

**PREVALENCE AND FACTORS ASSOCIATED WITH NOMOPHOBIA  
AMONG MEDICAL AND NURSING STUDENTS WITH PROBLEMATIC  
SMARTPHONE USE AT MOI UNIVERSITY**

**BY**

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## DECLARATION

### Declaration by the candidate

I declare that this thesis is unique to me and has never been submitted for a degree at another university. Without the author's and/or Moi University's explicit written consent, no part of this thesis may be duplicated.

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## **DEDICATION**

With genuine gratitude and warm regard, I dedicate this thesis work first and foremost to GOD for making, keeping and sustaining me. To Dr Juddy Wachira, for believing in me and pushing me tirelessly. And finally, to my daughter Donnah Nyaboke for your continued prayers and for being my information technology guru.

**ABBREVIATIONS AND ACRONYMS**

<b>AMTA</b>	Australian Mobile Telecommunications Association
<b>APPS</b>	Applications
<b>BFI-10</b>	Big Five personality Inventory
<b>BSI</b>	Brief Symptom Inventory
<b>CHS</b>	College of Health Sciences
<b>CI</b>	confidence Interval
<b>COVID-19</b>	Corona Virus Disease 2019
<b>DSM-4</b>	Diagnostic and Statistical Manual of Mental Disorders, 4 <sup>th</sup> edition
<b>DSM-5</b>	Diagnostic and Statistical Manual of Mental Disorders, 5 <sup>th</sup> Edition
<b>E-IEARNING</b>	Electronic learning
<b>FFM</b>	Five-Factor Model
<b>FOMO</b>	Fear of Missing Out
<b>FOMOs</b>	Fear of Missing Out scale
<b>GPA</b>	Grade Point Average
<b>GSMA</b>	Global System for Mobile communication Association
<b>IBMI</b>	Institute of Biomedical and Informatics
<b>IREC</b>	Institutional Research and Ethics Committee

<b>KNBS</b>	Kenya National Bureau of Statistics
<b>M-PESA</b>	Mobile money transfer
<b>MPPUS</b>	Mobile Phone Problematic Use Scale
<b>MTRH</b>	Moi Teaching and Referral Hospital
<b>NMP-Q</b>	Nomophobia Questionnaire
<b>OR</b>	Odds ratio
<b>PMPUQ</b>	Problematic Mobile Phone Use Questionnaire
<b>PPS</b>	Phantom phone signals
<b>R</b>	Reverse scored
<b>REDCap</b>	Research Electronic Data Capture
<b>SIM</b>	Subscriber Identity Module
<b>SMS</b>	Short Text Message
<b>SMSes</b>	Short Text messages
<b>SNSs</b>	Social network sites
<b>STATA</b>	Statistics and data
<b>TCI-R</b>	Temperament & Character Inventory- Review
<b>TVET</b>	Technical and Vocational Education and Training
<b>UCLA</b>	University of California, Los Angeles
<b>UCLAs-3</b>	University of California Los Angeles Loneliness Scale version

<b>UCLAs-8</b>	University of California, Los Angeles, short form, version 8
<b>UK</b>	United Kingdom
<b>UOR</b>	Unadjusted odds ratio
<b>USA</b>	United States of America
<b>WIFI</b>	Wireless Fidelity
<b>WHO</b>	World Health Organization

## OPERATIONAL DEFINITION OF TERMS

**Problematic smartphone use** - This word is used in the context of the inability to control one's smartphone use, including preoccupation with the phone/ excessive use, use in dangerous and illegal settings, and incurring financial burdens.

**Mobile Phone**- This is used in the context of smartphones.

**Nomophobia**- irrational, pathological fear and anxiety that a person experiences when they cannot access their mobile phone or communicate with it for any given reason.

**Nomophobic**- the state of being anxious, nervous, and panicky that a person experiences because of not being able to use their smartphone.

**Phubbing**-ignoring one's companion to pay attention to one's phone

**Fear of missing out**- an emotional response to the belief that other people are having a wonderful time online which the person who is offline is missing.

**Loneliness**- sadness that a person experiences because they do not have friends or company.

## ABSTRACT

**Background:** Mobile phones have transformed how people converse, interact, work, learn and obtain information. In Kenya, mobile coverage is high (80%) with the majority of its users being the youth. Problematic smartphone use: the inability to control one's smartphone use has been reported to be high among college students. If uncontrolled, it leads to nomophobia: the fear, anxiety, and panic that accompanies the inability to use one's smartphone. This has detrimental effects on students' social and mental well-being.

**Objectives:** To determine: 1) the prevalence of problematic smartphone use, 2) the prevalence of nomophobia among problematic smartphone users, and 3) the factors associated with nomophobia among problematic smartphone users, at Moi university schools of nursing and medicine.

**Methods:** This was a cross-sectional study involving 502 university students. Multistage sampling was used to select participants and data was collected using structured self-administered questionnaires. The problematic mobile phone use (PMPUQ) and nomophobia (NMP-Q) questionnaires which have been validated and used elsewhere in Africa were used to collect the data. Data were analyzed for measures of central tendency, and chi-square and fisher's exact tests were used for bivariate analysis. Logistic regression analysis was used to determine the associations between various variables. A P-value of less or equal to 0.05 was considered significant.

**Results:** The mean age of the participants was 22.6 ( $\pm$  2.9) with the majority being males at 53.6%, medical students constituted 74.9%, 60.6% had owned a smartphone for more than 5 years and 93.6% spent more than 30 minutes on their smartphones daily. Overall, the prevalence of problematic smartphone use was 86.4%. Among those with problematic smartphone use, the prevalence of nomophobia was 99.8%. In this study moderate form of nomophobia was 67.2% and the mild was 29.7%. At the bivariate level, only fear of missing out (FOMO) was the factor significantly associated with nomophobia ( $P < 0.001$ ). On logistic regression analysis, fear of missing out ( $P < 0.001$ ) and the personality trait of openness to experience ( $P = 0.015$ ) were significantly associated with nomophobia. There were no significant differences between medical and nursing students on the prevalence of nomophobia and its associated factors.

**Conclusion:** The prevalence of problematic smartphone use was 86.4%. Nomophobia among problematic smartphone users was 99.8%. Factors associated with nomophobia were FOMO and openness to experience. This study has demonstrated for the first time in Kenya that smartphone use is associated with serious psychological issues.

**Recommendations:** There is a need for urgent prevention and interventions to address problematic smartphone use and nomophobia. Moi University and other institutions offering medicine and nursing courses may need to create awareness by including nomophobia in their syllabuses and offering psychological help to the affected students.



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## CHAPTER ONE: INTRODUCTION

### 1.1 Background

Many devices have been developed as a result of rapid technological growth, one of which is mobile technology. Mobile phones were first introduced in the world in 1983 (Hunt, 2005) and later on the category of the smartphone (Nishad & Rana, 2016). Mobile phones have transformed how people converse, interact, work, and obtain information. The development of the smartphone with its various functions increased memory capacity and speed, as well as the ability to stay connected to the internet at all times, which became widely available in 2011, has increased the amount of time people spend on mobile phones around the world. Smartphones have become more sophisticated and multifunctional, combining the services of the internet and mobile telephony with the advantage of portability, and easy accessibility, and therefore offering quality services (Cha & Seo, 2018). People now do not have to have a computer and be in an office to access information, communicate, do google searches or gain access to social network sites. All these are available on their smartphones and at the touch of a button.

Smartphones provide integrated services that range from communication, computing and mobile sectors which include voice communication, messaging, Personal Information Management (PIM) apps, and wireless communication capability. These smartphones can display photos, play games and videos, navigation, have built-in cameras, audio and video playback and recording abilities as well as provide capacity for sending and receiving electronic mail (Emails) (Zheng & Ni, 2006). According to a study by Xia, smartphones are now equipped with numerous multiple wireless network interfaces, which are meant to meet the different diverse communication and networking demands of the digital population. These tools now have powerful

processors, increased memory capacity, multiple network interfaces and more powerful operating systems that include but are not limited to Windows, phone, Google, Android, and Apple's iPhone operating system. They have mobile gaming, real-time location-based tracking apps, cameras and diaries. These very desirable numerous applications (apps) that are found in the smartphone have made many people increase the amount of time they spend on them (Xia et al., 2015).

A study by O'Dea (O'Dea, 2022) on statistics and facts on smartphones shows that there are over 14.02 billion mobile phones worldwide of which 1.43 billion of these are smartphones. This means that 44.98% of the global population has smartphones with China, India, and America having the highest number. According to the Global System for Mobile Communication Association (GSMA, 2019), an association of mobile network operators worldwide, mobile phone penetration in Sub-Saharan Africa stands at 75%, with 747 million SIM connections (GSMA, 2019). Studies that have been done to look at mobile phone usage show that some people have multiple sim cards and use them interchangeably. Statistics on mobile usage from Pew Research Centre in an article titled Technology use in Africa: mobile phones in 2017, found that 91% of the adults in South Africa own mobile phones of which 51% are smartphones; Ghana's and Kenya's mobile phone ownership stand at 80%.

Anecdotal information such as by Business Today (2019), shows that Kenya leads in Africa in terms of smartphone prevalence and internet usage with about 91% (46.94M) cellular subscriptions in comparison to those in Africa whose average is 80%. It also reports that 8.3 million Kenyans have mobile internet and spend about 3 hours daily on the internet more so on many social media platforms. WhatsApp (74 percent), Facebook (70 percent), and Twitter (50%) are the most widely used social media applications, and additionally, Snapchat and Instagram are for the younger

generation. As of 2018, there were 10,668,000 smartphone users in Kenya in a population of about 47,564,296 (Kenya National Bureau of Statistics, 2019) of which youth aged 18-34 years number about 13.7 million. The percentage of young people aged 15-24 in Kenya is 20.3%, which is among the highest globally.

Smartphone ownership amongst the youth is ubiquitous according to the Organization for Economic Co-operation and Development, (OECD, 2017). In a research conducted among South African students in technical and vocational education and training (TVET), the majority of the students owned mobile phones in the category of smartphones (Shava, Chinyamurindi, & Somdyala, 2016). Two-thirds of youth in Kenya now either own a mobile phone or have access to one according to the Kenya National Bureau of Statistics, which further reports that 43.5 % of Kenyans aged 3 years and above own a mobile phone, with more females than males of the same age bracket owning one. To access the internet 22.6% use smartphones and about 10.4% use a computer (Kenya National Bureau of Statistics, 2019).

The smartphone has revolutionized communication, made lives convenient and easier because of its many functions and applications, and thus contributed to making the world a global village. Where information used to take ages to be passed from one person to the next and from one continent to another, these days, we have live streams whereby people the world over get information live; as it is occurring, the rest of the world gets it in real-time through their smartphones, provided the smartphone has power, internet through wireless fidelity (WIFI), internet or mobile data/bundles and signals (inbound signal, also called reception and outbound signal also called transmission). According to Pew Research 2018 (Silver, Laura, and Johnson, 2018), the majority of youths use their smartphones for learning and research through google searches/platforms, entertainment via video games, music, and social media, and 84

percent of them also use their mobile phones to connect with other people, especially via text messages, according to an article by Laura and Courtney titled: Internet Connectivity seen as having a positive impact on life in Sub-Saharan Africa. About 83% of the youth use their mobile phones to acquire new knowledge and 43% use them to avoid interacting with people (Silver, Laura and Johnson, 2018). Smartphones have evolved from being a status symbol to a necessary daily utility in people's lives (Myakal & Vedpathak, 2019). Its numerous applications, portability, easy accessibility, low calling rates, availability of free WIFI, and low-cost text messages have contributed to its increased usage. The intense use of smartphones by the youth is monumental due to the inlaid applications as well as the installed applications (Kaysi *et al.*, 2021).

The youth are more fascinated with smartphones since it provides them with a sense of autonomy, individuality and credibility. Apart from being a source of enjoyment, it also assists them in maintaining communication with their significant others, as well as gathering and processing information (Sathak, & Sathak, 2018). They use their smartphones to access social media, listen to music, view videos, and play games, and they regard them as leisure devices (Lepp *et al.*, 2014). Smartphones are more widely used by the youth since they adopt technology at a higher rate than the general population. The youth more so students are keen to keep up with the latest technological advancements and developments so they are more at risk to develop an addiction (Yıldırım, 2017). With this widespread use, misuse, excessive use, and addiction have arisen which has brought about various physical, behavioural, and psychological problems (Cha & Seo, 2018).

Problematic smartphone use, also known as smartphone addiction or cell phone dependency, is defined as an inability to control one's use of a mobile phone,

including excessive use, a progressive rise in use to achieve fulfilment (tolerance), and interference with activities of daily living and eventually causing negative consequences (Mitchell & Hussain 2018). Other studies define it as a psychological or behavioural dependence on cell phones that involves a preoccupation with mobile communication, excessive money and time spent on cell phones, and usage of cell phones in socially or physically unsuitable and dangerous settings, such as while driving (Bianchi & Phillips 2005) & (Kwon *et al.*, 2013). A study by Cha and others looks at the behaviours of automatism that lead to uncontrollable usage, overwhelming desire / insatiable need, loss of control, and inattention to routine activities, carrying out the activity despite negative effects, focusing all interest on the activity and being irritable and lethargic with abstinence (Cha & Seo 2018).

A study by Lin of 30 Chinese people in a qualitative study came up with five (5) criteria for technological addiction and these are; withdrawal, salience, conflict, phantom phone signals and psychological factors (Lin *et al.*, 2016). Withdrawal was the most prominent symptom in this study and it is the negative feelings that a person feels when they are not able to engage in the desired activity. Salience is where the said desirable activity dominates the thoughts and behaviours of the person and is manifested by them frequently checking their smartphone for notifications and messages. Conflict is whereby a person's activity is inconsistent with other people and activities such as quarrels arise from a person using their smartphone during family time or dinner (phubbing). Phantom phone signals (PPS), are the illusory perception of having an incoming call (phantom ringing), text (ringxiety/ textxiety), or social media notifications when in reality it is not true. The last symptoms are psychological factors that arise from personality traits and in this study by Lin, the

following personality traits were predictive of smartphone addiction; neuroticism, extroversion and conscientiousness (Lin *et al.*, 2016).

The potential of people becoming hooked to smartphone use has been addressed by both the mainstream media and researchers (Panova & Carbonell, 2018). There has been, therefore, a surge in research into the prevalence of problematic smartphone use in recent years, which has been operationalized so that it maps onto behavioural addiction concepts such as tolerance, withdrawal (dysphoria when the battery dies), preoccupation with, neglect of other activities, subjective loss of control, and continued use despite evidence of harm (Wang *et al.*, 2016). When a person uses his or her smartphone the majority of the time, is unable to reduce its usage, and uses mobile smartphones as a way to pass the time, feels anxious or depressed when the smartphone is out of range, or loses a relationship because of its use, then it becomes an addiction/problematic use.

The World Health Organization (WHO) has documented problematic smartphone use as a public health concern (WHO, 2015) as well as a study by Velthoven (Velthoven *et al.*, 2018). In a meta-analysis of problematic smartphone use among children and young people by Sohn it was demonstrated that problematic smartphone use has been associated with lower subjective well-being and negative health outcomes (Sohn *et al.*, 2019). Kuss, in their study to validate the problematic mobile phone use questionnaire (PMPUQ) suggested that several problems from smartphone overuse can arise which include dependence, dangerous use, use in prohibited situations and antisocial use like phubbing- which is using one's smartphone while in a conversation with someone (Kuss *et al.*, 2018).

Adolescence is a period associated with significant developmental changes, where physical, cognitive and social-emotional transitions occur, though not often synchronously as found in a study by Valkenburg and thus more vulnerable to problematic smartphone use (Valkenburg *et al.*, 2022). Adolescents of this era are growing in an increasingly digitalized reality connecting frequently with their peers and learning about the world through the smartphone, they, therefore, need a lot of guidance on its proper and beneficial use (Granic *et al.*, 2020).

Sarwar wanted to find out both the positive and negative aspects of smartphones in the society. They found that on education, smartphones had a positive impact of enhancing students' easy and instant access to information, irrespective of where they were. They have made electronic learning (E-learning) possible so that students who are sick or absent from classes can still attend classes. But these devices have negatively caused distraction because of social network sites. They also thought that smartphones could be tools for exam cheating (Sarwar & Soomro, 2013). In neighbouring Tanzania, a study found that university students focused on message notifications on social network sites and this made them vulnerable to poor time management since they spent most of their time chatting rather than carrying out academic work. They also found that female students had developed addictive tendencies of taking selfies most of the time and uploading them as statuses on social network sites, awaited for notifications and reactions, and in the process got distracted and wasted valuable time (Kibona & Rugina, 2015).

Problematic smartphone use has also led to behavioural issues and disorders among adolescents, that includes new pathologies such as nomophobia which is a fear of not being able to use a cell phone (Andrews *et al.*, 2015), and phubbing which refers to a situation whereby while in a conversation with others, a person ignores their

companion in order to pay attention to their mobile phone (Pavithra, 2015), textaphrenia, ringxiety, and textxiety which is the mistaken impression of receiving a text message or phone call leads to repeated checking of the phone or device (Subba *et al.*, 2013). According to a meta-analysis article by Lin, they came up with criteria for defining problematic smartphone use among adolescents and youth. It included significant distress that is manifested for not less than three months, of the following symptoms; withdrawal symptoms on stoppage or reduced smartphone use, use for more than the intended time, unsuccessful attempts at reducing time spend on smartphones, impulsivity and continued usage despite knowledge of physical and psychological problems arising from smartphone use (Lin *et al.*, 2016). Sohn on the other hand defined it as smartphone use associated with at least some element of dysfunction such as panic and anxiety with the unavailability of the device and neglect of other activities as a result of its use (Sohn *et al.*, 2019).

Augusto and others wanted to study whether problematic smartphone use caused any distractions among people. So, they carried out a study among college students of the University of Batangas in the Philippines. They found that among 117 study participants who used smartphones for between 5 to 6 hours daily for non-classroom activities, they got distracted from learning activities to a great extent (Augusto *et al.*, 2017). On digital distraction, Goundar used survey monkey to study whether Information and Communication Technology (ICT) university students were distracted by their digital devices in their studies. He found that the students admitted to spending a lot of time during lectures using their smartphones for other activities other than learning (Goundar, 2014). And finally, on digital distraction, a study of 304 University of Almeria, nursing students, on practicum, found that students who had high levels of nomophobia also regularly used their smartphones during their



practicum, with 27.3% getting distracted by watching another student using their smartphone. 23.4 percent agreed to being distracted by their smartphone as they worked and 33.9% said that at times, they observed another student being distracted by their smartphone. 36.9% of these nursing students agreed with the need to limit smartphone use among nursing professionals (Aguilera-Manrique *et al.*, 2018).

One of the latest psychological syndromes which are considered the phobia of the 21<sup>st</sup> century that has arisen from smartphone addiction is nomophobia. Nomophobia (NO Mobile PHOBIA) is the irrational, pathological dread and anxiety that a person feels when they are unable to use or access their smartphone. When contact with one's smartphone is lost, it causes worry, tension, fear, discomfort, and misery, especially among obsessive smartphone young users (Rosales-Huamani, *et al.*, 2019). It is a contemporary phobia of the digital age (Adawi *et al.*, 2018) and it has been termed the twenty-first century's modern phobia (Yildirim & Correia, 2015).

The term "nomophobia" was coined after a 2008 study in the United Kingdom (UK) discovered that 66 percent of the more than 1000 people polled suffered from the disorder defined as being without access to a mobile phone ("66% of the population suffer from Nomophobia," ). Nomophobia is an English word that combines the words "no mobile" and "phobia". It's a form of modern phobia that arose in the digital era of the twenty-first century as a result of the increased use of mobile technologies.

A person with nomophobia exhibits symptoms similar to other psychological problems; anxiety disorders and mood swings are examples of such conditions. When they forget their smartphones, run out of battery, have no network coverage, or lack airtime/data bundles they become nervous (Gezgin, 2016). They never turn off their devices, and keep looking at them to check for notifications (Clayton *et al.*, 2015).

They find it rewarding to check their mobile applications and notifications and compulsively check their smartphones for updates, texts, and missed calls which negatively affects their daily lives. Nomophobic people state that their smartphone is an extension of their bodies, determining their identity and way of living (Hoşgör & Hoşgör, 2019). Bragazzi and others have suggested that nomophobia should be included in the Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5) since it meets the diagnostic criteria for specific phobias in the Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM-4) by significantly interfering with one's life (Bragazzi *et al.*, 2019).

Ramos-Soler found that when compared to physical interactions with others, nomophobic people use their smartphones to protect themselves from social encounters and may perceive themselves as more comfortable, safer, and successful while on their smartphones (Ramos-Soler *et al.*, 2017). The ubiquity of smartphones is thought to be increasing the prevalence of nomophobia (Gezgin, 2016). It presents with withdrawal symptoms when the person is away from their smartphone. It is characterized by using the smartphone all the time, spending a lot of time on it, always carrying a charger or power bank, and becoming frightened and nervous at the prospect of losing one's phone or being unable to use it. They sleep with their device in their bed and have minimal social face-to-face interactions, preferring instead to converse with others through modern technology (Moreno-Guerrero *et al.*, 2020a).

## **1.2 Smartphone Use Issues**

Nomophobia is prevalent equally in both developed and developing countries and has a prevalence between 40 percent to 99 percent, with the young adult population having the highest incidence (Ozdemir *et al.*, 2018). Nomophobia was shown to be

prevalent in India in the following studies; Myakal found it to be 71.39% among students in a rural medical college (Myakal & Vedpathak, 2019). Yasodhamma found it to be 76.7% among nursing students (Yasodhamma *et al.*, 2018). Sharma among medical students in Indore found a 73% prevalence (Sharma *et al.*, 2015), and Khilnani 72.80% in a medical teaching hospital in western Gujarat (Khilnani *et al.*, 2019). In Turkey, a study by Ozdemir, who did a comparative study among university students between a Pakistani and a Turkey university found a high prevalence (Ozdemir *et al.*, 2018), and Gurbuz who carried out a study in Balsa province in rural Turkey found a prevalence of 80%, amongst the youth (Gurbuz & Ozkan 2020). In Oman, a study by Mohammed found a prevalence of 99%, and a study by Aguilera of 304 university students of Almeria found it to stand at 82.39% (Mohammed *et al.*, 2018) & (Aguilera *et al.*, 2018) respectively. Buctot found an 87% nomophobia prevalence among Philipino high school students (Buctot *et al.*, 2020).

The effects of nomophobia are numerous as stipulated by numerous studies. Social effects include dependence and distraction, and phubbing (paying attention to one's smartphone while ignoring one's companion/ companions) leading to poor social skills and interactions (Ramos-Soler *et al.*, 2017) and social isolation and social phobia (Mehrnaz *et al.*, 2018). On the academic, it causes low academic achievements and interrupts class activities (Dasgupta *et al.*, 2017), as well as causing work/ professional distractions (Aguilera *et al.*, 2018). Psychologically, it causes anxiety, attention-deficit disorder, aggression, cyber-addiction, eating disorders and stress (Thomé, 2018), (Moreno-Guerrero *et al.*, 2020b) & (Olivencia-carrión *et al.*, 2018). Physically it causes obesity, hypertension, sleep disturbances, muscular pains, neck syndrome, and headaches (Myakal & Vedpathak, 2019), (Ahmed *et al.*, 2020) & (Tavolacci *et al.*, 2015).

There are few studies on nomophobia in Africa. A study by Ifeanyi among undergraduate students at North-West University in South Africa found that 50% of male students and 57% of female students were distracted by their smartphones in class which negatively impacted their academic performance with some answering calls in class (Ifeanyi & Chukwuere, 2018). A Moroccan study found the prevalence of nomophobia to be 66.1% (Louragli *et al.*, 2018). A study on nomophobia among health training institutions in the Kaduna States, Nigeria found a 53% prevalence (Alhaji *et al.*, 2021). At Cairo University, Faculty of Nursing, Mahgoub (Mahgoub *et al.*, 2019) found that 93% of the students had a moderate to severe prevalence of nomophobia and Awofala found a prevalence of 74% among undergraduate students at the University of Lagos, Nigeria (Awofala, 2020). Another study in Ghana among university students found a 96.4% prevalence, with the majority having moderate nomophobia that affected their studies (Essel *et al.*, 2021). And finally, a study on adolescents aged 12-18 years in South Africa among students found fear of missing out to be a strong predictor of nomophobia (Popovac & Hadlington, 2020).

### **1.3 Problem Statement**

There is a paucity of studies on problematic smartphone use and nomophobia that have been done in Kenya, even though Kenya leads the continent in smartphone penetration in the African Continent. Smartphone use increased exponentially with the advent of COVID-19 when learners were required to own and use electronic gadgets for electronic learning (e-learning).

There are anecdotal reports in the mainstream media that the Kenyan youth using smartphones are usually so absorbed with their devices and incur many unwarranted debts and expenses by borrowing money from *M-kopa*, *M-shwari*, *fuliza*, and *oko*

*jahazi* just to remain connected. A good proportion of the students may go into panic mode the moment they can't access their smartphones. A room full of youth will be quiet because each is busy on their smartphones on which they spend much of their time, avoiding places without network coverage. It is suspected that the students keep their phones on during the night, use them before sleeping, and keep checking them at all times and it is the first thing they go through as soon as they wake up in the morning.

#### **1.4 Justification**

Given the high prevalence rate of moderate to severe nomophobia found in both developed and developing countries, it is clear that nomophobia is here with us (Dasgupta *et al.*, 2017) & (Tavolacci *et al.*, 2015). Unfortunately, research and literature are scarce on its prevalence in the population and more so among the youth in developing countries. Establishing this phenomenon among nursing and medical students is especially critical since a study by Lee, found that nomophobia reduces students' academic performance because of distraction (Lee *et al.*, 2018). Another study of Nursing students on practicum found that they were distracted by their smartphones as they attended to their patients (Aguilera-Manrique *et al.*, 2018). From the foregoing studies, medical and nursing students with nomophobia are likely to be distracted while attending their classes and their patients.

The reason I chose medical and nursing students from the College of Health Sciences and not all undergraduates is because their training is intensive both at the theory and clinical levels. The two courses' training involves theoretical instruction by their lecturers and practical hands-on clinical rotations at various hospital units. Their education entails a lot of research, staying up late to read, and a long stay at the ward

rotations to pick up practical knowledge. They are thus needed to be keen and focused. Any distraction by nomophobia on their part will have dire consequences on their academics, completing school and on their patients in case, their clinical supervisors and instructors are away or inattentive. Learning at the university necessitates a lot of use of online platforms, more so during the Global pandemic of Corona Virus Disease 2019 (COVID-19). Since there are no studies on problematic smartphone use and nomophobia in Kenya to document their presence, the purpose of this study was to look into and document the prevalence of problematic smartphone use, nomophobia and factors associated with nomophobia among medical and nursing students with problematic smartphone use at, College of Health Sciences, Moi University in Uasin-Gishu County, Kenya.

### **1.5 Study Significance**

The findings of this study can form the baseline for further studies around issues of problematic smartphone use and nomophobia. This study has established that problematic smartphone use and nomophobia are major concerns and therefore institutions and governments ought to enact policies and measures aimed at controlling the same.

### **1.6 Research Questions**

1. What is the prevalence of problematic smartphone use among medical and nursing students at the College of Health Sciences, Moi University?
2. What is the prevalence of nomophobia among medical and nursing students with problematic smartphone use at the College of Health Sciences, Moi University?

3. What are the factors associated with nomophobia among medical and nursing students with problematic smartphone use at the College of Health Sciences, Moi University?

## **1.7 Research Objectives**

### **Broad objective**

To establish the Prevalence and factors associated with nomophobia among medical and nursing students with problematic phone use at Moi University

### **Specific Objectives**

1. To determine the prevalence of problematic smartphone use among medical and nursing students at the College of Health Sciences, Moi University.
2. To determine the prevalence of nomophobia among medical and nursing students with problematic smartphone use at the College of Health Sciences, Moi University.
3. To determine the factors associated with nomophobia among medical and nursing students with problematic smartphone use at the College of Health Sciences, Moi University.

## CHAPTER TWO: LITERATURE REVIEW

### 2.0 Overview

This section was dedicated to a review of the works done regarding my objectives and helped me acquaint myself with the methodologies used, their findings, the instruments for data collection and analysis, and find the gaps that needed to be addressed.

### 2.1 Introduction

Many devices have been created as a result of rapid technological advancements; mobile technology is one of them. Mobile technology was first introduced in the world in 1983 (Hunt, 2005) and its latest version is the smartphone (Nishad & Rana, 2016). A study on Technology & telecommunications by O'Dea on smartphone use (O'Dea, 2022) shows that there are now over 14.02 billion phones worldwide and 1.43 billion of these are smartphones. This rapid evolution, accompanied by shifting exposure patterns has raised questions about the potential health effects of the exposure by the World Health Organization (Hardell, 2018). Smartphones have many desirable applications, augmented memory capacity, and speed, combining the services of the internet and mobile telephony with the advantage of portability, easy accessibility, and therefore offering quality services (Cha & Seo, 2018). These increase the amount of time spent on the mobile phone globally which inadvertently leads to misuse, excessive use, and addiction (Cha & Seo, 2018). Smartphones are more widely used by young people since they are faster than the rest of the population to adopt technology and to keep up with its latest advancements and developments (Yildirim *et al*, 2016), so the youth are more at risk to develop an addiction. Smartphone users argue that their phones have become an extension of their bodies,



influencing both their identity and way of life (Hoşgör & Hoşgör, 2019). This excessive use may eventually lead to nomophobia.

## **2.2 Problematic Smartphone Use**

Problematic smartphone use, also known as mobile phone overuse, smartphone addiction, or cell phone dependency, is defined as an inability to control one's use of a mobile phone, including excessive use, a progressive rise in use to achieve pleasure, and interference with activities of daily living, eventually causing negative consequences (Mitchell & Hussain, 2018). Problematic smartphone use is defined as a type of psychological or behavioural dependence on smartphones that includes preoccupation with mobile communication, excessive money and time spent on smartphones, and use of smartphones in socially or physically inappropriate and dangerous situations, such as while driving (Bianchi & Phillips, 2005) & (Kwon *et al.*, 2013). Another study looks at problematic smartphone use as presenting with automatism which is a type of behaviour that leads to uncontrollable use, overwhelming desire / irresistible need, lack of control, inattention to normal activities, and doing the activity despite negative effects, focusing all interest on the activity and being irritable and lethargic with abstinence (Cha & Seo, 2018). When a habit becomes an obligation, it is an addiction (Alavi *et al.*, 2012).

A lot of research on problematic smartphone use and addiction has been conducted. Shambare (Shambare, 2012) considers it to be one of the most serious addictions of the twenty-first century. He distinguishes between six forms of behaviours: habitual, obligatory, voluntary, dependent, compulsive, and addictive. As a result, an addiction to, excessive attention and uncontrollable dedication to one's smartphone exists. Compulsion, functional impairment, tolerance, and withdrawal are also four

characteristics of smartphone addiction, according to Lin and colleagues (Lin *et al.*, 2014). People can become addicted to their smartphones, according to both the mainstream media and researchers (Panova & Carbonell, 2018). This has led to a surge in research into the prevalence of problematic smartphone use in recent years, which has been operationalized to map onto behavioural addiction concepts such as tolerance, withdrawal (dysphoria when the battery dies), preoccupation, neglect of other activities, subjective loss of control, and continued use despite evidence of harm (Wang *et al.*, 2020). It becomes an addiction/problematic use when a person uses his or her smartphone the majority of the time, is unable to cut back on mobile phone usage, uses mobile phones as a solution to boredom, or feels nervous or unhappy when the smartphone is out of range or loses a relationship as a result of the mobile phone use. Other studies describe the compulsivity that accompanies the uncontrollable use of a smartphone which characterizes maladaptive dependency, where people tend to use their smartphones constantly without being separated from them (Chen *et al.*, 2017).

### **2.3 Problematic Smartphone Use among the Youth**

The use of smartphones among young people has risen dramatically in the United Kingdom during the last decade according to the Office for National Statistics, 2019 (Prescott, 2019) & Organization for Economic Co-operation and Development (OECD, 2017), and this has coincided with an increase in common mental health problems among teenagers. A study by Cha (Cha & Seo, 2018) found that young people are at a high risk of having smartphone addictions with many of them saying they couldn't live without them. These addictions have grave implications for lifelong mental health (Perou *et al.*, 2013) & (Whiteford *et al.*, 2013) and the healthcare

economy (Sohn *et al.*, 2019). Thomée performed an online poll as well as a study on the behaviours of Elon University students. They found that students seemed to be addicted to their mobile phones and were unable to live quality lives without them. Excessive smartphone use was found to have a negative psychological impact, according to the findings of this study (Thomée *et al.*, 2011).

Divan published a study in which they found that smartphone users had higher levels of anxiety, depression, mental distraction, and indolence. They also discovered that the earlier a child begins to use a smartphone, the worse the situation becomes (Divan *et al.*, 2012). A study among middle school Korean students found that adolescents are at high risk of smartphone addiction because they get strongly attached to it and even consider the smartphone as their second self. They also postulate that the reason for this addiction could be that adolescents have yet to develop self-control when compared to adults (Cha & Seo, 2018).

Another study found that increased problematic smartphone use was associated with increased stress levels and that increased perceived stress levels were associated with decreased critical thinking. In this study, it was found that adolescents and youth used smartphones as mechanisms to alleviate negative emotions and experiences of pain, tension and loneliness without eliminating the source of these emotions. These youth and adolescents who had increased levels of problematic smartphone use had associated lower levels of academic engagement, and reduced attitudes towards learning and academic achievements. From this study, it was deduced that young people with problematic smartphone use will have issues with their studies and academic achievement (Arrivillaga *et al.*, 2022).

A study among German participants found a positive moderate correlation between problematic smartphone use and self-reported reduced productivity (Duke & Montag, 2017). A study by Chen found that problematic smartphone use among university undergraduates was associated with psychological and behavioral problems such as depression, anxiety and sleep disturbances (Chen *et al.*, 2017). And Wacks in their study found that smartphone addiction is associated with cognitive-emotional irregularities, impaired cognitive function, social network sites addiction, low self-esteem and shyness. In this meta-analysis review by Wacks and others, it was also found that the participants had sleep problems, reduced physical fitness, unhealthy eating habits, pains and migraines, reduced cognitive control as well as changes in the brain's grey matter volume (Wacks & Weinstein, 2021).

#### **2.4 Nomophobia Among the Youth**

The term "nomophobia" was coined after a 2008 study in the United Kingdom (UK) discovered that 66 percent of the more than 1000 people polled suffered from the disorder defined as being without access to a mobile phone ("66% of the population suffer from Nomophobia," n.d.). Nomophobia is an English word that combines the words "no mobile" and "phobia". It's a form of modern phobia that arose in the digital era of the twenty-first century as a result of the increased use of mobile technologies.

Bragazzi defined it as a disorder that affects the digital society and is characterized by feelings of discomfort, anxiety, irritation, and anguish when a person is unable to use their smartphone or computer (Bragazzi & Puente, 2017). It's been dubbed the "contemporary fear of the twenty-first century" (Yildirim & Correia, 2015). Anxiety disorders or mood swings are examples of other psychological problems that a person with nomophobia exhibits. When they forget their phones, the battery runs out, or

there is no network coverage, they become nervous (Gezgin, 2016). They never turn off their devices and keep looking at them to check for notifications (Clayton *et al.*, 2015). They find it rewarding to check their mobile applications and notifications, become addicted to this positive feeling, and compulsively check their phones for updates which negatively affects their daily lives.

It has also been defined as a fear of losing contact with one's smartphone that manifests as anxiety, nervousness, panic, discomfort, and distress in young users, particularly among compulsive smartphone users (Rosales-Huamani *et al.*, 2019). Another study considers it as a situational pathological anxiety arising from losing communication with one's mobile phone, not having a network, not having enough credit/bundles, and having a low battery (Dixit *et al.*, 2010). Mertkan found that nomophobic people, who use their smartphones to protect themselves from social contacts feel more comfortable, safer, and successful than when they connect with others in person (Mertkan *et al.*, 2018). The fear of being deprived of their mobile phone is thought to increase with the prevalence of smartphones (Gezgin, 2016).

Whenever a person is separated from their smartphone, they experience withdrawal symptoms known as nomophobia. It is characterized by the constant use of the phone, extensive time spent on it, constant carrying of a charger or power bank, and anxiety and nervousness at the prospect of losing or being unable to use the phone as a result of no airtime/bundles, no network, and low battery. The person keeps checking the phone for notifications, texts, and missed calls. They sleep with the device in their bed and have minimal social face-to-face interactions, preferring instead to converse with others through the new technology (Bragazzi & Puente, 2014). According to Yildirim who developed the nomophobia questionnaire (NMP-Q), nomophobia has four dimensions which explain the reason why and how people get nomophobia. These

dimensions include fear of not being able to communicate, fear of not being able to connect, fear of not having rapid access to information, and finally, dread of giving up the comfort arising from the use of the mobile phone (Yildirim & Correia, 2015).

The dimension of not being able to communicate dimension brings feelings of losing instant interaction and not being able to use the services of a smartphone instantly. Since the person needs immediate communication with the smartphone whenever they want to, when the person cannot access their tool, they get anxious and nervous. The person gets worried, distressed and panicky since they imagine that their significant others, family or friends are not able to reach them. In this dimension, the person feels that the connection is severed between them and their family if they do not have their smartphone with them or for any reason, they are not able to use it.

The dimension of Losing connectedness is associated with feelings of losing the abundant connectivity that smartphones provide. Under this factor, the person feels disconnected from their online identity. The discomfort arises from not staying up to date with social media like Facebook, Twitter, Snapchat, WhatsApp, WeChat, and Reddit and from not being able to access other online networks. It also includes not being able to check notifications for updates constantly and instantly. These people, therefore, feel empty without their smartphones and do not know what to do without them.

The third dimension which is the fear of not being able to access rapid information on the nomophobia questionnaire tool has items that pertain to general access, being unable to retrieve or search for information by use of their smartphone. Young people do a lot of google searches, therefore when a person is unable to do this, they feel anxious, distressed, uncomfortable and nervous. A person who feels deprived of

access to information constantly and instantly from their smartphone will fall under this nomophobia dimension.

The fourth and final dimension is that of giving up convenience in the nomophobia questionnaire is related to feelings of giving up comfort that is provided by the smartphone since a person with nomophobia takes their smartphone as part of the self; an indispensable tool. Many people have multiple social network applications (apps) and accounts and therefore they get fearful and afraid of running out of battery and credit or losing network signal. This dimension is thus related to aimlessly scrolling through their smartphone, ringxiety, textaphrenia and textiety. Ringxiety is the anxiety that results from the mistaken belief that one's smartphone is ringing or vibrating. Textaphrenia is the mistaken feeling that one has received a text message when in truth, a message had not arrived or been received. Textiety on the other hand is the anxious feeling of not receiving or sending a text message

Dalbudak described it as the phobia of the modern age introduced by information & communication technology, especially smartphones (Dalbudak *et al.*, 2020). To Arpaci nomophobia is an emerging human behavioural phenomenon arising from widespread smartphone use (Arpaci *et al.*, 2017). And to Lopez, the fear of being out of reach of a mobile phone is what nomophobia is (Lopez, 2019). Due to the foregoing definition of nomophobia, Bragazzi, suggest that nomophobia should be included in the Diagnostic and Statistical Manual of Mental Disorders, 5<sup>th</sup> Edition (DSM-5) since it is a pathological phobia that interferes with people's lives and meets the Diagnostic and Statistical Manual of Mental Disorders, 4<sup>th</sup> edition's (DSM-4's) criteria for specific phobias (Bragazzi *et al.*, 2019).

## 2.5 Prevalence of Problematic Smartphone Use

A Pew Research Report of 2018 (Monica & Jiang, 2018) titled “Teens, Social Media & Technology 2018” found that 50 percent of teenagers say they are "addicted" to their cell phones. According to the report, 59 percent of parents say their children are addicted to their electronics. This survey found that 45 percent of kids use the internet virtually constantly, while 44 percent go online multiple times a day. In comparison to boys, 50% of adolescent girls are virtually always online, compared to 39% of adolescent boys. Tavakolizadeh, in a cross-sectional study of 700 medical students found that excessive mobile phone use was associated with anxiety and depression in 36.7 percent of the participants (Tavakolizadeh *et al.*, 2014). Lopez-Fernandez found a 10% problematic smartphone use among British adolescents in a study of 1529 high schoolers using the Mobile Phone Problematic Use Scale (MPPUS). The greatest problematic smartphone use was among 11 to 14-year-olds (Lopez-Fernandez *et al.*, 2014).

Sánchez-Martínez who did a study among 1328 Spanish adolescents aged between 13 and 20 years, found a 20% prevalence of problematic phone use. Females had a higher prevalence of 26.1% compared to 13% of males (Sánchez-Martínez & Otero 2009). Gutiérrez, studied 1126 Spanish people aged 16-65 years and found a 20.5% prevalence using MPPUS (Gutiérrez, de Fonseca & Rubio, 2016). Vally and others wanted to find out how common problematic smartphone use is among college-going young people, in the United Arab Emirates. They studied 350 youngsters aged 18-33 years and found a prevalence mean of 47.14% with a standard deviation of 19.98% (Vally & El Hichami, 2019a). In Lebanon, a study found the prevalence of smartphone addiction to be 20.2% (Nahas *et al.*, 2018). And in a Philipino cross-



sectional study of 1447 high school participants in 2018-2019, the prevalence of problematic smartphone use was found to be 62.6% (Buctot *et al.*, 2020).

In a systematic review of 41,871 children and teenagers, it was found that the prevalence of problematic smartphone use stood at 23.3% (95% CI:14-31.2). This review concluded that 1 in every 4 children/young people had problematic smartphone use in all the studies under review, (Sohn *et al.*, 2019). In another meta-systematic analysis in India, of 45 articles from 1995 to 2014 the magnitude was found to be 39-44% among Indian adolescents (Davey & Davey, 2014). In Korea, even though internet addiction is 4.9-10.7%, it has emerged as a major public health concern (Koo & Kwon, 2014). In a study of 1062 undergraduates in mainland China, the prevalence of problematic smartphone use was found to stand at 21.3%. In this study at Changsha, the factors that were associated with the problematic smartphone were high perceived stress, perfectionism, high parental expectation, high family income and elevated emotional symptoms (Long *et al.*, 2016). A study by Chen found a prevalence of 29.8% problematic smartphone use among 1441 undergraduate students aged between 17 and 26 years. In this study, males had a 30.3% prevalence compared to that of females which was 29.3% and that for the males, it was playing smartphone games that predicted their addiction whereas for the females it was using multimedia and social network sites that predicted their problematic smartphone use (Chen *et al.*, 2017). In 2019, a cross-sectional study of 364 students in Ibadan, Nigeria, it was found that 22.7 percent of the students said they couldn't imagine life without their smartphones, even for a day (Adeolu *et al.*, 2019).

## 2.6 Prevalence of Nomophobia

Nomophobia is equally prevalent both in industrialized and developing countries, with prevalence rates ranging from 40% to 99 percent in both, the highest incidence being among young adults (Ozdemir *et al.*, 2018). Myakal in a cross-sectional study of 346 medical undergraduate students in Ambajogai, India, found a nomophobia prevalence of 71.39% which was more in males (73%) than females (69.94%). In their study carried out in 2017-2018, nomophobia was associated with sleep disturbance, worse in students from nuclear families, those aged between 20-22 years, and those who spend more time on their phones (Myakal & Vedpathak, 2019).

A descriptive study of 150 nursing students of Mohammed Sathak College, Chennai, found a moderate to severe prevalence of nomophobia of 76.7%. They didn't find any variance between males and females (Yasodhamma *et al.*, 2018). A study of 178 nurses by Hoşgör found a 96.56% prevalence of nomophobia, with a majority of them having a moderate level of nomophobia (Hoşgör *et al.*, 2021). In Indonesia a study of 497 people found a cumulative prevalence of nomophobia of 99.7%, whereby 63.4% had a moderate form of nomophobia, 27.2 percent had a severe form, 9.1% had a mild form and only 2 study participants did not have it (Mansyur *et al.*, 2020).

Ozdemir while analyzing nomophobic behaviours among adolescents in 475 high school students in Turkey from six different schools using Yildirim and Correia's Nomophobia Questionnaire (NMP-Q) scale (Yildirim & Correia, 2015), found high prevalence rates. Females were more affected than males but there were no differences between socio-economic statuses (Ozdemir *et al.*, 2018). But Sharma while studying a sample of 130 3<sup>rd</sup> year medical students found a prevalence of 73% amongst 22-24-year-olds. In this study, when they could not find their smartphones, 83 percent of the students had regular and recurrent anxiety/panic attacks (Sharma *et*

*al.*, 2015). Gezgin who surveyed 929 9<sup>th</sup> to 12<sup>th</sup>-grade high school students in Turkey, found slightly above-average moderate nomophobia levels. The female students were more affected than the males (Gezgin *et al.*, 2018). Cakmak in their study among Turkish college-going students found that the level of nomophobia among college-going students is higher than average and the prevalence of moderate nomophobia level stood at 73% where females were affected more than males. In this study, 78.4% said that they checked their smartphone as soon as they awoke in the morning. It also found that the cohort that checked their device the first thing in the morning was more nomophobic, compared to those who did not check (Çakmak & Karahan, 2022).

In a 2014 survey among university students in the United States of America (USA), half of the participants had their phones taken away. The other half was asked to turn off and put away their phones. After that, an anxiety scale was administered. The participants' anxiety levels had increased in both groups (Cheever *et al.*, 2014). Dalbudak in a study of 408 participants found a prevalence of 73.45%, with females being more affected than males. However, age was not a significant variable in this study. They found that time in terms of daily usage and duration mattered. The more the daily internet bundles used as well as personality were positively associated with nomophobia (Dalbudak *et al.*, 2020).

An online survey using e-mail and WhatsApp on 331 individuals in Western Gujarat obtained a male prevalence of 70% compared to that of females at 65.3%. 72.80% of those polled, felt that their smartphones consumed their time, and affected their daily activities (Khilnani *et al.*, 2019). While studying 645 university students from 28 Turkish universities aged 18 to 35 years, Mertkan found a moderate level of nomophobia. These students were more worried about not being able to communicate, losing connectedness and not being able to access information in that order of concern

(Mertkan, 2017). Aguilera-Manrique who studied 304 nursing students on practicum found an 82.39% prevalence of nomophobia and their smartphone use caused some level of distraction as they attended to their patients with many agreeing that there is a need to limit smartphone use among nursing professionals (Aguilera-Manrique *et al.*, 2018).

While studying nomophobia among university students in Oman, a study found that nearly everyone in the 735-person sample had mild to severe nomophobia. The prevalence stood at 99.3% on the NMP-Q scale (Qutishat, *et al.*, 2020). Gezgin on the other hand found the prevalence of nomophobia in a Turkey study of 433 university students to be above average (Gezgin *et al.*, 2016). In their study of 537 Turkish college students, the prevalence of nomophobia was found to be 42.6% and it was more prevalent among females as compared to males. The most prevalent dimensions were fear of not being able to communicate and the inability to access information (Yildirim & Correia 2015). In rural Turkey, a study among 400 young people found a prevalence of 80% (Gurbuz & Ozkan, 2020). Kumar through snowballing instant questionnaires online found that 74.8% of the 2061 respondents had moderate nomophobia while 18.9% had severe form. In this study, the males were more affected than females and those who spent more than five hours on their devices were highly addicted to their smartphones and were more nomophobic (Kumar & Thomas, 2020).

Aguilera-Manrique from their cross-sectional study of 304 students from the University of Almeria using NMP-Q found a prevalence of 82.39%. More females (83.39%) were affected than males (79.04%). In this study, they found that the nursing students used their phones during practicum, which distracted them as they attended to their patients (Aguilera-Manrique *et al.*, 2018). A comparative study by

Dasgupta in West Bengal, India, between two institutions of medical and engineering undergraduates found that from a sample of 305 engineering students, the prevalence was 44.6% compared to 42.6% of 303 medical students. Nomophobia was more prevalent in females than males in both colleges. Those who had had their smartphones for more than two years, as well as those who spent more time and money on them, were more vulnerable (Dasgupta *et al.*, 2017). Ahmed and colleagues who conducted another cross-sectional study in India using the google platform, with a sample of 157 physiotherapy students found a 77.6% prevalence. In this study by Ahmed, nomophobia affected the student's academic performance and their daily activities (Ahmed *et al.*, 2020).

A meta-analysis review of the prevalence of nomophobia by Humood found that the prevalence of moderate to severe nomophobia is 70.75% (95% confidence interval of 62.62-77.75), while the prevalence of severe nomophobia ranged between 15.45 percent to 27.43 percent with an average of 20.43 percent. In their analysis, they discovered that university students appeared to be the highest group affected by a prevalence of severe nomophobia. In the meta-regression, age and gender were not important predictors of severe nomophobia (Humood *et al.*, 2021). Another meta-analysis by León-Mejía found that the prevalence of nomophobia in the general populace stood between 45.5% and 93.85% and within the nomophobic group, moderate levels varied between 25.7 percent and 73.3 percent. A severe form of nomophobia ranged between 1 percent to 87 percent. In this meta-analysis, it was found that women and the younger individuals suffered more from nomophobia compared to the rest of the population (León-Mejía *et al.*, (2021).

Setia & Tiwari who studied 100 study participants aged between 18 years to 40 years who had owned a smartphone for more than one (1) year found that the students are a

hundred percent (100%) nomophobic to some extent. In this study, they found that college students are more prone to nomophobia compared to working professionals and that females had more severe nomophobia compared to males who had a moderate level of nomophobia (Setia & Tiwari, 2021). In an Arabian study, it was found that of all the 526 study participants all of them had some level of nomophobia. 39% had a mild form, 46.2% had moderate and 14.8% had a severe form of nomophobia. In this study being female, single, younger and with insufficient income predicted more nomophobia, as well as spending between 4 to 9 hours online and having a university education (Hussien, 2022).

In Africa, a Moroccan study of 541 adolescents found a nomophobia prevalence of 69.1% in girls compared to 63% in boys by using NMP-Q (Louragli *et al.*, 2018). Alhaji while studying nomophobia among health training institutions in the Kaduna States, Nigeria found a 53% prevalence (Alhaji *et al.*, 2021). At Cairo University, Faculty of Nursing, Mahgoub (Mahgoub *et al.*, 2019) found a 93% moderate to severe prevalence of nomophobia and Awofala established a prevalence of 74% in a study among Nigerian undergraduate mathematics students at Lagos university (Awofala, 2020). Another study in Ghana among university students found a prevalence of 96.4% with the majority having moderate nomophobia (Essel *et al.*, 2021).

## **2.7 Factors Associated with Nomophobia**

Studies on nomophobia found that it is associated with gender, age, time, personality, self-image/ self-esteem, and self-efficacy. It is also a function of loneliness and fear of missing out.

### **2.7.1 Age and Nomophobia**

Age has been linked to nomophobia among adolescents and university students were studied from various geographical locations, and it was found that nomophobia is prevalent and spreads among young people thus interfering with their lives by causing fear and anxiety.

In Iran, a descriptive cross-sectional study among undergraduate students at Islamic Azad University, Tehran found that nomophobia was more prevalent in participants with a lower mean age. Participants in this age bracket felt more discomfort, anger, anxiety, and insecurity when they couldn't access their mobile phones (Darvishi *et al.*, 2019). But Gutiérrez, in their comparative study among Pakistani and Turkey university students, did not find age to be significantly associated with nomophobia (Gutiérrez *et al.*, 2016). A study in India reported that medical students aged between 20 and 22 years were more impacted by nomophobia (Myakal & Vedpathak, 2019).

In another study in India by Yasodhamma (Yasodhamma *et al.*, 2018), age was found to be a factor in the development of nomophobia as well but another study in a similar population did not establish any significant relationship between nomophobia and age (Dalbudak *et al.*, 2020). According to Yildirim nomophobia is more prevalent among the younger generation since they are the ones who widely use smartphones and adapt quickly to the rapid advancement in technology (Yildirim *et al.*, 2018).

Qutishat on the other hand found that 1<sup>st</sup> years had less nomophobia than senior students in their study of university students in Oman (Qutishat *et al.*, 2020). To Lachmann, who carried out their study at Ulm University, college students are more affected by nomophobia than other youths because of their proficiency in using smartphones and study stresses (Lachmann *et al.*, 2018). They use search engines like google and social media apps (Al-Hariri & Al-Hattami, 2015). Khilnani didn't find

any significant relationship between nomophobia and age (Khilnani *et al.*, 2019). According to Betoncu, nomophobia being a digital disease is more prevalent in the youthful population between 12 and 18 years (Betoncu & Ozdamli, 2019). Gurbuz studied 400 young people in rural Turkey and discovered that the younger the person, the higher their levels of nomophobia (Gurbuz & Ozkan, 2020). Farooqui on the other hand found that those aged 20-24 years were more prone to nomophobia in their study (Farooqui *et al.*, 2018b).

### **2.7.2 Gender and Nomophobia**

Several studies discussed here below have linked nomophobia with gender, with some finding that females are more affected, while others found that males were more affected and yet others found that there was no difference between the sexes. Farooqui found no gender difference in their cross-sectional study of 145 first-year medical students aged between 18 to 21 years in Pune, India (Farooqui *et al.*, 2018b). Yasodhamma also found no gender difference in their quantitative study of 150 nursing students at the Mohamed Sathak college of nursing, Chennai, India (Yasodhamma *et al.*, 2018). Adawi (Adawi *et al.*, 2018) in their online survey of persons whose mean age was 27.9 in Italy, pavithra (Pavithra *et al.*, 2015) who carried out a cross-sectional study among medical students aged between 17-27 in Bangalore India, as well as Ramos-Soler (Ramos-Soler *et al.*, 2017) all did not find gender differences in their various studies.

Studies that found nomophobia to be more prevalent among males include that of Khilnani who used an online cross-sectional survey in a medical and teaching hospital in Western Gujarat, of people aged from 18-60 years which established that the males had moderate to severe nomophobia of 70% compared to 65.3% of females (Khilnani



*et al.*, 2019). Darvishi, while studying university students at Tehran University found a higher prevalence of nomophobia among males than females (Darvishi *et al.*, 2019). Ozdemir who carried out a comparative study between undergraduates from a Pakistani university and a Turkey university found that males were more affected by nomophobia because of low self-esteem (Ozdemir *et al.*, 2018). Myakal found that the males in their study had a 73% nomophobia compared to females who had 69.9% (Myakal & Vedpathak, 2019). Kumar (Kumar & Thomas 2020) found that moderate to severe nomophobia affected more males than females in their study as did Sonali (Sonali *et al.*, 2017). An Indonesian study had more males affected than females in all nomophobia forms (Mansyur *et al.*, 2020). Finally, a study by Azra, found it to be more prevalent in males than females (Azra *et al.*, 2019).

Several studies have reported that the female gender is most affected by nomophobia than the male gender. These studies include those of Yildirim in a Turkish college students study which found that females were more nomophobic than males, a finding that was ascribed to their fear of not being able to communicate and access information (Yildirim *et al.*, 2016). Aguilera-Manrique in a cross-sectional study of 304 nursing students from the University of Almeria also established that the prevalence of nomophobia was higher in females at 82.39% as compared to 79.04% in males (Aguilera-Manrique *et al.*, 2018). Dasgupta compared nomophobia presence among engineering and medical students from 2 different colleges in Bengal and found that though the engineering students had a higher prevalence, in both colleges, it was higher in females than in males (Dasgupta *et al.*, 2017). A study by Cakmak found that females were more nomophobic than males in their study of college students (Çakmak *et al.*, 2022) and so did Setia & Tiwari who found that females had

severe nomophobia compared to males who had a moderate form of nomophobia (Setia & Tiwari 2021).

Mohammed found that females had higher nomophobia levels compared to males and so did Gezgin who studied 929 Turkish high schoolers and found that females' nomophobic states were higher than males (Mohammed *et al.*, 2018) & (Gezgin, 2016) respectively. In a Philipino study of 1447 high school students, Buctot also found the female gender to be more affected than males (Buctot *et al.*, 2020) and so did Dalbudak (Dalbudak *et al.*, 2020) when they studied 408 students. Gutiérrez-Puertas did a comparative study of 258 nursing students, 130 from Almeria university and 128 from the Polytechnic Institute of Braganza, Portugal and reported that the nomophobia levels were higher among females at 95.91% compared to that of males which was 79.19%. Further, the same study also reported that the levels of nomophobia among the Spanish nursing students at Almeria university was 80.56% in females while that of males was 73.78% (Gutiérrez-Puertas *et al.*, 2019). Moreno-Guerrero, who studied Spanish students between the ages of 12 and 20 years found that females were more affected than males (Moreno-Guerrero *et al.*, 2020). In a study of students from 6 different schools in Turkey, Gezgin, too found females had a higher percentage of nomophobia than males (Gezgin *et al.*, 2018). Another study in Canada also found a high prevalence among females than males (Tams *et al.*, 2018). A study in Saudi Arabia found that being female and single were predictors of nomophobia among the study participants (Hussien, 2022). And in a study in Morocco, it was found that 69.1% of the females were more nomophobic as compared to 63% of the adolescent boys (Louragli *et al.*, 2018).

### **2.7.3 Personality and Nomophobia**

Personality is the unique way an individual thinks, feels, acts and behaves. It is unique to that person and it encompasses their emotions, moods, attitudes and opinion as it is expressed in their relations and interaction with other people (Chhabra & Pal, 2020). The occurrence of nomophobia can be influenced by the personality of an individual, more so among the youth (Fischer-Grote *et al.*, 2019) & (Hussain *et al.*, 2017). One of the latest theories of personality that have been utilized in studies on mobile phones and substance abuse is the Five-Factor Model (FFM). The five factors in this model are Extraversion, Neuroticism (emotional instability), Openness to experience or change, Conscientiousness, and Agreeableness.

Extraversion reflects a trait of seeking fulfilment from outside sources. Persons exhibiting extraversion are active, warm, thrill-seeking and more open to self-disclosure. They are sociable, assertive, and talkative. On the scale of assessing extraversion using the big five personality inventory, a possible score is between two and ten. High scorers (8-10) tend to be very social while low scorers (2-5) prefer solitude and working alone on their activities/projects.

Agreeableness measures how well a person adapts and adjusts to the needs of others. People who are gregarious, warm-hearted, trustworthy, and friendly fall under this category. High scorers on this trait are typically people who are polite, likeable and like others while low scorers on this personality trait are people who “tell it as it is”.

Conscientiousness is a personality quality that describes someone as honest and hardworking. These are people who are organized, diligent, careful, and self-controlled. High scorers on this trait tend to follow rules and clean freaks, thus prefer clean homes. Low scorers on this trait may be messy and tend to cheat others; cut corners. Neuroticism is the trait of being emotional; perceiving situations as

threatening, and feeling moody, depressed, angry, and anxious. They experience mood swings. High scorers for neuroticism on the personality trait will be emotionally unstable, and moody with erratic mood swings while low scorers on this personality traits tend to be more emotionally stable and less reactive to stress.

Openness to experience is the trait that seeks new experiences and intellectual pursuits so these people are adventurous, original, creative, curious, and oriented to their thoughts and feelings. High scorers on this trait may daydream a lot and they enjoy thinking about new and different things. These high scorers are thought to be people who are more creative, flexible curious and adventurous. Low scorers on the other hand tend to be very down-to-earth; more of a here-and-now thinker. They are people who enjoy routines, predictability and structured work (Costa & McCrae, 2012).

Mu & Hoşoğlu found that being a woman, extravert, neurotic, and having a low receptivity to experience predicts 13.5 percent of cases of problematic phone use which in turn leads to nomophobia. Neuroticism is linked to low self-esteem and a desire for social approval and a lack of openness to new experiences leads to a drive to avoid unpleasant emotional states, thus the person gets addicted to their smartphone as a counter-intuitive measure (Mu & Hoşoğlu 2019).

Dalbudak by using the big 5-factor personality inventory found that personality was positively associated as a determinant of nomophobia. They found that the higher the nomophobia levels, the lower the total scores on the big five-factor personality scale (Dalbudak *et al.*, 2020). A study by Olivencia-carrión linked certain personality traits with nomophobia. They created two tests, one to assess nomophobia and the other with 240 items to assess temperament and character. Using 1000 adults, they found that being spiritual and having the predisposition to collaborate with others protected

against nomophobia. Spirituality in this sense meant being socially tolerant, empathetic, helpful, and compassionate. They found that those who suffered from nomophobia had the following features; Gratification-seeking behaviours, Self-centered, and behaviour that requires positive reinforcement from others (Olivencia-carrión *et al.*, 2018).

A study of 403 Italian undergraduate students used the Brief Symptom Inventory (BSI-9) to assess personality and nomophobia. Somatization, obsession-compulsion, interpersonal sensitivity, melancholy, anxiety, anger, phobic-anxiety paranoid ideation, and psychoticism are among the nine aspects measured by the BSI-9. They discovered a link between personality and nomophobia (Adawi *et al.*, 2019). A study of 968 Andalusian population wanted to find out the relationship between temperament & personality, and nomophobia. Using Temperament & Character Inventory-Review (TCI-R), it was discovered that corporate culture reduces nomophobia. The relationship between reward reliance and mobile addiction and loss of control was found to be positive. As a result, there is a connection between nomophobia and personality (Olivencia-carrión *et al.*, 2018).

Ozdemir studied the relationship between nomophobia, self-esteem, loneliness, and self-happiness among 729 Turkish and 361 Pakistani students. Using the Rosenberg Self-esteem Inventory (RSI), the University of California, Los Angeles Loneliness Scale-8 (UCLA), and the Self-Happiness Scale, nomophobia was highly correlated with loneliness, self-happiness, and self-esteem. It was negatively correlated with self-happiness but positively correlated with loneliness and self-esteem (Ozdemir *et al.*, 2018). A study on personality, self-esteem, gender, age, and nomophobia, among 242 Spanish students found that self-esteem, extraversion, conscientiousness, and emotional stability predict nomophobia (Argumosa-Villar *et al.*, 2017). A study to

find out the relationship between nomophobia, personality traits and self-esteem among 378 Bandar Abbas university students was conducted. In this study, there was a negative significant correlation between nomophobia, openness to new experiences, extroversion, agreeableness, conscientiousness personality traits as well as self-esteem. They also found a negative correlation between nomophobia and age, which means that as the students got older, nomophobia reduced. This meant that nomophobia was more commoner among the younger students (Amiri *et al.*, 2022).

A study in Nigeria on nomophobia and the influence of personality traits at Nnamdi Azikiwe University, using a sample of 181 students, found that extraversion and conscientiousness significantly predict nomophobia. Neuroticism positively predicts it and openness to experience was strongly associated with nomophobia while agreeableness doesn't predict it. In this study, the tools used were NMP-Q and the Big 5 Personality Inventory (Okoye *et al.*, 2017).

#### **2.7.4 Patterns and Duration of Use and Nomophobia**

Research by Cha & Seo discovered that teenagers spend the longest time on mobile phones and that the duration of daily use of a smartphone is an excellent sign of inappropriate smartphone usage according to the study (Cha & Seo, 2018). Dasgupta found that those who have had a smartphone for more than two years stood a greater risk of developing nomophobia. Those youths who incurred high mobile bills for airtime and bundles as well as those who spend cumulatively more than 4 hours daily on their smartphones got nomophobia compared to those who spent less time in terms of hours (Dasgupta *et al.*, 2017). Yildirim, in their study also found a correlation between nomophobia with the duration of ownership of a smartphone. The longer the duration one has owned their smartphone, the more likely they are to develop

nomophobia (Yildirim & Correia, 2015). The following studies also found that those who use their smartphones for more than 3 hours got nomophobia (Pavithra *et al.*, 2015);( Adawi *et al.*, 2018) & (Azra *et al.*, 2019).

Myakal and colleagues in their study of medical students found an association between nomophobia and expenditure in terms of money for credit. In this study too, the greatest number of students utilized their mobile phones for calling and short text messages (86.42 percent), gaming (80%), academic reasons (78.03 percent), social media (72.83 percent), and other activities (41.33 percent) (Myakal & Vedpathak, 2019). The import of time usage in the development of nomophobia was also found in these other studies (Gezgin, 2016) & (Dalbudak *et al.*, 2020). They found that the longer the time of owning their smartphones and using them, the greater the nomophobia levels. A study in Indonesia found that a majority of the study participants (71%) spent between 3-5 hours on their smartphones and this was positively and significantly associated with moderate nomophobia among the study participants (Mansyur *et al.*, 2020).

Hussain carried out a study and found that 72% of the nomophobic participants couldn't stay away from their smartphones. They kept their phones within 5 feet of their bodies (Hussain *et al.*, 2017). Khilnani and others found an association between nomophobia and those who spend more time on their smartphone daily, those who check their devices more frequently, and those with phantom ringing syndrome (Khilnani *et al.*, 2019). Another study found that the longer someone owns a smartphone and the more addicted they are to the internet, the more nomophobic they get (Gezgin *et al.*, 2018). Siddiqi found that 70% of nomophobic youngsters never switch off their phones, 33% kept them under the pillow and 60% put them on the side table next to their bed (Siddiqi *et al.*, 2017).

A study by Deng (Deng *et al.*, 2019) found that students were spending more time on their smartphones while another study of university students in a Malaysian tertiary institution found that the more time the students spend on their smartphones the lower their Grade Point Average (GPA) became (Foen *et al.*, 2017). A study among university students found that smartphone overuse caused red tearing/ dry eyes, head and neck pains, insomnia, and interference with sleep patterns which in turn led to difficulty in concentrating on lessons (Kaysi *et al.*, 2021). Finally, a study in the Arabian Kingdom found that those people who spent between 4 hours to 9 hours online and checked their smartphone first thing on awakening and last thing before sleeping were more nomophobic compared to those who spent less time online (Hussien *et al.*, 2022).

### **2.7.5 Fear of Missing Out (FOMO) and Nomophobia**

FOMO is an acronym for "fear of missing out". It involves negative thoughts and emotions in response to the belief that one's social circle is creating and enjoying memorable events in one's absence. This leads to anxiety and or maladaptive use of social media apps like Snapchat, WhatsApp, Facebook, Twitter, Instagram, and Swarm. A South African study of 1184 adolescents aged 12-18 years found that fear of missing out, particularly among older teens, was found to be a great predictor of increased online risks and duration spent online (Popovac & Hadlington, 2020).

A convenient study of 538 university students in Turkey found a positive relationship between nomophobia and fear of missing out (Gezgin 2016). A study by Kuss & Griffiths also thought that nomophobia could directly be caused by FOMO as many youngsters want to keep abreast of what is happening on social media network sites. They reply to texts instantly and stay online constantly because they fear missing



something (Kuss & Griffiths, 2011). Gezgin and others found that FOMO predicts nomophobia by 41% (Gezgin *et al.*, 2018). A Canadian study found that FOMO and nomophobia often occur together, predicting each other. According to them, since FOMO drives social media, a person with FOMO will most likely have nomophobia (Maeng 2018). Another similar study found a significant correlation between nomophobia and fear of missing out in their study of 178 nurses (Hoşgör *et al.*, 2021).

### **2.7.6 Loneliness**

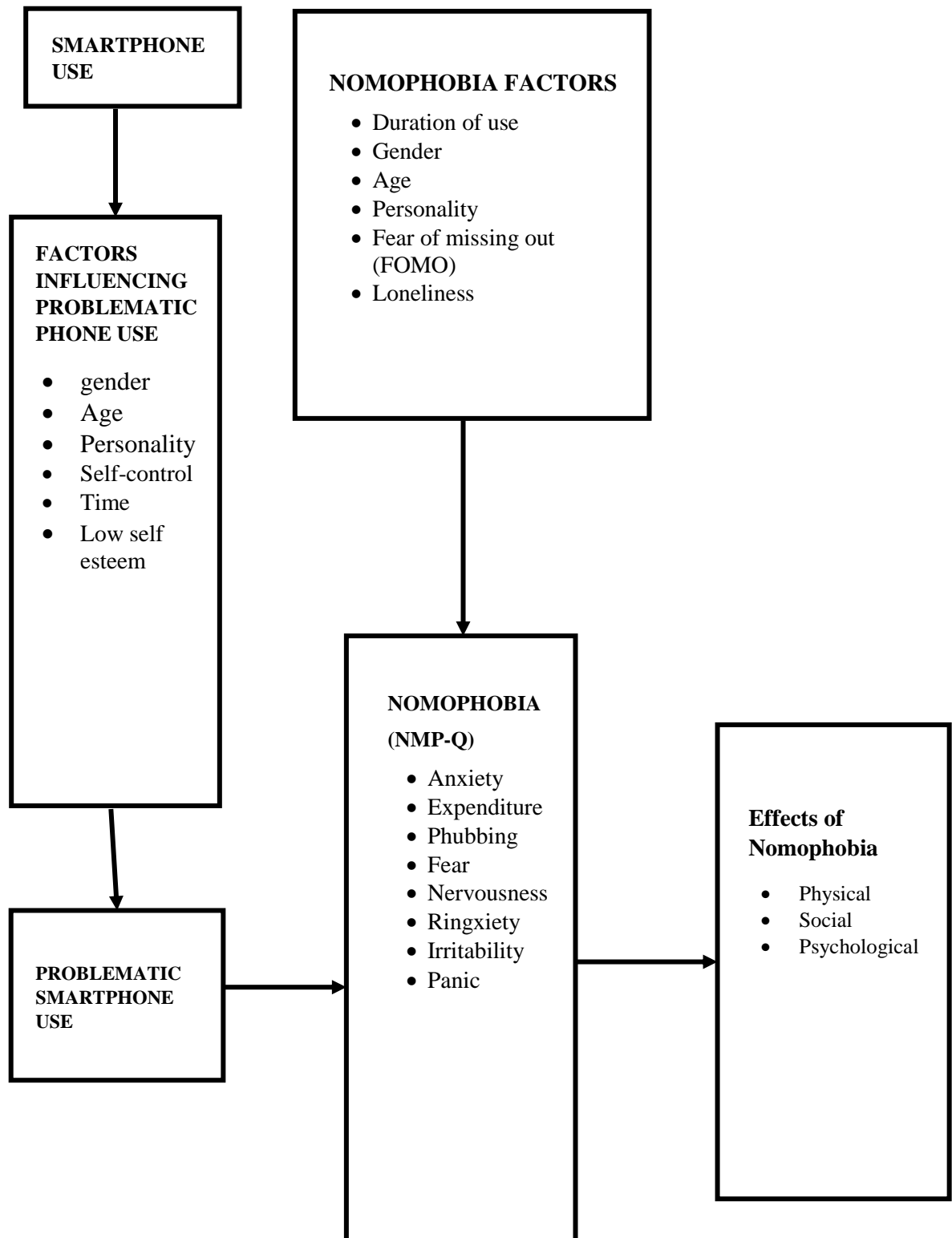
Loneliness is the unhappiness and sadness that is felt by someone because they feel isolated, solitude, desolate or secluded for lack of companionship. There is a link between nomophobia and loneliness, according to some studies. Gezgin studied 301 adolescents in Turkey, using the nomophobia Questionnaire (NMP-Q) and the University of Los Angeles Loneliness Scale (UCLA-8) short form, and found a statistical significance between nomophobia and loneliness (Gezgin *et al.*, 2018). A study of 274 adolescents found that there was a link between regular smartphone usage, loneliness, and nomophobia where they discovered that teenagers are lonelier and more worried, and as a result, they exhibit greater nomophobic behaviours (Kara *et al.*, 2019). Students from Pakistan and Turkey were compared in a study by Ozdemir and others and it was found that there exists a relationship between nomophobia, loneliness, and self-happiness. They used the nomophobia questionnaire scale (NMP-Q) and the UCLA Loneliness Scale (UCLA-8) (Ozdemir *et al.*, 2018). Furthermore, Yildiz found a moderately positive relationship between nomophobia and loneliness. This means that as loneliness increases, so does nomophobia. He surveyed 786 high school adolescents using the nomophobia questionnaire and the University of Los Angeles loneliness scale. He discovered that adolescents are always

online, removing themselves from the physical world, which causes them to feel lonely (Yildiz Durak, 2019).

Loneliness was positively and significantly intercorrelated with nomophobia in a study in the Kingdom of Saudi Arabia among 526 participants. They found that the two variables are intercorrelated in that each predicts the other; as loneliness increased, so did nomophobia and vice versa. In this study, there were moderate levels of loneliness among the study participants which was also related to more time spent online (Hussien *et al.*, 2022). In a study that targeted 773 participants aged between 18 and 66 years, which was carried out during the COVID-19 pandemic by Kaysi, there was a low significant link between loneliness and smartphone addiction. In this study, the loneliness was worsened by the social isolation necessitated by the presence of the pandemic (Kaysi *et al.*, 2021). Deniz who carried out a study in Turkey of 692 university students in Trakya, found that there is a significant correlation between nomophobia and loneliness in familial relations. This study wanted to assess the relationship and effects of social and emotional loneliness levels and nomophobia (Deniz, 2021). Finally, a study by Valenti who studied 456 participants in Italy found that it was positively correlated with nomophobia (Valenti *et al.*, 2022).

This study shall use the conceptual framework, which has two dependent variables; problematic smartphone use and nomophobia and several independent variables which includes, age, Gender, fear of missing out, loneliness, personality, low self-esteem and duration of ownership of the smartphone, see figure 1.

## 2.8 Conceptual Framework



**Figure 1: Conceptual Framework**

The conceptual framework explains diagrammatically the interplay factors between smartphone addiction, nomophobia, and resultant effects. Smartphones have many desirable applications that attract young people to want to own and use them. They are portable, accessible, easy to use and combine telephony with internet connectedness, thus making them potentially addictive devices. The youth adapt easily to technological advancement, using its many handles to gather information, converse, and for entertainment. Factors that determine addiction include gender, age, personality, self-control, and socio-economic factors. Once addiction sets in, it may lead to nomophobia. Nomophobia is related to gender, loneliness, age, fear of missing out, time & duration of usage, and personality. It is been found that the longer one uses their smartphone both daily and duration of ownership, it predicts nomophobia, just as being female with low self-esteem and efficacy as well as being young leads to developing nomophobia.

## **CHAPTER THREE: METHODOLOGY**

### **3.0 Overview**

The research setting, research design, study population, eligibility criteria, sample size & sampling strategy, research instruments for data collection, and research processes were all covered in detail in this chapter. It also included administration of the instruments, data analysis methods, ethical considerations, study limitations, expected outcomes, and data dissemination.

### **3.1 Research setting**

The research was conducted at Moi University, College of Health Sciences which is within Eldoret town, Uasin Gishu County, Kenya. The College of Health Sciences is located at the Moi Teaching and Referral Hospital (MTRH), on Nandi Road. The College was established in 1988 as a Faculty of Health Sciences and admitted its first students in 1990. The College of Health Sciences (CHS) of Moi University has four schools; the School of Medicine, the School of Nursing, the School of Public Health, and the School of Dentistry. These schools offer undergraduate courses as well as postgraduate courses. The study focused on undergraduate medical students from the School of Medicine and nursing students from the School of Nursing.

### **3.2 Research design**

This was a quantitative cross-sectional study that used a modified online survey research design since this approach best answered the research questions and the objectives of the study while taking into consideration the presence of a pandemic. A survey is a method of gathering population-based data from a group of people by asking them questions and recording their responses in a quick way (Ponto, 2015).

### **3.3 Study population**

This study's target population was medical students in academic years 1 to 6, in the School of Medicine, and nursing students in academic years 1 to 4 in the School of Nursing, College of Health Sciences, Moi University within Eldoret town, Uasin Gishu County, Kenya. The overall student population of the College of Health Sciences, Moi University undergraduates as of August 2020 was 1118. In the School of Medicine, there were 573 undergraduate students and in the School of Nursing, there were 194 undergraduate students. This brought the total study population to 767.

### **3.4 Eligibility Criteria**

#### **3.4.1 Inclusion Criteria**

Medical and nursing students who had owned a smartphone for at least 6 months.

#### **3.4.2 Exclusion Criteria**

Medical and nursing students who did not own a smartphone.

Those medical and nursing students who were unwilling to take part in the research.

### **3.5 Sample Size**

To determine the sample size for the research, Cochran's equation was used to calculate a 95% confidence interval and a 5% sampling error and used Fisher's formula.

Fisher's Formula:

$$N = Z^2 P (1-P) \div I^2$$

Where

$N$  = sample size

$Z$  = Normal deviation at the desired confidence interval of 95%. Thus, the  $Z$  value was 1.96

$P$  = Proportion of the population with the desired characteristic was 54.7%, (Gutiérrez-Puertas *et al.*, 2019)

$Q = 1 - P$  = Proportion of the population without the desired characteristic

$I$  = degree of precision, of 5% which was 0.05

$$N = \frac{Z^2 P (1-P)}{I^2}$$

$$N = \frac{1.96^2 \times 0.547 \times 0.453}{0.05^2}$$

$$N = \frac{3.84 \times 0.2477}{0.0025}$$

$$N = 381$$

30% adjusting for non-response gives  $N$  divided by the response rate, which was 70% or 0.7 (Yun & Trumbg, 2000)

$$N \div 0.7 = 381 \div 0.7$$

$$N = 544$$

$$N = 544$$

This sample size is larger than what Yamane's formula would have given since the study population is dynamic with more than one admission annually. The larger sample size provided more precision to the results that were obtained in the study in comparison to a lower sample.

### 3.5.1 Sampling Frame

The sample size of 544 from the study population of 767 was distributed as in the table below

**Table 1: Sampling Frame**

No. of students per program	Class	Total number of students	Class of sample	Gender	
				No. of Male	No. of Female
<b>Medicine</b>  <b>406</b>	Year 1	149	106	66	40
	Year 2	63	44	24	20
	Year 3	80	57	35	22
	Year 4	125	89	55	34
	Year 5	73	51	34	17
	Year 6	83	59	39	20
	<b>Total</b>	<b>573</b>	<b>406</b>	<b>253</b>	<b>153</b>
<b>Nursing</b>  <b>138</b>	Year 1	72	52	30	22
	Year 2	28	19	11	8
	Year 3	44	31	12	19
	Year 4	50	36	15	21
	<b>Total</b>	<b>194</b>	<b>138</b>	<b>68</b>	<b>70</b>



### **3.6 Sampling Methods**

A multiphase sampling procedure was used in selecting participants in the research. From the College of Health Sciences, School of Medicine, and School of Nursing were purposively selected because of the historical proximity of the medical and nursing students to patients and because the literature on nomophobia had associated nomophobia with distraction. The total number of students enrolled as undergraduates at the School of Medicine in academic years 1 to 6 was 573 and in the School of Nursing, they were 194 respectively. This was stratified to the year of study. Then from each year, the study sample was chosen using simple random sampling, which took into account gender balance. This was to ensure that the sample was fair, equitable, and representative of the various study variables. The selection criteria included all medical and nursing students who had a smartphone, had had it for at least six months and were willing to take part in the research.

### **3.7 Research Instruments**

This section deals with the data collection instruments and tools used in the research.

#### **3.7.1 Socio-demographic questionnaire**

The research instruments in the study are the tools and materials. First, a written request was sent to the Institute of Biomedical informatics (IBMI) for the creation and rights to a Research Electronic Data Capture (REDCap) account. This was approved, an account was created for use, and rights were allowed for use for the project: Problematic and nomophobia. After the account was created, the questionnaire was then loaded onto the REDCap application (app) and testing was done for dummy filling. The uploading of the questionnaire was such that it allowed for in-person filling of the questions and saving. This modified way of gathering information using

REDCap was chosen since online surveys have a high non-response rate. The study participants, therefore, physically used the data collection tools that included a laptop, smartphone and tablets to fill out the REDCap-mounted questionnaire.

The uploaded structured self-administered questionnaire, which took approximately 10 to 12 minutes to fill, was used as the data collection tool in the study. The questionnaire (see appendix 2) aimed at eliciting relevant information from the study participants concerning their socio-demographics, duration of ownership of the smartphone, and screen time.

The Problematic Mobile Phone Use Questionnaire (PMPUQ) was used to find out the prevalence of problematic smartphone use (see appendix 2 section two). The Problematic Mobile Phone Use Questionnaire is a validated tool with 30 Likert scale-like questions which are then broken down into four dimensions in section two of the tool. Although the PMPUQ had not been used in Africa because of a paucity of studies, it had been used in countries with similar socio-economic settings like ours like China (Wang *et al.*, 2020) and the United Arab Emirates (Vally & El Hichami, 2019). The answers were in a Likert scale ranging from 1 (strongly agree) to 4 (strongly disagree). PMPUQ scores were computed by adding all of the individual's answers to the questions in section one. The range of possible values was 30 to 120, with a higher score indicating problematic smartphone usage. To estimate the prevalence of problematic smartphone use we used a 50% cut point where a score less than 60 was classified as not having problematic smartphone use while those with a score of  $\geq 60$  were classified as having problematic mobile smartphone use. This was arrived at by finding the median of the possible score which ranges from 30 and 120 and not the scores attained by the respondents. To find out the dimensions of the problematic smartphone use section two of the tool was used. The data collected using

this section two of the tool was divided into four sections; smartphone use in prohibited/antisocial situations, financial problems arising from smartphone use, use in dangerous situations and dependent use. These are also Likert scale like questions in each sub-section which were analyzed by adding the respondents' total points out of the possible answers in that section. The sub-section on dangerous use which pertained to use of mobile phone while driving had only 5 study participants filling it with the option of strongly agree and the rest filled all the questions with strongly disagree. This brought the percentage to one point one for those who agreed with posed questions therefore even though this data was analyzed, it was not reported. The section two of the PMPUQ has 5 questions on dangerous use dimension, 5 on Prohibitory use, 7 on dependence use dimension and 13 on financial dimension.

The Nomophobia Questionnaire (NMP-Q), a validated tool by Yildirim (Yildirim, 2014) was used to assess nomophobia among the study participants. The NMP-Q tool was used in Nigerian among university students, whose socio-economic setup is similar to ours (Okoye *et al.*, 2017). The items on NMP-Q are 20, are coded NMP-Q from 1-20, and are structured into 4 dimensions; dimension 1 is "inability to communicate (questions 10-15), dimension 2 is losing connection (questions 16-20), dimension 3 is the inability to access information (questions 1-4), and dimension 4 is giving up comfort (questions 5-9). The NMP-Q scale that measures nomophobia is a Likert scale with scores between 20 and 140. A score of 20 indicates no nomophobia, a score of 21-59 indicates mild nomophobia, a score of 60-99 indicates moderate nomophobia, and a score of 100-140 indicates severe nomophobia. To compute a participant's score, all the answers to the tool are added up.

The Big 5 Personality Inventory (BFI-10) and Fear of missing out (FOMO) scale were used to obtain information on factors associated with nomophobia as well as the

University of California Los Angeles (UCLA-3) loneliness scale. The Big 5 personality inventory (short form) has 10 Likert-like questions with 5 possible responses; 1 is “disagree strongly”, 2 “Disagree a little” 3 “Neither agree nor disagree” 4 “Agree a little” and finally 5 is “Agree strongly”. In this tool, there are 2 items per trait, one item of the two is reverse-scored (R) to obtain a participant’s dominant personality trait. If the study participant obtains a total of ten in the two items, then that is their dominant personality trait. This big 5 personality inventory is scored as follows: extraversion is items 1R&6, agreeableness 2&7R, Conscientiousness 3R&8, Neuroticism 4R&9, and finally, Openness to experience is 5R&10. This BFI-10 was used in Nigeria in a study that wanted to see the relationship between personality and nomophobia (Okoye *et al.*, 2017).

The FOMO scale is a Likert scale with 10 questions; scores range from 10 to 50 but to calculate the results, an average per respondent is found. Popovac, while carrying out a study in South Africa, found it to be reliable in determining a correlation between fear of missing out and teens' problematic phone use (Popovac & Hadlington, 2020). Higher scores above the median of 2.5 indicate higher levels of fear of missing out.

The UCLA loneliness scale has 20 Likert scale questions with scores ranging from 20-80. High scores mean more loneliness. The majority of studies done using the UCLA loneliness scale have been in the West and Eastern countries. In a study of 409 African- Americans in Madrid, it was found to be an effective tool to assess loneliness (Ausín *et al.*, 2019), and it has also been used in Iran (Zarei *et al.*, 2015). These two places have similar socio-economic characteristics to the setting of the present study.

### **3.7.2 Face Validity of the Instruments**

The questionnaire that was used in the study was validated for face validity.

Validation and pilot testing of the REDCap mounted questionnaire were done by having 10 students from Moi University's school of public health fill it on a laptop. This was to ascertain the time it took to fill it, and the adequacy, and appropriateness of the instrument. The school of public health was not part of the study population but had similar characteristics to those of the main study. The pilot testing brought out the following; Clarity and understanding of the questions which included adequacy/inadequacy of the questions. It also helped to know the duration of time taken to answer the questions as well as if there were items that weren't responded to.

### **3.8 Recruitment & Data Collection**

#### **3.8.1 Recruitment**

After validation of the tools, pilot testing, and all necessary modifications were done, and approval from the Institutional Research and Ethics Committee (IREC), recruitment of the participants commenced. The researcher first obtained written consent from the deans of the school of medicine and the school of nursing, allowing the researcher to gather information from the students. A list of the class representatives and their contacts was then obtained from the admissions office and the dean of students' office. The researcher then called the class representatives and explained the study's goal, as well as the inclusion criteria. The researcher opted to use the class representatives to collect the data to avoid bias through coercion of the study participants since the researcher works in the students' clinic. It was also convenient to use class representatives given the busy nature of the study participants.

The class reps were then trained on how to use the App, given log-in information, and how to save the collected data through demos. During the demos, the class reps were

trained on checking that all the questions on the App were filled by intentionally letting them skip some questions and try to save and exit the form. A prompt came up showing which questions were left unanswered and whether they wanted to proceed to save or fill the unanswered ones. They were then given consent forms for their class and the data collection tool as well as their class target sample. They were informed to enrol those willing to participate in the study randomly, bearing in mind their class target sample, and the proportion of females and males. Those willing were given two informed consent forms to sign that had already been signed by the researcher. They retained one consent form while the other was returned to the researcher.

Enrolment involved simple random sampling of the students from each class according to the sampling frame. Simple random sampling started with knowing the number of students in each class both males and females. The class reps were given the number of females and males needed from their class to fill out the questionnaire. A tablet or laptop, loaded with questionnaires on the REDCap app was given to the class rep and they gathered the data at night in the hostels and also during weekends. Since there were only 4 tools with the App, data collection started with 6th-year medical students and 4<sup>th</sup>-year nursing students to capture them before they exited college after completing their studies. The class reps assisted in the data collection to avoid bias and coercion of the participants since the researcher could influence sampling and the data collection.

### **3.8.2 Data Collection Procedure**

Due to the COVID-19 pandemic, the research utilized the REDCap online platform.

The eligible enrolled medical and nursing students accessed 2 copies of the informed consent forms to fill out physically. They signed the forms which were already pre-signed by the researcher. They then kept one and the other copy was returned to the class rep and later transmitted to the researcher. Thereafter they were given a tablet or a laptop to fill out the questionnaire on the REDCap tool physically. This method was chosen to reduce the high rate of non-response on online surveys. For confidentiality and anonymity, each informed consent form had a unique identification which the students were asked to copy onto the electronic form. After completing the questionnaire, the student was requested to save and exit the survey. If there were any unanswered questions, there was a prompt that showed the unanswered questions and requested them to fill in. During the data collection, at some point the fifth-year medical students left for home before their class study sample size was attained, so for 10 days, the link to the online survey was randomly sent to the remaining 20 students via WhatsApp. These logged in using the given link and filled out the questionnaires, which were automatically uploaded to the server.

### **3.9 Data Management & Analysis**

The information was checked to verify if it was accurate, that it was collected as per the pre-set standards and that ethical standards were maintained during collection. The data was cleaned and edited for errors or incorrect filling, and non-responses. The cleaned edited raw data was then entered and coded into Microsoft Excel. It was then exported to STATA version 16 where coding and further manipulations were done. For ease of interpretation of results, we used the 50<sup>th</sup> percentile to classify personality, fear of missing out, loneliness, and problematic smartphone use while nomophobia was changed into a binary categorical variable. Those who had a score above the 50<sup>th</sup>

percentile were classified as having that personality trait, fear of missing out, loneliness, or problematic smartphone use, whereas nomophobia was classified into no/mild and moderate/severe forms.

All the findings were presented as a comparative analysis between medical and nursing students where Chi-Square/Fishers exact test and *t*-test were used to compare proportions and means respectively. Descriptively, numerical variables such as age and age when first obtained smartphone were summarized as means and their corresponding standard deviations were obtained. Categorical variables such as gender, where the participant placed the phone at night, personality traits, social media apps used, fear of missing out, and loneliness were summarized as frequencies with their corresponding percentages. Some of the variables such as; year of study, how long they had had a smartphone, how many calls they made per day, time spent on the phone per day, and the number of short text messages (SMSes) sent per day where data was collected as numerical variables were grouped into meaningful categories and summarized as categorical variables.

To answer objective three, logistic regression was used at both bivariate and multivariate levels where unadjusted and adjusted odds ratios were reported respectively. The multivariate model included age, gender, course, and covariates that were significantly linked with the outcome variable at the bivariate level. The significance level for all statistical analyses was set at 0.05 alpha. Charts and tables were used to present the findings. Below is an analysis matrix.



### 3.9.1 Matrix Of Analysis

**Table 2: Matrix of Analysis**

<b>Objective</b>	<b>Level of Analysis</b>	<b>Independent Variables</b>	<b>Dependent Variable</b>	<b>Test</b>
<b>1 &amp; 2. Prevalence</b>	-	-	Problematic phone use Nomophobia	Proportions 95% Confidence interval (CI)
<b>3. Factors determining nomophobia</b>	Bivariate Analysis	Age (continuous variable)	Nomophobia (binary categorical variable)	Logistic regression
		Gender (categorical)	Nomophobia (binary categorical variable)	Logistic regression
		Personality (categorical)	Nomophobia (binary categorical variable)	Logistic regression
		Time (categorical)	Nomophobia (binary categorical variable)	logistic regression

	FOMO (categorical)	Nomophobia (binary categorical variable)	Logistic regression
	Loneliness (categorical)	Nomophobia (binary categorical variable)	Logistic regression
Multivariate Analysis	Age (continuous variable)	Nomophobia (binary categorical variable)	Logistic regression
	Gender (categorical)		
	Personality (categorical)		
	FOMO (categorical)		
	Course (categorical)		

### **3.10 Study limitations**

This study was conducted on medical and nursing students, who use problem-based and self-directed learning methods and thus do a lot of online reading/google searches. They, therefore, spend a lot of time using their smartphones. And even the presence of the COVID-19 pandemic has necessitated online learning which meant students spent more time on their smartphones.

This was an online study, so the researcher was not in control of how and where the study participants filled out the questionnaire.

The study could not differentiate between the fear of missing out arising from social network sites visits during leisure time and the fear of missing a class/ tutorial since all classes are organized via WhatsApp. Finally, because of the small sample size, these findings cannot be applied to the general population.

### **3.11 Ethical Considerations**

The Institutional Research and Ethics Committee (IREC) granted ethical clearance and consent to the researcher, as well as permission from the College of Health Sciences administration, including the Deans of the two schools, and the Institute of Biomedical Informatics (IBMI). Further consent was obtained from every participant after sufficient information and explanation. Ethical considerations followed those that pertain to quantitative research and those that apply to general scientific investigation. Following an explanation of the nature and content of the study, the respondents were given a consent form to read and sign. It was stated explicitly in the consent form that participation in the research was voluntary, and that they were free to withdraw at any moment. The researcher ensured that the respondents remained

anonymous to maintain confidentiality. The respondents were requested not to put their names, telephone numbers, or anything that could identify them on the online questionnaire as they responded to the questions save for the unique identification number.

The participants were given the option to withdraw from the study at any time. The materials and data from the research will be kept securely and safely under lock and key/ password for 5 years.

A student who felt in urgent and dire need of help as a result of nomophobia was linked with help.

### **3.12 Expected Outcomes**

At Moi University's College of Health Sciences, the study determined and recorded the prevalence of problematic smartphone use and nomophobia among medical and nursing students with problematic smartphone use. It also investigated the factors associated with nomophobia among problematic smartphone users. This information is important for policy formulation by the Kenyan government/ Communications Authority and Counties on the use of smartphones in the workplace and class environment, especially use of the social network sites. It will facilitate the formulation of policy on curriculum development to include problematic smartphone use and nomophobia in learning institutions seeing the prevalence is high from the study. The dissemination of this information can be achieved through seminars, mass media campaigns and public education forums.

This study's results will create awareness of the prevalence of both problematic smartphone use and nomophobia among all the stakeholders, enabling them to come up with possible solutions and implement them to curb the menace. Psychologists and

counsellors will now be aware of the presence of problematic smartphone use, nomophobia arising from problematic phone use, and factors associated with them so as to come up with ways of ameliorating these situations. The results of this study will encourage a qualitative/ longitudinal study to assess the perceptions of the youth on nomophobia, and possible solutions according to them as well as determine if fear of missing out was as a result of social network sites per se or from fear of missing class. This study is the first one to be carried out in Kenya, therefore it has provided a landmark source of information on the presence and prevalence of problematic smartphone use and nomophobia, and laid the ground for other studies to be conducted such as on different age groups, the impact of nomophobia on academic performance and the psychological wellbeing of those affected and.

### **3.13 Data Dissemination**

Study findings will be disseminated to the study participants, at scientific conferences, and government agencies, and published in peer-reviewed publications.

## CHAPTER FOUR: FINDINGS

### 4.1 Introduction

Out of the 544 targeted participants, only 502 medical and nursing students in various academic years in the School of Medicine and School of Nursing, filled and returned the completed questionnaires. This translated to a response rate of 92.3% and therefore the following section will be based on these 502.

### 4.2 Social Demographic characteristics

#### 4.2.1 Age of the respondents

Respondents varied in age from 18 to 39 years old, with a mean age of  $22.6 \pm 2.9$  years where medical students were significantly ( $p < 0.001$ ) older ( $22.9 \pm 3.1$  years) compared to that of the nursing students ( $21.8 \pm 2.1$  years).

#### 4.2.2 Gender of the respondents by course of study

The participants were almost equally distributed according to gender where males constituted 53.6%. There was no statistically significant difference in the enrolment of the participants by gender and course  $P = 0.351$  (see table 3).

**Table 3: Gender of the Respondents by Course**

Gender	Course		Total	P-Value
	Medicine	Nursing	Total by gender	
Male	206(54.8%)	63 (50%)	269 ( <b>53.6%</b> )	P=0.351
female	170 (45.2%)	63(50%)	233(46.4%)	
Total by course	376 ( <b>74.9%</b> )	126(25.1%)	502	

### 4.2.3 Respondents by course and year of study

**Table 4: Participants by year and course of study**

		No. of Medical students (%)	No. of Nursing	Total by year of	P-Value
Year of	1	<b>107 (28.5)</b>	<b>52 (41.3)</b>	<b>159 (31.7)</b>	<b>&lt;0.001<sup>c</sup></b>
Study	2	46 (12.2)	17 (13.5)	63 (12.6)	
	3	68 (18.1)	16 (12.7)	84 (16.7)	
	4	32 (8.5)	41 (32.5)	73 (14.5)	
	5 & 6	123 (32.7)		123 (24.5)	
	Total by course	376(74.9%)	126(25.1%)	502	

A majority at 74.9% of participants were undertaking medicine as opposed to those undertaking nursing at 25.1%, and the highest number of the participants were in their first year of study at 31.7%. The enrolment in the first year of training was significantly different from the rest of the academic years  $P < 0.001$  (see table 4)

#### 4.2.4 Personality attributes of the participants by course

**Table 5: Personality traits of the participants by course of study**

Attribute	Traits	No. & % of	No. & % of	Total by	P=Value
		medical	nursing	trait	
Personality traits	Extraversion	52(13.8%)	8(6.4%)	60(11.9%)	<b>0.025<sup>c</sup></b>
	Agreeableness	108(28.7%)	55(43.6%)	163(32.5%)	<b>0.002<sup>c</sup></b>
	Conscientiousness	157(41.8%)	71(56.3%)	228(45.4%)	<b>0.004<sup>c</sup></b>
	Neuroticism	53(14.1%)	7(5.6%)	60(11.9%)	<b>0.011<sup>c</sup></b>
	Openness	96(25.5%)	31(24.6%)	127(25.3%)	0.836 <sup>c</sup>

On personality traits, about half (45%) of the respondents were classified as having a conscientiousness personality trait followed by those who had an agreeableness trait (32.5%) and openness to new experiences (25.3%). According to personality traits, there was a statistically significant difference between the proportion of nursing and medical students. Medical students were more extraverted ( $p=0.025$ ), and neurotic ( $p=0.011$ ) while nursing students had more agreeableness ( $p=0.002$ ) and conscientiousness ( $p=0.004$ ).

In the analysis according to loneliness 193 (39%) suffered from loneliness while 302 (61%) students did not suffer from it. The study participants who had fear of missing out (FOMO), were about 25.7%, of whom 88 (23.4%) were from medicine and 41 (32.5%) were nursing students. There was a statistical difference between the medical and nursing students, where more nursing students suffered from FOMO ( $P= 0.042$ ).



#### 4.2.5 Phone use characteristics among participants by course

The mean age when the study participants owned their first smartphone was 16.1 for both courses with no statistical difference between the two,  $P= 0.937$ .

Most (60.6%) of the study participants indicated that they had owned a smartphone for more than 5 years with only 10 (2%) indicating to have owned it for less than 1 year. There was no statistical difference between the course of the participant and the duration of smartphone ownership ( $P= 0.365$ ).

When it comes to the number of calls made per day, the majority of the participants made 3 – 5 (39.8%) calls daily with medical students making significantly more calls than nursing students ( $p= 0.031$ ). The number of short text messages (SMS) sent by the participants daily was 0-3 (41.0%). However, 93.6% of participants indicated spending more than 30 minutes on their smartphone daily, even though there was no statistical difference between the two courses on the length of time spent on the smartphone daily ( $P=0.407$ ).

A majority (89.8%) of the study participants did not switch off their smartphones at night, with no statistical difference between those study participants undertaking medicine and those doing nursing ( $P= 0.539$ ) and about half (49%) placed their smartphones on the table next to the bed at night while 30% put them on the bed. On where the participants placed their smartphones at night, this was not statistically different between the medical and nursing students  $P=0.539$ .

**Table 6: Phone use characteristics by respondents by course of study**

<b>Variable</b>	<b>Category</b>	<b>Medicine N=376</b>	<b>Nursing N=126</b>	<b>Total 502</b>	<b>P-value</b>
<b>Age when got the first phone</b>	Mean (SD)	16.1 (2.4)	16.1(2.3)*	16.1(2.4)*	0.937 <sup>t</sup>
		*			
<b>How long owned Smartphone</b>	≤ 5 years	144 (38.3)	54 (42.9)	198 (39.4)	
	> 5 years	232 (61.7)	72 (57.1)	304 (60.6)	0.365 <sup>c</sup>
<b>Calls made per day</b>	0 – 2	107 (28.5)	37 (29.4)	144 (28.7)	
	<b>3 – 5</b>	<b>161 (42.8)</b>	<b>39 (30.9)</b>	<b>200 (39.8)</b>	<b>0.031<sup>c</sup></b>
	>5	108 (28.7)	50 (39.7)	158 (31.5)	
<b>Time spent on the phone per day</b>	≤ 30 minutes	22 (5.8)	10 (7.9)	32 (6.4)	
	>30 minutes	354 (94.2)	116 (92.1)	470 (93.6)	0.407 <sup>c</sup>
<b>Number of SMSes sent per day</b>	0 – 3	154 (41.0)	52 (41.3)	206 (41.0)	0.170 <sup>c</sup>
	4 – 10	109 (29.0)	27 (21.4)	136 (27.1)	
	> 10	113 (30.0)	47 (37.3)	160 (31.9)	
<b>Where phone at night</b>	N-missing	3	0	3	
	Under the pillow	67 (18.0)	21 (16.7)	88 (17.6)	

	On the bed	114 (30.5)	34 (27.0)	148 (29.7)	
	The table next to the bed	176 (47.2)	68 (54.0)	244 (48.9)	0.566 <sup>f</sup>
	Others	16 (4.3)	3 (2.3)	19 (3.8)	
<b>Whether switches</b>	No	336(89.4)	115(91.3)	451(89.8)	0.539 <sup>c</sup>
<b>Phone off at night</b>	Yes	40 (10.6)	11 (8.7)	51 (10.2)	

#### 4.2.6 Social media apps used by the respondents by course of study

**Table 7: Social media apps used by the respondents and their course of study**

<b>Variable</b>	<b>Category</b>	<b>Medicine (376), %</b>	<b>Nursing (126), %</b>	<b>Total 502</b>	<b>P-Value</b>
<b>Social media apps</b>	Twitter	235 (62.5)	79 (62.7)	314 (62.5)	0.968 <sup>c</sup>
	<b>Facebook</b>	<b>229 (60.9)</b>	<b>90 (71.4)</b>	<b>319 (63.5)</b>	<b>0.034<sup>c</sup></b>
	WhatsApp	368 (97.9)	125 (99.2)	493 (98.2)	0.329 <sup>c</sup>
	Instagram	278 (73.9)	88 (69.8)	366 (72.9)	0.371 <sup>c</sup>
	Snapchat	129 (34.3)	37 (29.4)	166 (33.1)	0.307 <sup>c</sup>
	Reddit	41 (10.9)	7 (5.6)	48 (9.6)	0.077 <sup>c</sup>

The study participants had the following social media apps; Twitter, WhatsApp, Instagram, Facebook, Snapchat and Reddit. The majority (98.2%) had WhatsApp, 72.9% had Instagram and 63.5% and 62.5% had Facebook and Twitter respectively.

There were significantly ( $p=0.034$ ) more nursing students using Facebook at 71.4% compared to medical students (60.9%).

### 4.3 Problematic smartphone use among participants

The prevalence of problematic smartphone use at the College of Health Sciences, Moi University, among medical and nursing students was 86.4% (95% CI: 83 – 89.3). This prevalence is based on 424 study participants; thus, N is 424. Nursing students had a slightly lower prevalence of 84.5% (95% CI: 76.9 – 90.4) compared to 87.0% (95% CI: 83.1–90.2) for medical students even though the difference was statistically insignificant ( $p=0.501$ ).

**Table 8: Problematic smartphone use by course of study and dimension**

Variable	Medicine	Nursing	Total	p-value
Overall problematic	<b>320 (87.0%)</b>	<b>104 (84.5%)</b>	<b>424 (86.4%)</b>	<b>0.501<sup>c</sup></b>
Phone use				
Dependence	367 (98.9%)	122 (97.6%)	488 (98.6%)	0.375 <sup>f</sup>
Financial	365 (98.6%)	124 (98.4%)	489 (98.6%)	>0.99 <sup>f</sup>
Prohibit	339 (90.2%)	115 (92.7%)	454 (90.8%)	0.388 <sup>c</sup>

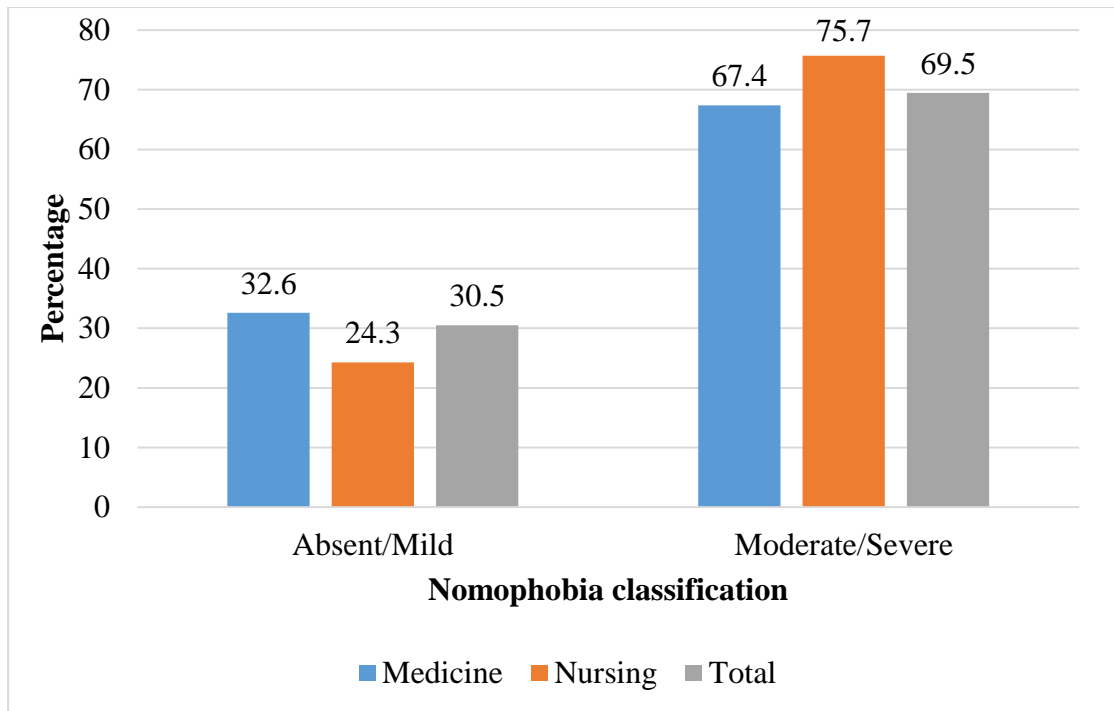
### 4.4 Prevalence of Nomophobia among the participants

Nomophobia is a result of problematic smartphone use. This is because once a person has smartphone addiction (problematic smartphone use), it is very easy to become so

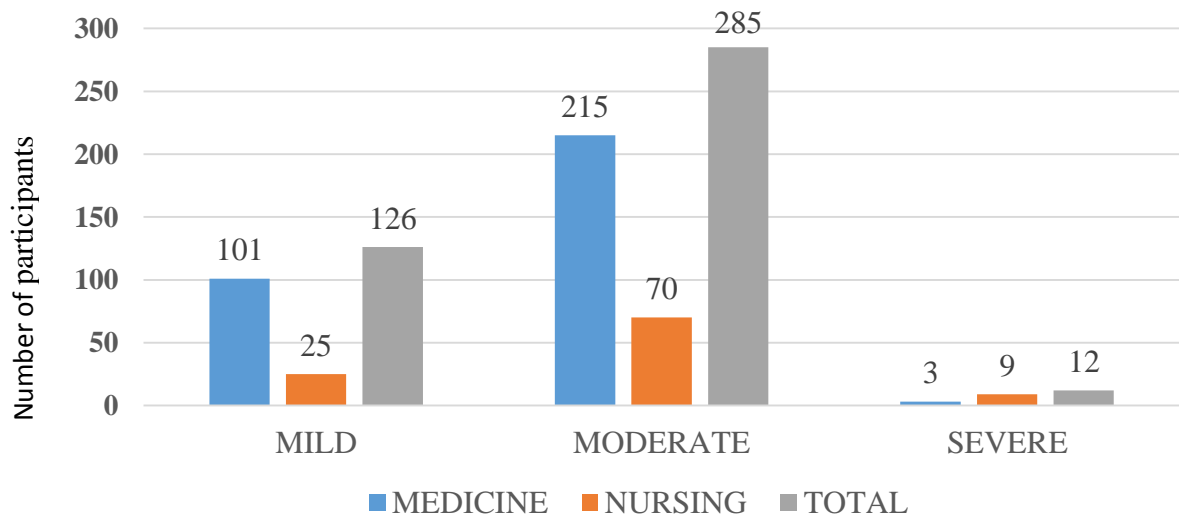
attached to their gadget that they get anxious and panicky when they cannot access it or its functions. Therefore, analysis involving nomophobia is henceforth based only on those who had problematic phone use (n=424).

The prevalence of nomophobia among medical and nursing students, at the College of Health Sciences, Moi University was 99.8% (95% CI: 98.3 – 99.9). A majority (285 (67.2%)) of the study participants had a moderate form of nomophobia followed by those who had a mild 126 (29.7%) form while 12 (2.8%) had a severe form. Only one study participant did not have nomophobia.

Since only one participant had a score of 20 (no nomophobia) the researcher classified nomophobia into a binary variable, that is, none /mild and moderate/severe. Among the 104 nursing students, 75.7% reported having a moderate/severe form of nomophobia compared to 67.4% among the 319 medical students. This proportional difference was, however, not statistically significant ( $p=0.112$ ).



**Figure 2: Nomophobia classification in percentages among medical and nursing students with problematic smartphone use**



**Figure 3: Nomophobia among participants in numbers by course and form.**

#### **4.5 Factors associated with nomophobia among the participants with problematic smartphone use**

Table 9 shows the association between nomophobia as the outcome variable and socio-demographics, loneliness, fear of missing out, and personality as the independent variables. At the bivariate level, only fear of missing out ( $P < 0.001$ ) was found to be substantially associated with nomophobia, with the odds of having a moderate/severe nomophobia being 4.01 among those who had fear of missing out compared to those who did not fear of missing out. This was after holding at a constant, age ( $P = 0.431$ ), Gender ( $P = 0.972$ ), course of study ( $P = 0.113$ ) time on phone 10-30 mins ( $P = 0.223$ ), >30mins ( $P = 0.790$ ), loneliness ( $P = 0.630$ ) and personality (extroversion ( $P = 0.810$ ), Agreeableness ( $P = 0.306$ ) conscientiousness ( $P = 0.361$ ), neuroticism ( $P = 0.086$ ) and openness to experience ( $P = 0.051$ ) which were not associated with moderate to severe nomophobia at the bivariate level.

**Table 9: Bivariate association between nomophobia and demographic, loneliness, fear of missing out, and personality among the study participants with problematic smartphone use**

Variable	Category	uOR	95% CI	p-value
Age	Years	1.03	0.96 – 1.11	0.431
Gender	Male	1		
	Female	0.99	0.65 – 1.51	0.972
Course	Medicine	1		
	Nursing	1.51	0.91 – 2.51	0.113
Time on phone	0 – 10	1		
	10 – 30	0.35	0.06 – 1.89	0.223
	>30	1.21	0.30 – 4.92	0.790
Personality	Extrovert	0.92	0.49 – 1.74	0.810
	Agreeable	1.27	0.81 – 0.99	0.306
	Conscientious	1.22	0.80 – 1.86	0.361
	Neuroticism	1.84	0.92 – 3.70	0.086
	Openness	1.64	0.99 – 2.71	0.051
Fear of missing out	No	1		
	Yes	4.01	<b>2.19 – 7.37</b>	<b>&lt;0.001</b>
Loneliness	No	1		
	Yes	0.90	0.59 – 1.38	0.630

uOR = Unadjusted odds ratio



Table 10 shows the multivariate model where fear of missing out and openness to experience personality traits were the only factors positively associated with nomophobia. Controlling for age, gender, course of study, and openness to new experience, the odds of moderate/severe nomophobia were 4.2 (95% CI 2.24-7.67) for those who had fear of missing out compared with those with no fear of missing out. The odds of having a moderate/severe nomophobia were 1.9 (95% CI 1.13-3.16) for those who had an openness to experience personality trait compared to those with no openness to a new experience after controlling for age, gender, course of study, and fear of missing out.

**Table 10: Multivariate association between socio-demographic, personality, and fear of missing out with nomophobia among participants with problematic smartphone use**

Variable	Category	aOR	95% CI	p-value
<b>Age</b>	Years	1.02	0.94 – 1.10	0.682
<b>Gender</b>	Male	1		
	Female	0.99	0.64 – 1.54	0.984
<b>Course</b>	Medicine	1		
	Nursing	1.48	0.87 – 2.52	0.149
<b>Openness to experience</b>	No openness	1		
	Openness	<b>1.89</b>	<b>1.13 – 3.16</b>	<b>0.015</b>
<b>Fear of missing out</b>	No	1		
	Yes	<b>4.15</b>	<b>2.24 – 7.67</b>	<b>&lt;0.001</b>

**aOR = Adjusted odds ratio**

## CHAPTER FIVE: DISCUSSION

### 5.1 The prevalence of problematic smartphone use

From the analyzed data the overall prevalence of problematic smartphone use among medical and nursing students at the College of Health Sciences, Moi University was 86.4%. This result was from a sample size of 424 students. Nursing students however had a slightly lower prevalence of 84.5% compared to the medical students who had a prevalence of 87%. This difference could be attributed to the workload and duration that each course entails and the blended learning, especially during this COVID-19 pandemic time. According to the factor analysis of problematic smartphone use, dependence and financial factors had similar percentages of 98.6% for both courses. This means that many students are dependent on their smartphones and face financial difficulties as a result of their problematic smartphone usage. For both courses, the prohibited use rate was 90.8 percent.

The results of the present study compare well with that of Buctot who found a problematic smartphone use prevalence of 62.6% in their Philipino study (Buctot *et al.*, 2020). It also compares with that of Vally who wanted to determine the extent of problematic smartphone use among college-going young people, in the United Arab Emirates, and found a prevalence of 47.14% (SD 19.98) (Vally & El Hichami, 2019a). It however contrasts with that in Lebanon, which found that the prevalence of smartphone addiction was 20.2% (Nahas *et al.*, 2018). Another study found a problematic smartphone use prevalence of 21.3% in Changsha, Mainland China when they studied 1062 undergraduates which also contrasts with the present study (Long *et al.*, 2016). A study by Sánchez-Martínez & Otero among 1328 Spanish adolescents found a prevalence of 20% (Sánchez-Martínez & Otero, 2009) while another one

done in India found a prevalence above 36.7% among medical students (Tavakolizadeh *et al.*, 2014). A study of 1126 Spanish population aged 16-65 years which used the Mobile Phone Problematic Use Scale (MPPUS) found a prevalence of 20.5% (Gutiérrez *et al.*, 2016).

The disparity in prevalence between the present study and those other contrasting studies could be due to the difference in the time when the studies were undertaken. The present study was carried out in 2021 during the COVID-19 pandemic, while some of those other studies were carried out between 2009 and 2014. Also, in the present study, the study participants are medical and nursing students who are carrying out their studies using self-directed, problem-based blended learning which necessitates the students to have a greater and sustained interaction with the internet for research and academic materials over and above interaction on social media network sites.

The high proportion of problematic smartphone use in the present study is way higher than in those countries with higher smartphone penetration such as the USA, China, and Spain as evidenced by the foregoing comparison and contrasts. This implies that there is a potential explosion of consequences of problematic smartphone use such as psychological, physical and behavioural problems among the Kenyan youth.

## **5.2 The prevalence of nomophobia**

The prevalence of nomophobia at the College of Health Sciences, Moi University, among medical and nursing students who had problematic smartphone use was 99.8% with only one student not having nomophobia out of the 424 students. The majority had a moderate form of nomophobia. The results of this study compare well with those of a study among the University of Oman students which found a 99.3%

prevalence of nomophobia with almost all of the study participants having moderate-severe nomophobia (Mohammed *et al.*, 2018). This similarity in the results could be attributed to an almost similar target population in terms of socio-economic factors and the fact that both targeted university students. Another comparative study was carried out in Indonesia which found a cumulative prevalence of nomophobia of 99.7% where the majority had moderate nomophobia with only 2 people not having any form of nomophobia and 71 percent of them spending between 3-5 hours on their smartphones (Mansyur *et al.*, 2020). And another similar study is that of the Kingdom of Saudi Arabia by Hussien who found that all the 526 study participants had some form of nomophobia, with a majority having a moderate form (Hussien, 2022).

In contrast, several studies in India such as those by Myakal (Myakal & Vedpathak, 2019) who studied 346 medical undergraduates in India found a prevalence of 71.39%, Yasodhamma (Yasodhamma *et al.*, 2018) who studied 150 nursing students, at Chennai, India had a prevalence of 76.7%. Kumar found a prevalence of moderate nomophobia of 74.8% and 18.9% severe form among undergraduate students aged between 18-22 years of the University of Madras (Kumar & Thomas, 2020). Dalbudak got a prevalence of 73.45% among 408 participants (Dalbudak *et al.*, 2020) and Sonali had a 91.2% nomophobia in a private medical university in Patia India, with 70.1% having a moderate form and 21.15 having severe (Sonali *et al.*, 2017). A study of 130 3<sup>rd</sup> year Indian medical students found a 73% prevalence of nomophobia (Sharma *et al.*, 2015), and so did a study that used the google platform and a sample size of 157 physiotherapy students which found a prevalence of 77.6% (Ahmed *et al.*, 2020). All these Indian studies reported a prevalence of between 71% to 91% which is lower than that of the present study, even though smartphone penetration among the youth in India is higher than that of Kenya.

Similar contrasting studies with the present study have been reported in Turkey by Ozdemir (Ozdemir *et al.*, 2018) who found a 73% prevalence and Gurbuz (Gurbuz *et al.*, 2020) in rural Turkey also got a prevalence of 80% of nomophobia. In a study among 304 participants at the University of Armenia, the prevalence of nomophobia was 82.39% (Aguilera-Manrique *et al.*, 2018).

In Africa, comparable studies have been reported in a Ghanaian University which found a prevalence of 96.4% (Essel *et al.*, 2021) and in Cairo, a study among nursing students found a prevalence of 93% moderate to severe nomophobia (Mahgoub *et al.*, 2019). This similarity between the current study and that of Essel and Mahgoub could be due to a similar study population of medical/nursing students and in terms of socio-economic status.

Contrasting African studies have been reported in Morocco by Louragli (Louragli *et al.*, 2018) who found that the prevalence of nomophobia was 66.1% and in Nigeria (Awofala 2020) who found a prevalence of 74%. The difference could be attributed to the fact that the Moroccan participants were general undergraduate students and the Nigerian study was among pre-service mathematics students, whose curricula are not as demanding as that of medical and nursing students.

### **5.3 Factors associated with nomophobia**

This section discusses the associations of the dependent variable with the independent variables of this study. It compares and contrasts the findings of this study to that of other quoted studies with similar socio-demographic factors with a critical analysis of aspects of differences between them.

### 5.3.1 Fear of Missing out

The present study found that those participants with a fear of missing out (FOMO) both at bivariate and multivariate levels had a positively significant correlation with moderate to severe nomophobia (**Odds ratio 4.01 (4.15 multivariate),  $P < 0.001$** ) compared to those study participants without fear of missing out. These results resonate with those of Gezgin who discovered that the two variables have a moderately positive association, where FOMO predicted nomophobia by 41% (Gezgin *et al.*, 2018). A study in Canada found that FOMO and nomophobia predict each other by 26% (Maeng 2018). According to the two studies above, it was found that fear of missing out drives social media use which is often accessed using smartphones. Hoşgör found an above-average significant correlation with FOMO explaining 30% of nomophobia (Hoşgör *et al.*, 2019). Another study in South Africa also found that fear of missing out and nomophobia had a significant positive correlation (Popovac & Hadlington, 2020), and so did Hoşgör (Hoşgör *et al.*, 2021).

This could be explained by the fact that the individuals who are unable to access information or communicate via their smartphones, may believe they have missed something and become nervous and fearful. In the present study, the number of short text messages (SMSes) that the participants send was between 1 and 3. It is possible that the study participants used more social network sites to chat instead of sending short text messages since the majority had WhatsApp, Instagram, and Facebook accounts. Most young people prefer direct messaging (Dm), video calls, and WhatsApp chats to normal voice calls and short text messages. They also prefer sharing their moments in their statuses and via Snapchat more so with the free available WIFI.

### 5.3.2 Personality traits with nomophobia

Using the big five personality inventory (short form), the current study found at the multivariate level a significant positive correlation between personality and nomophobia (**Odds ratio 1.9, P= 0.015**). Among the personality traits, it was those participants with openness to a new experience trait that correlated positively with moderate/severe nomophobia compared to those without openness to a new experience personality trait. A study in Nigeria that used similar instruments like the current study found openness to new experience personality traits as well as extraversion, conscientiousness, and neuroticism to be positively associated with nomophobia (Okoye *et al.*, 2017). And so did the following studies (Yogurtcu *et al.*, 2018), (Izzet 2021) & (Dal, 2020). The following studies found openness to new experiences personality traits and nomophobia to have a negative correlation (Kara *et al.*, 2019), (Amiri, 2022) & (Chhabra & Pal, 2020). However, a study by Klori did not find any relationship between openness to new experiences personality traits and nomophobia (Klori *et al.*, 2020).

The results from the present study on the openness to experience personality trait having a positive correlation with nomophobia can be explained by the fact that people with an openness to new experiences personality trait are adventurous, original, creative, curious, and oriented to their thoughts and feelings which easily makes them to be addicted to their smartphones. This smartphone addiction may eventually lead to nomophobia.

### 5.3.3 Gender

In the present study, gender was not an important factor in association with nomophobia. This could be explained by the fact that both genders' uptake of modern technology is similar at the present and given that both use the same google searches in their studies, therefore there was no gender difference. This result is similar to that of Yasodhamma who did not find any gender difference in their study (Yasodhamma *et al.*, 2018). These studies found more males have nomophobia than females (Myakal & Vedpathak, 2019) & (Kumar & Thomas, 2020). A study by Khilnani who also used an online survey like the present study found that males had more nomophobia than females (Khilnani *et al.*, 2019). Darvishi (Darvishi *et al.*, 2019) who studied university students in Tehran as well as a study by Sonali found that males were affected more than females by nomophobia (Sonali *et al.*, 2017).

However, many more studies found females to be more nomophobic than males according to literature. These found that females were more affected than males (Ozdemir *et al.*, 2018), (Dalbudak *et al.*, 2020), (Yildirim *et al.*, 2016), (Gutiérrez-Puertas *et al.*, 2019), (Mohammed *et al.*, 2018), (Buctot *et al.*, 2020) & (Dasgupta *et al.*, 2017). In a study by Hussien, it was found that being female, single, and a graduate with insufficient income predicted moderate to severe nomophobia (Hussien, 2022). Others studies are those done by Moreno-Guerrero, Gezgin and Tams (Moreno-Guerrero *et al.*, 2020), (Gezgin, 2016) & (Tams *et al.*, 2018) respectively. And in Africa, a study carried out in Morocco among University undergraduates also found that nomophobia was significantly associated with the female gender (Louragli *et al.*, 2018).

#### **5.3.4 Age**



Age in this study was not significantly associated with nomophobia. However, the older the students, the more nomophobic they were. Mohammed and Farooqui had similar results in that the first years had less nomophobia than senior students and the 20-24 years old respectively (Mohammed *et al.*, 2018) & (Farooqui *et al.*, 2018a). More studies in the literature found younger participants have nomophobia than older ones; (Darvishi *et al.*, 2019), (Yildirim & Correia, 2015), (Betoncu & Ozdamli, 2019) & (Gurbuz & Ozkan, 2020).

However, the following studies found no age differences in association with nomophobia; (Gutiérrez *et al.*, 2016), (Dalbudak *et al.*, 2020) & (Khilnani *et al.*, 2019). This age difference could be explained by the progression in academic classes and more academic work for the students (thus more online/ google searches), as well as longer smartphone ownership since the mean age of first ownership of a smartphone, was 16.1 years in the study.

### **5.3.5 Time spent on the smartphone**

The average time spent on the smartphone each day did not have a significant relationship with nomophobia, according to this study. This is unlike the Dasgupta (Dasgupta *et al.*, 2017) comparative study between medical and engineering students as well as in a study by Dalbudak which found that time matters as pertains to nomophobia (Dalbudak *et al.*, 2020). A study by Kara found that teachers who had owned a smartphone for more than 5 years were more nomophobic than those who had had it for less time (Kara *et al.*, 2019). In a study by Khilnani, many participants felt that their smartphones consumed their time, affecting their daily activities (Khilnani *et al.*, 2019). In the current study, many students said that they spent a significant amount of time on their smartphones but did not want to reduce the time.

Most of the participants obtained their first smartphone at the age of 16 years, yet nomophobia increased with age (positive coefficient).

Nomophobia was found to have a positive significant relationship with daily smartphone usage, with students who spent more time on their cellphones having higher levels of nomophobia (Goswami & Singh, 2016). A study found that those students who spent more than five hours on their smartphones were more nomophobic than those who spent fewer hours (Kumar & Thomas, 2020). Another study found that a majority of study participants (71%) spent between 3-5 hours on their smartphones and this was positively and significantly correlated with higher levels of moderate nomophobia (Mansyur *et al.*, 2020). And a study in Saudi Arabia found that those who spend between four to nine hours online had more moderate to severe nomophobia compared to those who spent fewer hours (Hussien, 2022).

### **5.3.6 Loneliness**

It's worth noting that the present study found no evidence of a link between loneliness and nomophobia. But Gezgin got a statistically significant association between nomophobia and loneliness (Gezgin *et al.*, 2018). Another study found that there was an association between daily smartphone usage, loneliness, and nomophobia, according to their study. They discovered that teenagers are lonelier and more worried, and as a result, they exhibit greater nomophobic behaviours (Kara *et al.*, 2019). A study by Ozdemir found a relationship between nomophobia, loneliness, and self-happiness (Ozdemir *et al.*, 2018). Furthermore, according to Yildiz nomophobia and loneliness have a moderately positive correlation. He found that adolescents are constantly online, moving away from the physical world and as a result, they felt lonely (Yildiz Durak, 2019). A study by Hussien found that people with a moderate

level of loneliness had a significantly strong positive intercorrelation with nomophobia (Hussien, 2022). So did other studies by Valenti and Kaysi respectively both of whom found a positive correlation between loneliness and nomophobia (Valenti *et al.*, 2022) & (Kaysi *et al.*, 2021). Finally, a study by Deniz found a significant association between nomophobia and loneliness in the family setup (Deniz, 2021).

## CHAPTER SIX: CONCLUSION AND RECOMMENDATION

### 6.1 Conclusion

In conclusion, this research has established the prevalence of problematic smartphone use among medical and nursing students at the College of Health Sciences, Moi University to be high with medical students having a slightly higher prevalence than nursing students. The problematic smartphone use dimensions that came out in this study were dependence and financial for both courses.

The prevalence of nomophobia among medical and nursing students with problematic smartphone use at the college of health sciences, Moi University was very high at 99.8%. The majority of the participants had a moderate form of nomophobia, followed by mild and the least were those with the severe form. Medical students were relatively less nomophobic compared to the nursing students.

The leading factor associated with moderate to severe nomophobia in the study was fear of missing out (FOMO). The next important factor was openness to new experiences personality traits. The other factors in the study; that is age, Gender, loneliness, duration of smartphone ownership as well as the daily time spent on the smartphone were not significantly associated with nomophobia.

## **6.2 Recommendations**

1. Creation of awareness on the presence of problematic smartphone use through psychoeducation to the students because of dependence and financial implications of smartphone use.
2. Establishment of Peer group forums for sensitization and mitigation so as to come up with intervention measures against nomophobia among the student community. The schools of medicine and nursing may think of including nomophobia in their common courses, given the very high prevalence.
3. Further studies on factors associated with nomophobia and their impacts on the performance of students and their mental well-being.

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## APPENDICES

**Appendix I: Recruitment Eligibility Survey**

Please answer the following questions to enable us to enrol you into the study

1 How old are you now \_\_\_\_\_

2 Do you have a smartphone?

Yes

No

3 How long have you had your smartphone?

Less Than 6 Months

More Than 6 Months

## **Appendix II: Informed Consent Form**

### **Introduction**

You are invited to participate in a research study titled: To assess problematic phone use and nomophobia among medical and nursing students of Moi University, Uasin-Gishu County, Kenya. You are requested to be a participant and if you have any questions, feel free to ask. This study is being conducted by a Moi University master's student.

### **Study purpose of the study**

The purpose of this study is to assess the prevalence of problematic phone use and nomophobia. It is intended for documenting and informed-decision making among all involved stakeholders.

### **The procedure of the study**

If you agree to participate in the study, you will fill out a questionnaire that will take approximately 10-12 minutes.

### **Risks of taking part**

No known risks

### **Benefits of taking part**

There are no direct benefits

### **Alternatives for taking part**

You are at liberty to opt in or opt-out

**Confidentiality**

The anonymity of the information you provide is guaranteed. Don't put any identifying information on the questionnaire.

**Costs**

You will not incur any study-specific costs

**Payment**

You will not receive any payment for taking part in this study.

**Contacts for any queries**

For any questions about the study contact the researcher on 0721908156 or email [maryborter@gmail.com](mailto:maryborter@gmail.com) or [irec@mtrh.or.ke](mailto:irec@mtrh.or.ke)

**Voluntary nature of the study**

Taking part in this study is voluntary. You may choose to take part or not with no penalty or impact on you or your relationship with the investigator.

Signed:

Participant \_\_\_\_\_ Date \_\_\_\_\_

Researcher \_\_\_\_\_ Date \_\_\_\_\_



## Appendix III: Questionnaires

### Section One: Socio-Demographics

I request that you kindly complete the following questions truthfully and honestly.

1. What is your age? \_\_\_\_\_ Years
2. What is your gender?
  - Male
  - Female
3. What is your course of study \_\_\_\_\_
4. What is your year of study \_\_\_\_\_
5. How long have you owned a smartphone?
  - Less than 1 year \_
  - 1 to 5 years \_
  - More than 5 years
6. How old were you when you got your first phone? \_\_\_\_\_
7. How many calls do you make with your mobile phone per day?
  - 0 – 2
  - 3 – 5
  - More than 5

8. How much time do you spend on your mobile phone per day?

- 0 - 10 minutes
- 10 - 30 minutes
- More than 30 minutes

9. How many SMS (text messages) do you send per day?

- 0 – 3
- 4 - 10
- More than 10

10. What social media apps do you have and use? (Tick as appropriate)

- Twitter
- Facebook
- WhatsApp
- Instagram
- Snapchat
- Reddit

11. Where do you place your phone at night? \_\_\_\_\_

12. Do you switch off your phone at night?

- Yes
- No

## Section Two: The Problematic Mobile Phone Use Questionnaire (PMPUQ)

1. How long have you **owned** a mobile phone?

Less than 1 year  1 to 5 years  More than 5 years

2. How **many calls** do you make with your mobile phone per day?

0 - 2  3 - 5  More than 5

3. How **much time** do you spend on your mobile phone per day?

0 - 10 minutes  10 - 30 minutes  More than 30 minutes

4. How many **SMS (text messages)** do you send per day?

0 - 3  4 - 10  More than 10

5. Do you have a **driving licence**?  Yes  No

5a) How **long** have you held it? \_\_\_\_\_ Years

6. Do you consider yourself **addicted** to your mobile phone?  Yes  No

7. What is your **age**? \_\_\_\_\_ Years

8. What is your **gender**?  Male  Female

Please kindly answer the following questions as best as you can

Strongly agree

Agree, Disagree Strongly

disagree

1. I don't use my mobile phone when it is completely forbidden to use it 1 2 3 4

2. It is easy for me to spend all day not using my mobile phone 1 2 3 4

3. My mobile phone bill is too high in terms of my overall expenses 1 2 3 4

4. I use my mobile phone while driving 1 2 3 4

5. I don't pay attention to my mobile phone spending 1 2 3 4

6. Is it hard for me not to use my mobile phone when I feel like it 1 2 3 4

7. I don't use my mobile phone in the library 1 2 3 4

8. I can easily live without my mobile phone 1 2 3 4
9. My mobile phone bills prevent me from buying some other things I need 1 2 3 4
10. I get irritated when I am forced to turn my mobile phone off 1 2 3 4
11. I try to avoid using my mobile phone when driving on the motorway 1 2 3 4
12. I can control my mobile phone bills 1 2 3 4
13. I use my mobile phone where it is forbidden to do so 1 2 3 4
14. I find myself in financial difficulties because of mobile phone costs 1 2 3 4
15. I'd like to spend less time using my mobile phone 1 2 3 4
16. I use my mobile phone in situations that would qualify as dangerous 1 2 3 4
17. I feel lost without my mobile phone 1 2 3 4
18. I receive mobile phone bills that are too high 1 2 3 4
19. When using my mobile phone on public transport, I try not to talk too loudly 1 2 3 4
20. I spend too much time using my mobile phone 1 2 3 4
21. I efficiently manage the money that I spend using my mobile phone 1 2 3 4
22. I don't attach a lot of importance to my mobile phone 1 2 3 4
23. While driving, I find myself in dangerous situations because of my mobile phone use  
1 2 3 4
24. I have trouble paying my mobile phone bills 1 2 3 4
25. I try to avoid using a mobile phone where people need silence 1 2 3 4
26. I am surprised by how big my mobile phone bills are when I get them 1 2 3 4
27. It is hard for me to turn my mobile phone off 1 2 3 4
28. I borrow money from family or friends to pay my mobile phone bills 1 2 3 4

29. I use my mobile phone while driving, even in situations that require a lot of concentration

1 2 3 4

30. My mobile phone conversations take longer than I want 1 2 3 4

### **Problematic mobile phone use questionnaire Dimensions**

#### **Factor 1: Dangerous Use**

1. I use my mobile phone while driving\*
2. I try to avoid using my mobile phone when driving on the motorway
3. I use my mobile phone in situations that would qualify as dangerous\*
4. While driving, I find myself in dangerous situations because of my mobile phone use\*
5. I use my mobile phone while driving, even in situations that require a lot of concentration\*

#### **Factor 2: Prohibity Use**

1. I don't use my mobile phone when it is completely forbidden to use it
2. I don't use my mobile phone in a library
3. I use my mobile phone where it is forbidden to do so\*
4. When using my mobile phone on public transport, I try not to talk too loudly
5. I try to avoid using a mobile phone where people need silence

**Factor 3: Dependence**

1. It is easy for me to spend all day not using my mobile phone
2. Is it hard for me not to use my mobile phone when I feel like it\*
3. I can easily live without my mobile phone
4. I get irritated when I am forced to turn my mobile phone off\*
5. I feel lost without my mobile phone\*
6. I don't attach a lot of importance to my mobile phone
7. It is hard for me to turn my mobile phone off\*

**Factor 4: Financial Problems**

1. My mobile phone bill is too high in terms of my overall expenses\*
2. I don't pay attention to my mobile phone spending
3. My mobile phone bills prevent me from buying some other things I need\*
4. I can control my mobile phone bills
5. I find myself in financial difficulties because of mobile phone costs\*
6. I receive mobile phone bills that are too high\*
7. I efficiently manage the money that I spend using my mobile phone
8. I have trouble paying my mobile phone bills\*
9. I am surprised by how big my mobile phone bills are when I get them\*
10. I borrow money from family or friends to pay my mobile phone bills\*
11. I'd like to spend less time using my mobile phone\*
12. I spend too much time using my mobile phone\*
13. My mobile phone conversations take longer than I want\*

NOTE: \* reverse item

### Section Three: Big Five Inventory-10

Please read the inventory below and tick the number that best describes you under each row

Instructions: How well do the following statements describe your personality?

I see myself as someone who ...	Disagree Strongly	Disagree a Little	Neither Agree nor Disagree	Agree a Little	Agree Strongly
1. ... is reserved	(1)	(2)	(3)	(4)	(5)
2. ... is generally trusting	(1)	(2)	(3)	(4)	(5)
3. ... tends to be lazy	(1)	(2)	(3)	(4)	(5)
4. ... is relaxed, handles stress well	(1)	(2)	(3)	(4)	(5)
5. ... has few artistic interests	(1)	(2)	(3)	(4)	(5)
6. ... is outgoing, sociable	(1)	(2)	(3)	(4)	(5)
7. ... tends to find fault with others	(1)	(2)	(3)	(4)	(5)
8. ... does a thorough job	(1)	(2)	(3)	(4)	(5)
9. ... gets nervous easily	(1)	(2)	(3)	(4)	(5)
10. ... has an active imagination	(1)	(2)	(3)	(4)	(5)





## Section Four: Fear of Missing Out Scale: FOMOs

### Participant Instructions

Below is a collection of statements about your everyday experience. Using the scale provided please indicate how true each statement is of your general experiences. Please answer according to what really reflects your experiences rather than what you think your experiences should be.

Please treat each item separately from every other item.

### Items

	Not at all true of me	Slightly true of me	Moderately true of me	Very true of me	Extremely true of me
1. I fear others have more rewarding experiences than me.					
2. I fear my friends have more rewarding experiences than me.					
3. I get worried when I find out my friends are having fun without me.					
4. I get anxious when I don't know what my friends are up to.					
5. It is important that I understand my friends' "in-jokes."					

6. Sometimes, I wonder if I spend too much time keeping up with what is going on.					
7. It bothers me when I miss an opportunity to meet up with friends.					
8. When I have a good time it is important for me to share the details online (e.g. updating status).					
9. When I miss out on a planned get-together it bothers me.					
10. When I go on vacation, I continue to keep tabs on what my friends are doing.					

### Section Five: UCLA-3 Scale

INSTRUCTIONS: Indicate how often each of the statements below is descriptive of you

Statement	Never	Rarely	Sometimes	Often
1. How often do you feel that you are "in tune" with the people around you?	1	2	3	4
2. How often do you feel that you lack companionship?	1	2	3	4
3. How often do you feel that there is no one you can turn to?	1	2	3	4
4. How often do you feel alone?	1	2	3	4
5. How often do you feel part of a group of friends?	1	2	3	4
6. How often do you feel that you have a lot in common with the people around you?	1	2	3	4
7. How often do you feel that you are no longer close to anyone?	1	2	3	4
8. How often do you feel that your interests and ideas are not shared by those around you?	1	2	3	4
9. How often do you feel outgoing and friendly?	1	2	3	4
10. How often do you feel close to people?	1	2	3	4
11. How often do you feel left out?	1	2	3	4
12. How often do you feel that your relationships with others are not meaningful?	1	2	3	4

13. How often do you feel that no one really knows you well?	1	2	3	4
14. How often do you feel isolated from others?	1	2	3	4
15. How often do you feel you can find companionship when you want it?	1	2	3	4
16. How often do you feel that there are people who really understand you?	1	2	3	4
17. How often do you feel shy?	1	2	3	4
18. How often do you feel that people are around you but not with you?	1	2	3	4
19. How often do you feel that there are people you can talk to?	1	2	3	4
20. How often do you feel that there are people you can turn to?	1	2	3	4

### Section Six: Nomophobia Questionnaire (Nmp-Q)

Please indicate how much you agree or disagree with each statement in relation to your smartphone.	Strongly Disagree				Strongly Agree		
	1	2	3	4	5	6	7
1. I would feel uncomfortable without constant access to information through my smartphone.							
2. I would be annoyed if I could not look information up on my smartphone when I wanted to do so.							
3. Being unable to get the news (e.g., happenings, weather, etc.) on my smartphone would make me nervous.							
4. I would be annoyed if I could not use my smartphone and/or its capabilities when I wanted to do so.							
5. Running out of battery in my smartphone would scare							

me.							
6. If I were to run out of credits or hit my monthly data limit, I would panic.							
7. If I did not have a data signal or could not connect to Wi-Fi, then I would constantly check to see if I had a signal or could find a Wi-Fi network.							
8. If I could not use my smartphone, I would be afraid of getting stranded somewhere.							
9. If I could not check my smartphone for a while, I would feel the desire to check it.							
<b>If I did not have my smartphone with me,</b>							
10. I would feel anxious because I could not instantly communicate with my family and/or friends.							
11. I would be worried because my family and/or							

friends could not reach me.							
12. I would feel nervous because I would not be able to receive text messages and calls.							
13. I would be anxious because I could not keep in touch with my family and/or friends.							
14. I would be nervous because I could not know if someone had tried to get a hold of me.							
15. I would feel anxious because my constant connection to my family and friends would be broken.							
16. I would be nervous because I would be disconnected from my online identity.							
17. I would be uncomfortable because I could not stay up-to-date with social media and online networks.							

18. I would feel awkward because I could not check my notifications for updates from my connections and online networks							
19. I would feel anxious because I could not check my email messages.							
20. I would feel weird because I would not know what to do.							



**Appendix IV: Budget**

ITEM	QUANTITY	COST	TOTALS
Field notebooks	3	50	150
Research Assistants	2	20000	40000
Airtime/Data bundles	10	1000	10000
Data bundle for participants	544	250	136000
IREC review fee	1	2000	2000
Pens	4	30	120
<b>TOTALS</b>			<b>188,270</b>

## Appendix V: IREC Approval



MOI TEACHING AND REFERRAL HOSPITAL  
P.O. BOX 3  
ELDORET  
Tel: 33471/2/3

Reference: IREC/2020/176  
**Approval Number: 0003682**  
Mary C. Borter,  
Moi University,  
School of Medicine,  
P.O. Box 4606-30100,  
**ELDORET-KENYA.**

### INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)



MOI UNIVERSITY  
COLLEGE OF HEALTH SCIENCES  
P.O. BOX 4606  
ELDORET  
Tel: 33471/2/3  
8<sup>th</sup> October, 2020



Dear Ms. Borter,

#### THE PREVALENCE AND ASSOCIATED FACTORS OF NOMOPHOBIA AMONG MEDICAL AND NURSING STUDENTS OF MOI UNIVERSITY, UASIN-GISHU COUNTY, KENYA

This is to inform you that **MU/MTRH-IREC** has reviewed and approved your above research proposal. Your application approval number is **FAN: 0003682**. The approval period is **8<sup>th</sup> October, 2020 – 7<sup>th</sup> October, 2021**.

This approval is subject to compliance with the following requirements;

- i. Only approved documents including (informed consents, study instruments, MTA) will be used.
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by **MU/MTRH-IREC**.
- iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to **MU/MTRH-IREC** within 72 hours of notification.
- iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to **MU/MTRH-IREC** within 72 hours.
- v. Clearance for export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days upon completion of the study to **MU/MTRH-IREC**.

Prior to commencing your study; you will be required to obtain a research license from the National Commission for Science, Technology and Innovation (NACOSTI) <https://oris.nacosti.go.ke> and other relevant clearances. Further, a written approval from the CEO-MTRH is mandatory for studies to be undertaken within the jurisdiction of Moi Teaching & Referral Hospital (MTRH), which includes 22 Counties in the Western half of Kenya.

Sincerely,

**DR. S. NYABERA**  
**DEPUTY-CHAIRMAN**  
**INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE**

cc	CEO	-	MTRH	Dean	-	SOP	Dean	-	SOM
	Principal	-	CHS	Dean	-	SON	Dean	-	SOD

## Appendix VI: Hospital



# MOI TEACHING AND REFERRAL HOSPITAL

Telephone : (+254)053-2033471/2/3/4  
 Mobile: 722-201277/0722-209795/0734-600461/0734-683361  
 Fax: 053-2061749  
 Email: [ceo@mtrh.go.ke/directorsofficemtrh@gmail.com](mailto:ceo@mtrh.go.ke/directorsofficemtrh@gmail.com)

Nandi Road  
 P.O. Box 3 – 30100  
 ELDORET, KENYA

Ref: ELD/MTRH/R&P/10/2/V.2/2010

13<sup>th</sup> October, 2020

Mary C. Borter,  
 Moi University,  
 School of Medicine,  
 P.O. Box 4606-30100,  
ELDORET-KENYA.

### APPROVAL TO CONDUCT RESEARCH AT MTRH

Upon obtaining approval from the Institutional Research and Ethics Committee (IREC) to conduct your research proposal titled:-

***"The Prevalence and Associated Factors of Nomophobia among Medical and Nursing Students of Moi University, Uasin Gishu County, Kenya".***

You are hereby permitted to commence your investigation at Moi Teaching and Referral Hospital.

*Done 13/10/2020*  
**DR. WILSON K. ARUASA, MBS**  
**CHIEF EXECUTIVE OFFICER**  
**MOI TEACHING AND REFERRAL HOSPITAL**

cc - Senior Director, (CS)  
 - Director of Nursing Services (DNS)  
 - HOD, HRISM



*All correspondence should be addressed to the Chief Executive Officer*

*Visit our Website: [www.mtrh.go.ke](http://www.mtrh.go.ke)*

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