of undergraduate students in Imo State as well as t-test to test the significance of gender difference in smartphone addiction of students. The result showed a significant relationship between smartphone addiction and sleep quality as well as a significant gender difference in smartphone addiction of students with female students being more addicted than male students. Based on the findings, it was recommended that Students should reduce their screen time on the phone to enhance the functions of melatonin.

Keywords: Smartphone, Addiction, Sleep Quality, Students

Introduction

The place of digitalization in the advancement of the nation cannot be overemphasized as it occupies a significant position in determining the progress of a nation globally. No stone has been left unturned as digital technology has found its way into the various sectors of the country and has become crucial in actualizing its set goals. It can be asserted that a nation's evidence of development and superiority mainly lies in its digital competence and this in turn has led all hands-on deck in order to achieve this subtle competitive goal. Narrowing this fact down to our home, Nigeria as a country has experienced tremendous change in technology since its independence from colonialism, though she is still on the 'developing' ladder. Advanced technologies like smartphones, computers, and the internet has made communication and interaction easier among people, with learners also utilizing this little tool (smartphone) to get wide range of knowledge (Ranjit & Manas, 2023).

Among the advanced technological tools, the smartphone seems the easiest accessible and the most utilized by the human population irrespective of gender, age, race, occupation, and level of education. Smartphone is a cellular telephone integrated with traditional mobile phone functions and advanced computing capabilities not originally associated with telephones, such as an operating system (OS), web browsing and ability to run software applications with a touch screen interface. Academically, students use smartphones for collaborative school work, to gain access to a wide range of information in their field of study which aids in learning and doing school assigned work at home. Also, with smartphone which engages one with an uninterrupted use of the internet, online lectures can take place through zoom meetings – in the confines of the individual's home and comfort; this was the most utilized form of teaching and learning during the COVID-19 pandemic. Boumosleh and Jadouk (2018) believed that smartphones have simplified the life of human beings and these devices have played an important role in enhancing knowledge and daily communications. It is a portable device, whose utility is not limited to communication through calls, but involves features like browsing, checking health status, sending and receiving emails, watching videos, listening to music, chatting and sharing of photos, videos and other documents (Hashemi et al., 2024). Though smartphones are of great advantage technologically, it is still prone to abuse due to its increasing popularity and the bond users have with it which leads to them being addicted with the little device.

Smartphone addiction refers to an unhealthy attachment to smartphones which leads to obsessive use or handling of it. It is an excessive and dysfunctional use of smartphones, evocative of behavioural problems (Kwon et al., 2013). The reliance of smartphones on internet due to its many internet-related applications, smartphone addiction has been linked to a generalized internet addiction by some researchers (Chen et al., 2020; Su et al., 2020). Though not formally recognized as a clinical diagnosis as well as included in Diagnostic and statistical Manual of Mental Disorders as published by the American Psychiatric Association nor in the International Classification of Disease (ICD-11) (Sohn et al., 2021; American Psychiatric Association, 2013; International Classification of Diseases as cited in Nikolic & Grujicic, 2023), "smartphone addiction" remain the considerable term for excessive use of smartphone and its manifested behavioural or health-related problems. Although not as serious as addiction to substances like nicotine or heroin, smartphone addiction still negatively impacts an individual's life (Panova & Carbonell, 2018). Moreover, since there is no better term to describe behaviour characterised by loss of self-control, dependence, overuse, and negative consequences, "addiction" was a more applicable term (Nikolic & Grujicic, 2023). Regardless of the controversy over the appropriate terminology to misuse of smartphone, its addiction is associated with psychological and general health problems that can emanate from sleep deprivation.

Sleep is a state of rest, void of physical and mental activities due to lack of consciousness. Sleep is as important as the food which fuel the body, and is critical to both physical and mental health and wellbeing. Sleep has two major phases which is subdivided into cycles. The first

phase of sleep is the Non-Rapid Eye Movement (NREM) which is divided into three stages – N1, N2 and N3.

The N1 is the transitional stage of sleep which occurs in a state of partial wakefulness and sleep, and sometimes referred to as drowsiness. The N2 stage is characterised with muscle relaxation, temperature drop and slowed heart rate; it is called the light sleep. The brain here prepares for the N3 sleep stage which is the deep sleep stage, also called the delta wave sleep; when woken in this stage (N3) the person becomes disoriented for a few seconds before gradually gaining sense of their environment. The second phase of sleep is the Rapid Eye Movement (REM) with two components – the phasic part and the tonic part. The tonic part of REM is para-sympathetically driven with no eye movement. It is associated with increased environmental awareness and is thought to be an intermediate state between wakefulness and phasic REM. The phasic part is sympathetically driven state, which characteristically consists of rapid eye movement as well as respiratory variability and muscle twitches (Tsoukalasi, 2012). The phasic REM occurs more often at the end of the night and is associated with a higher level of brain activity (Simor et al., 2020). The sleep cycle first starts with NREM period and then followed by REM period (Carskadon & Dement, 2011). Dreaming is mostly associated with the REM phase though other stages of sleep are not excluded.

Sleep most times is underrated in its role of ensuring good and quality life which is why some individuals jeopardize with it. Nikolic and Grujicic (2023) opined that the amount of sleep a person gets influences their health, wellbeing and everyday performance, though the amount required or recommended varies according to age and lifestyle. For school-age children 9-12 hours of sleep is recommended, for teens 8-10 hours, while adults need 7 or more hours of sleep at night (Center for Disease Control and Prevention, 2022). Sleep quality refers to the subjective evaluation of one's sleep experience, encompassing factors such as duration, continuity, depth and perceived restfulness (El-Nahass, 2024). Nikolic and Grujicic (2023) asserted that sleep quality is composed of both subjective and objective aspects. The subjective being "depth" or "restfulness" of sleep. The objective aspects that could be quantified are duration, sleep latency and the number of awakenings (Buysee & Reynolds as cited in Nikolic & Grujicic, 2023). The deprivation of sleep or poor sleep is the constituent of many health problems as well as poor cognition which lowers academic performance. This is because good sleep enhances brain activity. This is in line with Herculano-Houzel (2013) who posited that sleep improves memory recall and helps regulate the metabolism in the body and reduces mental fatigue.

Good sleep quality is invaluable for both physical and mental health and wellbeing. Poor sleep has been linked to adverse psychological and physical effects, such as depression, anxiety, heart disease, and psychological distress (Murawski et al., 2018; Pengid & Peltzer, 2022). When deprived, it can lead to manifestation of physical and psychological problems like depression, anxiety, irritability and heart problems. McGranaham and O'Connor (2021) asserted that the use of smartphone is one factor found to be affecting quality sleep. According to Yang, et al. (2020) two of the proposed mechanism of how smartphone use reduces sleep quality are

the blue light from the smartphone screen interfering with melatonin levels and the electromagnetic fields affecting brain activity. Their study also indicated an increased risk of poor sleep quality among smartphone addicts. Adverse effect of sleep deprivation is linked not to health problems alone but also lowered academic performance. Previous studies have proved that sleep is a key determinant of academic performance because it affects cognitive functions including attention and memory which are both crucial for effective learning (Okano et al., 2019; Alotaibi et al., 2020; Javheripour, 2019; Witkowski et al., 2020; Mehta, 2022), therefore when students deprive themselves of sleep, there is set to be a decline in their academic performance which invariably affects one of the crucial goals of their enrolment in school. A study by Akankunda (2023) discovered that academic performance of students is linked to their sleep quality. The result of the study showed that students with excellent sleep quality tend to have better academic performance, while those with poor sleep quality often perform worse academically.

It is notorious among undergraduate students to stay up at night with their smartphones – surfing the internet. Though some of these browsing is linked to academic works such as answers to assignments, materials for project writing, downloading and reading online books, among others, which might be envisaged as a good engagement - showing how dedicated the student is to their school work, it doesn't dispute the fact that a good night sleep is being denied. Apart from school work, the development of social media apps in smartphones has drastically increased the length of time users spend with their phones. It cannot be argued that social interaction is as important as life itself as no man can survive as an island. Humans need each other, and the interaction between persons is of great relevance in gaining information and knowledge as well as maintaining good health and mental wellbeing.

The emergence of smartphone has reshaped the scope of social relationship as there are more ways to interact with people through texts, calls, videos etc. It is due to this obvious need for human interaction that programmers have developed the various social media applications in smartphones to ensure an easy way of socializing with one another. The prominent platforms are twitter or X, Whatsapp, Instagram, TikTok, Youtube and Facebook and these ensure a seamless flow of interaction between people far and near, as well as various enticing features like video calls, sharing of images and videos, voice chats etc. The use of these social media aside dissemination of information, alleviate tension and provide a way of relaxation for the users as Naslund et al. (2020) clearly stated that social media can provide opportunities to enhance the mental health of users by facilitating social connections and peer support. It is worthy to note that over 59% of the global population, totalling 4.76 billion people engage in social media, with 137 million new users in the past year (Jahagirdar et al., 2024), they asserted that the average daily time spent on these platforms is 2h and 31 min as of Jaunary 2023. However excessive use of it is associated with lower psychological wellbeing (Boer et al., 2020). This excessive use of social media gives rise to smartphone addiction.

Sohn et al. (2021) study investigated the relationship between smartphone addiction and sleep quality in young adult population in Uk. The study involved 1,043

participants out of which 406 (38.9%) reported smartphone addiction and among the addicted participants, 68.7% had poor sleep quality. Alzhrani et al. (2023) examined the association between smartphone use and sleep quality, psychological distress, and loneliness among health care students and workers in Saudi Arabia using a cross-sectional design and a total of 773 health care students and workers. The result showed a significant positive association between smartphone addiction and psychological distress and emotional loneliness, a significant negative association between smartphone addiction and sleep quality but no significant relationship between smartphone addiction and social loneliness. A cross-sectional study on smartphone addiction and its effect on sleep quality among nursing students in a municipality town of West Bengal was conducted by Ghosh et al. (2021); the result showed that 45 out of the 91 sampled students were addicted to their smartphones and 82.42% of them were poor sleepers. Raza (2024) analysed the impact of smartphone addiction on sleep patterns in university students in Pakistan using a desk methodology. The study revealed that excessive smartphone use significantly disrupts sleep quality and duration. According to the study, the use of smartphone before bedtime, particularly for social media and gaming correlated with poorer sleep outcomes and higher instances of insomnia.

Pertaining to gender, Ranjit and Manas (2023) study showed no significant difference between male and female students in smartphone addiction. In same line, Chen, et al. (2017) research showed no significant gender difference in the prevalence of smartphone addiction, although how smartphones were used by the two genders differed, with male students more likely to play games, watch mobile videos and listen to music while the female students mostly used them for communication and social networking. However, a study by Demirci et al. (2015) showed that the mean score of female students on Smartphone Addiction Scale was significantly higher than that of male students. In consonance is the study by Sajidah et al. (2024) who discovered a gender difference in smartphone addiction with female adolescents having higher level of addiction than the males. Contradicting is the study by Afe et al. (2020) which showed a significant difference in smartphone addiction based on gender, with male students having higher mean SAS sores than female students.

Good health which includes the physical and psychological aspects is a prerequisite for the wellbeing of the student. The research works reviewed in this study has asserted and proved that sleep quality is crucial for healthy living and relevant in improving students' academic performance. Though insomnia is a condition which is sometimes caused by an underlying health issue, most sleeplessness is self-induced, which affects the individual knowingly and unknowingly. Self-induced relates to a person consciously staying up at night with or without the aid of sleep deprivation agents that act as antagonist on melatonin receptor site. Melatonin is a hormone secreted (mostly in the dark) by the pineal gland and causes sleep, but when an antagonist occupies the receptor site for melatonin, sleep is being inhibited and a person remains in a state of alertness. Whether the sleeplessness is self-induced with the use of agents or suppression of sleep through the engaging-activities of the smartphones, the result is same - sleep

deprivation. The necessity of quality sleep in enhancing physical, cognitive and psychosocial wellbeing prompted the researcher to investigate some human addictions such as smartphones (due to its widespread use) and its influence on sleep quality. Specifically, the researcher sought to determine:

1. The relationship between smartphone addiction and sleep quality in Imo State
2. The mean difference in smartphone addiction based on gender in Imo State

To achieve the objectives of the study, the following research questions guided the study:

1. What is the relationship between sleep quality of undergraduate students in Imo State?
2. What is the mean difference in smartphone addiction of undergraduate students in Imo State based on gender?

The following hypotheses were formulated and tested at .05 level of significance

1. Smartphone addiction has no significant relationship with sleep quality of undergraduate students in Imo State
2. There is no significant mean difference in smartphone addiction of undergraduate students in Imo State based on gender

Method

The study utilized a correlational research design in order to examine the relationship between smartphone addiction and sleep quality. The population of the study consist of all undergraduate students of public universities in Imo State which are: Imo State University, Owerri; Federal University of Technology, Owerri; Alvan Ikoku Federal University of Education Owerri; Michael Okpara University of Agriculture, Umuagwo. Conchran formula for unknown population was used to obtain a sample size of 385 students who were sampled using proportionate sampling technique with 96 students (48 males and 48 females) selected from each public university to ensure the both genders were equally represented, only in Imo State University was a sample size of 97 students selected (48 males and 49 females) due to its proximity to the researcher. A self-constructed scale titled "Smartphone Addiction Scale" (SAS) with 15-items and "Sleep Quality Scale" (SQS) with 10-items were used for the study, and rated on a 4-point likert scale of Extremely Characteristic of me – 4points, Characteristic of me – 3points, Uncharacteristic of me – 2points, Extremely Uncharacteristic of me – 1point. The instruments were face and content validated by specialists in Educational Psychology and Measurement and Evaluation. To test its reliability, a test-retest method was used on undergraduate students in Federal University of Agriculture Umudike, Abia State in an interval of two weeks. The reliability was ascertained using Pearson Product Moment Correlation and an index of .81 was obtained which is acceptable. The instruments were administered on the respondents with adequate time provided for them to go through the items and respond to them, after which they were collected immediately by the researcher to ensure no copy was lost. The data obtained were analysed using Pearson Product Moment Correlation and Mean and Standard Deviation to answer the research

questions, and P-val and t-test to test the hypotheses at .05 level of significance.

Results

Table 1: Pearson Production Moment Correlation between Smartphone Addiction and Sleep Quality of Undergraduate Students in Imo State

Variables	N	Pearson r.	Remark
Smartphone Addiction Sleep Quality	385	-.72	High Negative Relationship

Table 1 shows that the Pearson correlation coefficient (r) is -.72 which indicates high negative relationship between the variables under study. This result means that an increase in the independent variable (Smartphone Addiction) leads to a decrease in the dependent variable (Sleep Quality).

Table 2: Mean difference in Smartphone Addiction of Undergraduate Students in Imo state based on gender

Variables	N	Mean	Std	Mean Difference
Male	192	36.91	11.09	4.14
Female	193	41.05	13.97	

Table 2 shows the gender difference in smartphone addiction of undergraduate students. The mean value of the two genders show that the female students are more addicted to their smartphones than the male students.

Table 3: Significance of Pearson Product Moment Correlation between Smartphone Addiction and Sleep Quality of Undergraduate Students in Imo State

Variables	N	Smartphone Addiction	Sleep Quality	P-value	Decision
Smartphone Addiction	385	1	-.72		
Sleep Quality	385	-.72	1	.00	Significant

According to table 3, a p-value of .00 which is less than .05 level of significance shows that the relationship between the two variables (smartphone addiction and sleep quality) are significant. Therefore, the null hypothesis which states that there is no significant relationship between smartphone addiction and sleep quality is rejected.

Table 4: t-test of significance of difference in Smartphone Addiction of Undergraduate Students based on gender in Imo State

Variables	N	Mean	Std. Deviation	t_{cal}	Df	Std. error of difference	P-val	∞	Decision
Male	192	36.91	11.09	3.22	383	1.29	.00	.05	Significant
Female	193	41.05	13.97						

Table 4 shows the significance of the difference in smartphone addiction between male and female students. The significance of the difference is ascertained by a p-val of .00 less than .05. This leads to a rejection of the null hypothesis which stated that there is no significant difference in smartphone addiction of undergraduate students in Imo State based on gender.

Discussion

The study examined the relationship between smartphone addiction and sleep quality of undergraduate students in Imo Sate. The findings indicated that a high negative and significant relationship existed between the two variables. This result implies that smartphone addiction influences sleep quality of students with increase in the addiction leading to decrease in sleep quality. This occurrence can be attributed to the blue lights from phone interfering with melatonin levels (Yang et al., 2020), which is a hormone that causes sleep. In line with this study, Sohn et al. (2021) study reported that smartphone addicts had poor sleep quality. Also Raza (2024) analysed the impact of smartphone addiction on sleep patterns in University students in Pakistan and found that excessive smartphone use significantly disrupts sleep quality and duration. According to the study, the use of smartphone before bedtime, particularly for social media and gaming correlated with poorer sleep outcomes and higher instances of insomnia.

This study also investigated the gender difference in smartphone addiction with female students showing more addiction than male students. Female students are more users of social media in smartphone than the males who mostly utilize it for playing games and watching movies (Chen et al., 2017). With the increase in social media platforms, females are therefore more vulnerable to be addicted to these platforms which increases their time of using the smartphone. Also, they are prone to solicit for admiration which most time make them compete for followers in social media platforms like tiktok and instagram, and therefore spend most of their time making content for their followers to admire. The findings of this study are in line with Demirci et al., (2015) study which showed that the mean score of female students on Smartphone Addiction Scale was significantly higher than that of male students. In consonance is the study by Sajidah et al. (2024) who discovered a gender difference in smartphone addiction with female adolescents having higher level of addiction than the males. Contradicting, is the study by Afe et al. (2020) which showed a significant difference in smartphone addiction based on gender, with male students having higher mean SAS sores than female students. However, Ranjit and Manas (2023) study showed no significant difference between male and female students in smartphone addiction.

Conclusion

Smartphone addiction has been established as a behaviour that disrupts the sleep quality of students. Sleep is necessary for physical and mental wellbeing of a person and therefore should not be jeopardised due to its disastrous effect on psychological health as well as cognitive functions. The increase in usage of smartphone due to its easy access to the youths have predisposed them to addiction; such addiction in turn reduces the sleep quality of its users – specifically the students. Therefore, the aim of this study which is to discover the effect such addiction could have on the wellbeing of the students' sleep quality was actualized.

Recommendations

Based on the findings, the researcher makes the following recommendations:

1. Students should reduce their screen time with their phone to enhance the functions of melatonin.
2. Schools should prohibit the use of smartphones in class to reduce the time students allot to it.
3. Psychological therapy should be administered on students with smartphone addiction.
4. Other recreational activities such as sports, reading hardcopy novels etc. should be encouraged to limit time spent on the smartphone.

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