Qualitative Research Journal

"Oh my phone, I can't live without you": a phenomenological study of nomophobia among college students

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Received 1 June 2023
Revised 28 July 2023
30 September 2023
21 December 2023
23 February 2024
Accepted 5 April 2024

Abstract

Purpose – Previous studies have identified concerns and anxiety in individuals who are without their mobile phones, which is known as nomophobia, an acronym for "no mobile phone phobia." However, there is currently limited evidence of qualitative research that explores nomophobia. The purpose of this study is to explore personal experiences and individual meanings associated with mobile phone use and nomophobia.

Design/methodology/approach – To address this gap, the present study employed a Heideggerian phenomenological approach to investigate the issue. Ten college students, who have medium to high nomophobia were selected as respondents. Semi-structured interviews were conducted to collect data, which were then transcribed verbatim and analyzed using reflexive thematic analysis.

Findings – A deep understanding of the psychological dynamics, experiences, meanings, perceptions and beliefs of individuals regarding smartphone use can only be explored through a qualitative approach that presents personal statements of individuals through in-depth semi-structured interviews. This study contributes to a deep understanding of the psychological dynamic of nomophobia.

Research limitations/implications – This study has limitations that must be carefully considered. First, the respondents came from a university with a sample size of 10 people, which may not fully represent the phenomenon of nomophobia among students due to differences in cultural and academic backgrounds. However, we addressed this limitation by selecting only students who scored moderate to high levels of nomophobia. Second, the researchers acknowledge that the sample used in the study may not be fully representative of the broader target population or a larger group, as previously mentioned. Therefore, generalizing the findings of this research must be done carefully, being cautious and thoughtful to avoid hasty conclusions.

Practical implications – In the functional context, it is recommended for individuals to be more mindful of their smartphone usage and strive to strike a balance between utilizing their device's capabilities for productive purposes and avoiding excessive dependency that may lead to distractions or information overload. This includes limiting excessive smartphone usage for entertainment purposes, restricting aimless and irrelevant Internet browsing and implementing effective time management when using smartphones. For smartphone users from the ontological context, the advice is to critically evaluate their digital presence and ensure that their online activities align with their true values and self-perception, promoting responsible and ethical smartphone use. Engaging in fasting or break sessions by completely turning off the smartphone at specific times and utilizing that time for activities such as reading books, writing and engaging in spiritual practices, or exercising is also advisable. In the anthropomorphic context, individuals are advised to reflect on the potential emotional dependence on their smartphones and consider establishing healthy boundaries to avoid excessive reliance on these devices to fulfill emotional needs. One practical recommendation is to engage in self-reflection, where individuals take some time to ponder their smartphone usage patterns and emotional attachment to the device. They should ask themselves why they feel the need to constantly check their phone and how it impacts their emotions and overall well-being.

Originality/value – A deep understanding of the psychological dynamics, experiences, meanings, perceptions and beliefs of individuals regarding smartphone use can only be explored through a qualitative approach that presents personal statements of individuals through in-depth interviews. This study contributes to a deep understanding of the psychological dynamic of nomophobia.

Keywords Smartphone, Nomophobia, College student, Phenomenology

Paper type Research paper

Qualitative Research Journal

1443-9883
DOI 10.1108/QRJ-06-2023-0092

Introduction

The development of information technology has resulted in changes in individual behavior (Jahagirdar *et al.*, 2021; Kaviani *et al.*, 2020; Lee *et al.*, 2018; Salehan and Negahban, 2013). The widespread availability of affordable mobile devices has ushered in a new era of mobile technology (León-Mejía *et al.*, 2021; Avci, 2022; Oulasvirta *et al.*, 2012), with smartphones being the latest advancement in this field (Oulasvirta *et al.*, 2012). This progress in mobile information technology has facilitated the global adoption of smartphones, with the number of smartphone subscribers estimated to have surpassed 6bn by the end of 2014, continuing to grow until the end of 2022 (International Telecommunications Union, 2014).

Smartphones have become an essential part of teenagers' daily lives, and they cannot imagine their lives without them. Teenagers use smartphones for various school tasks, daily activities, entertainment and to alleviate boredom (Park and Lee, 2012). Kang and Jung (2014) have noted that smartphones are not only used for communication and information-seeking but also for entertainment purposes. By fulfilling their needs for learning, individual competency development, security and social relationships, smartphones have become an integral part of individuals' lives (Kang and Jung, 2014).

The COVID-19 lockdown has led to an increase in smartphone and information technology usage, resulting in new forms of addiction such as online gaming addiction, problematic social media use, problematic smartphone use and nomophobia (Jahagirdar *et al.*, 2021; Notara *et al.*, 2021; León-Mejía *et al.*, 2021; Avci, 2022; Rodríguez-García *et al.*, 2020; Pivetta *et al.*, 2019). Cases of smartphone and online game addiction emerged during the pandemic due to distance learning conditions that compelled children and teenagers to rely heavily on their smartphones. Moreover, the implementation of lockdown measures prevented them from engaging in outdoor activities, leading to boredom, which was compensated for by playing online games or using smartphones. As a result, teenagers find pleasure in playing online games, which, when repeated, can lead to psychological dependence and addiction (Notara *et al.*, 2021; León-Mejía *et al.*, 2021).

Previous research has shown that smartphones are linked to the development of compulsive checking habits (Avci, 2022; Güner and Demir, 2021; Oulasvirta *et al.*, 2012) and can lead to compulsive use, increased psychological pressure and smartphone addiction (Jahagirdar *et al.*, 2021; Kaviani *et al.*, 2020; Chiu, 2014; Lee *et al.*, 2018; Salehan and Negahban, 2013). One phenomenon that can arise from excessive smartphone use is nomophobia, a problem characterized by anxiety and fear when without a smartphone, which can negatively impact an individual's psychological well-being (Yildirim *et al.*, 2016; Yildirim and Correia, 2015; Lee *et al.*, 2018; Bragazzi and Del Puente, 2014; King *et al.*, 2010, 2013; Dixit *et al.*, 2010).

What is nomophobia?

Nomophobia, short for "no mobile phone phobia," was first identified by the UK Post Office in a study on smartphone user anxiety (SecurEnvoy, 2012). The study, which involved 2,100 respondents, found that approximately 53% of smartphone users experienced nomophobia (Mail Online, 2008). Additionally, the study showed that men were more susceptible to nomophobia than women, with 58% of male participants and 48% of female participants experiencing nomophobia. The age group most vulnerable to nomophobia were those aged 18–24 years, with 77% of respondents in this group classified as nomophobic, followed by those aged 25–34 years (68%) and those aged 55 years and above.

People who have a high level of nomophobia tend to frequently check their text messages or social media and may struggle to concentrate on their daily tasks because they fear losing connectivity or the ability to access information (Yildirim and Correia, 2015; Yildirim *et al.*, 2016). King *et al.* (2010, 2013, 2014) have described nomophobia as a modern "phobia," although some studies have used the terms phobia and addiction interchangeably to describe

the common symptoms of nomophobia, despite their different theoretical constructs (Yildirim *et al.*, 2016; Alosaimi *et al.*, 2016; Nikhita *et al.*, 2015; King *et al.*, 2013; Lee, 2014).

Several studies have suggested that, in addition to fear, excessive smartphone use is associated with addiction, compulsivity and anxiety. Loren (2012) and Bianchi and Phillips (2005) argue that the term "nomophobia" is misused and can be better described as a behavioral disorder, addiction or anxiety disorder rather than pure fear. Despite different interpretations, nomophobia is generally considered a "situational phobia" (Yildirim *et al.*, 2016; Yildirim and Correia, 2015; Lin *et al.*, 2019; King *et al.*, 2010, 2013, 2014).

Nomophobia, which is a relatively new concept in clinical psychology (Arpaci *et al.*, 2017; Yildirim *et al.*, 2016; Bragazzi and Del Puente, 2014; King *et al.*, 2010, 2013), may exhibit similarities with personality disorders, particularly, obsessive-compulsive personality disorder. Nonetheless, some studies have explored the correlation between nomophobia and other mental illnesses, such as anxiety and obsessive-compulsive disorders. Essentially, nomophobia can be defined as an irrational fear or distress that arises when individuals are unable to utilize, contact, communicate or access their mobile phones and are fear of missing out on information or having their virtual communication interrupted through the internet (Jahagirdar *et al.*, 2021; Yılmaz and Bekaroğlu, 2021; Notara *et al.*, 2021; Kaviani *et al.*, 2020; Rodríguez-García *et al.*, 2020; Mir and Akhtar, 2020; Olivencia-Carrión *et al.*, 2018; Yildirim *et al.*, 2016).

Negative impact of nomophobia

Numerous prior studies involving students as research participants have shown that nomophobia is associated with the onset of personality disorders (Lee *et al.*, 2018), loneliness, decreased levels of happiness and self-esteem issues (Ozdemir *et al.*, 2018; Dai *et al.*, 2021), particularly, in young populations or college students (Gutiérrez-Puertas *et al.*, 2016; Ramos-Soler *et al.*, 2017). Moreover, nomophobia has been found to be associated with depression, anger, anxiety, aggressiveness (Darvishi *et al.*, 2019; Durak, 2018; Kuscu *et al.*, 2020), stress, nervousness (Darvishi *et al.*, 2019), panic disorder (King *et al.*, 2010), sleep disorders, emotional instability and a lack of rest time due to excessive smartphone use (Kaviani *et al.*, 2020; Yildirim *et al.*, 2016; Rodrigurez-Garcia *et al.*, 2020).

Current research

Through a systematic literature review, researchers discovered that the majority of previous studies on nomophobia have relied on quantitative methods to test hypotheses, with only three qualitative studies being identified through a search of international and Indonesia national journal databases (i.e. Scopus database). Two of these studies were conducted in America (Yildirim and Correia, 2015) and Brunei Darussalam (Anshari *et al.*, 2019), respectively, while the third study in China (Dai *et al.*, 2021) focused more broadly on problematic smartphone use. Yildirim and Correia (2015) conducted a comprehensive study on nomophobia, employing a mixed-method approach. Their research identified four distinct dimensions that characterize the symptoms of nomophobia, including (1) the inability to communicate, (2) the loss of connectedness, (3) the inability to access information and (4) giving up convenience. On the other hand, Anshari *et al.* (2019) utilized text mining analysis to explore the characteristics of nomophobia. Their study revealed several key characteristics of nomophobia, such as constant checking for instant rewards, feelings of insecurity, frequent panic, fear, anxiety, anti-social behavior, over-dependence on social media, multitasking and various health issues. Meanwhile, limited evidence of qualitative research on the deeper personal experiences of nomophobia has been identified in Indonesia. Although two studies conducted by Dasiroh *et al.* (2017), also Faisal and Yulianita (2017) have explored nomophobia among college students, focusing on personal experiences, but they lack an in-depth

understanding of the psychological dynamics and individual impacts. Furthermore, these studies exhibited insufficient research quality in terms of methodology, state-of-the-art and qualitative data analysis. Therefore, the current study aims to provide a comprehensive understanding of the psychological dynamics, experiences, meanings, perceptions and beliefs related to smartphone use through a qualitative approach, utilizing semi-structured interviews to capture personal statements from individuals (van Manen, 2014; Husserl, 2008; van der Berg, 2003). Through these personal statements, we will gain a more comprehensive and profound knowledge of the psychological dynamics underlying excessive smartphone use (Frechette *et al.*, 2020; Van Manen, 2006). The findings of this research will serve as a valuable guide for parents, teachers, educators, policymakers, psychologists and therapists to take preventive measures in addressing excessive smartphone use that leads to a tendency of nomophobia. To address this gap, interpretative phenomenological qualitative studies will be conducted to gain a holistic understanding of these experiences (Gill, 2014; Benner, 1994).

Theoretical framework

This study utilizes two theories as frameworks for understanding and comprehending the nomophobia phenomenon. The two theories forming the basis of this study are attachment theory, which suggests that humans have an innate need for close, secure relationships with others and may develop similar attachment patterns with their smartphones (Cicirelli, 2010; Kleine and Baker, 2004; Kleine and Allen, 1995) and the theory of the extended self. This attachment may be particularly strong in individuals who perceive their smartphones as providing a sense of security and comfort, leading to a fear of being without the device or nomophobia (Asante, 2019; Konok *et al.*, 2016, 2017).

Recent research has provided support for the relationship between attachment to smartphones and nomophobia. For example, a study by Elhai *et al.* (2016) found that attachment anxiety, which reflects a fear of abandonment and a strong desire for close relationships, was positively associated with nomophobia. The study also found that attachment avoidance, which reflects a desire to avoid intimacy and emotional vulnerability, was negatively associated with nomophobia.

Another study by Sun and Miller (2023) found that both insecure attachments were positively associated with phubbing and these associations were mediated by problematic smartphone use. This study suggests that individuals who are insecurely attached to their smartphones may rely on habitual use as a coping mechanism for their attachment-related anxieties. Finally, a study by Zhang *et al.* (2022) found that attachment anxiety is positively associated with phone addiction. Arpaci *et al.* (2017) found that insecure attachment positively correlated with nomophobia, suggesting that attachment styles may be an important factor in mitigating nomophobia.

Overall, these studies suggest that attachment theory provides a useful framework for understanding the relationship between attachment to smartphones and nomophobia. They also highlight the importance of addressing attachment-related anxieties and providing social support as potential strategies for reducing nomophobia (Kim *et al.*, 2013).

The theory of the extended self, also known as the "extended self-schema" theory, was proposed by Belk (1988) and suggests that individuals define themselves not only by their physical bodies but also by the possessions and objects they consider as part of themselves. In other words, people's possessions are an extension of themselves, used to express their identities and communicate with others. Nomophobia, on the other hand, refers to the fear of being without a mobile phone or being unable to use one. This fear can result in significant distress, anxiety and physical symptoms such as increased heart rate and sweating (Yildirim and Correia, 2015).

Combining these two concepts, the theory of the extended self can help to explain why individuals may experience nomophobia. With mobile phones becoming increasingly ubiquitous in modern society, they have also become an integral part of many people's identities and self-concepts. People use their phones to communicate with others, access information and express themselves through social media and other online platforms.

Consequently, individuals may experience significant anxiety and distress when separated from their phones, feeling as though they have lost a part of themselves and being unable to express themselves and communicate with others in the ways they are used to. In conclusion, the theory of extended self offers an explanation for the occurrence of nomophobia, given the attachment of individuals to their mobile phones as an extension of their identities.

Research questions

To explore the depth of meaning and the psychological dynamics experienced by respondents regarding the phenomenon of nomophobia, the researcher presents fundamental questions to delve into the issue. These fundamental questions will evolve into more specific inquiries during the interview process. The fundamental questions are as follows:

What is the meaning of smartphones in individuals' daily lives?

What are the personal experiences and psychological dynamics of nomophobia?

What are the impacts of nomophobia on individuals?

Methods

The theoretical framework and philosophical stance of this study draw inspiration from the interpretive Heideggerian phenomenological tradition (Frechette *et al.*, 2020; Gill, 2014). This approach asserts that individual experiences are the product of construction and interpretation through the perspective of the individuals undergoing the phenomena as well as the perspective of the researchers studying them (Crist and Tanner, 2003). Therefore, the worldview, life experiences and cultural background of the researcher cannot be bracketed or disregarded when interpreting data (Braun and Clark, 2006, 2019a, b, 2020). Instead, it is recommended to reflectively acknowledge and remain aware of personal perspectives and influences throughout the qualitative analysis process.

We chose phenomenology as our qualitative research approach because it is suitable for exploring participants' experiences of what happens in their lives (Creswell, 2013). This approach acknowledges that the essence of experience may vary for each individual (Larkin *et al.*, 2019; Patton, 2002). As suggested by Cooper *et al.* (2012), phenomenological research emphasizes the identification and description of shared or common elements that constitute the essence of a particular phenomenon (van Manen, 2014; Husserl, 2008; van der Berg, 2003). The goal of this approach is to uncover essential features, meanings and patterns present across different individuals' experiences of the same phenomenon (Frechette *et al.*, 2020; Van Manen, 2006).

The aim of this study is to explore college students' experiences related to the use of smartphones and how they attribute meaning to them. Reflexive thematic analysis was used in this research based on the constructivist paradigm which assumes social reality as an individual's construction of perceived experiences (Braun and Clark, 2006, 2019a, b, 2020). Individuals construct their attitudes, beliefs and behaviors in conjunction with how they interpret the world in the context of their social and cultural surroundings (Braun and Clark, 2019b; Creswell, 2013).

Furthermore, reflexive thematic analysis provides an opportunity for researchers to actively identify and interpret themes that emerge based on the research questions (Braun and Clark, 2006, 2019a, b, 2020).

Respondents

Before the research was conducted, ethical clearance was obtained from the Ahmad Dahlan University institutional review board. In this study, the researchers utilized a purposive sampling technique, following recommendations from various experts in qualitative research (Frechette *et al.*, 2020; Gill, 2014; Benner, 1994). This approach helps ensure a certain level of homogeneity in the phenomenon under study (Gill, 2014). The respondents were recruited from the WhatsApp group of the Abnormal Psychology course and the researcher openly invited anyone interested in participating in this qualitative research. The Abnormal Psychology WhatsApp group is not directly related to this research. One of the researchers teaches the Abnormal Psychology course and created the WhatsApp group for coordinating the teaching and learning process. When the research was about to be conducted, the researcher informed the group about the research activities related to nomophobia. The researcher offered the opportunity to all students in the WhatsApp group to voluntarily participate in the research. Subsequently, 25 students expressed interest in participating and a screening process was conducted to assess the extent of nomophobia they experienced. The researcher then selected students with moderate to high levels of nomophobia to be involved in the study. Prior to their participation, the research theme and data collection techniques through interviews were explained to the participants. Informed consent was also given to all respondents before they were further interviewed. As part of their involvement, students who agreed to participate were given five books (a textbook in Psychology) written by the researcher and were required to complete a screening questionnaire about their tendency toward nomophobia. We employed the nomophobia questionnaire (NMPQ) developed by Yildirim and Correia (2015) as a screening tool for selecting participants. The NMPQ has been adapted and its validity and reliability have been tested in several countries, demonstrating a well-structured instrument (Tams *et al.*, 2018; Al-Balhan *et al.*, 2018; Adawi *et al.*, 2018; Rangka *et al.*, 2018; Ramos-Soler *et al.*, 2017; Bragazzi *et al.*, 2016).

We chose students as the research respondents based on considerations from previous research findings, which explain that the age group most vulnerable to nomophobia is those aged 18–24 years, with 77% of respondents in this group classified as nomophobic, followed by those aged 25–34 years (68%) and those aged 55 years and above (Mail Online, 2008). Additionally, the prevalence of nomophobia in both developed and developing countries ranges from 77% to 99%, most commonly occurring in the young adult population aged 20–25 years (Ozdemir *et al.*, 2018). Nomophobia also affects 18.5–73% of students (Dixit *et al.*, 2010; Kaur and Sharma, 2015).

Ten college students from Psychology courses, aged between 20 and 22 years, 5 girls and 5 boys, who had been using smartphones since junior high school and were long-time active smartphone users, voluntarily participated in the study. All respondents were selected based on their high scores on the NMPQ (medium to high). After some time, the researcher conducted semi-structured interviews with these 10 students on the agreed-upon day and time. All interview sessions were conducted in the Indonesian language as the native language.

Data collection

This research began in September 2022 and continued until January 2023. Semi-structured interviews were used as a suitable data collection tool to delve deeper into the feelings,

experiences, attitudes and beliefs of individuals (Holmqvist and Frisén, 2012; Marvasti and Trevino, 2019). During the semi-structured interview sessions, open-ended questions were used to provide respondents with the opportunity to freely express their thoughts and experiences, thus enriching the data collection process (Braun and Clark, 2006, 2019a, b, 2020).

Following the strategies outlined by Smith and Osborn (2003) for constructing interview questions, the researchers collaboratively developed open-ended questions based on the latest research conducted by Anshari *et al.* (2019), also Yildirim and Correia (2015) on smartphone use and nomophobia. The researchers formulated more specific open-ended questions to ensure the deeper psychological dynamics of the respondents were obtained (Patton, 2002, 2014; Smith and Osborn, 2003). The first author then conducted interviews with 10 respondents who voluntarily participated in this study.

Each respondent was interviewed individually for approximately 60 minutes to explore their experiences and perceptions of using smartphones in their daily lives, as well as the meaning of smartphones to them and how smartphones affect their lives overall. To guide the data collection process, the researcher created core questions, which were as follows:

(1) What does the use of a mobile phone mean to you?

(2) How do you feel when your phone is not with you, lost or held by someone else?

(3) What impact do you feel when using your phone?

(4) Can you explain what you are actually worried about when you cannot use your phone?

(5) How intense is your anxiety? From a scale of 1–10.

Data analysis

Reflexive thematic analysis by Braun and Clark (2006, 2019a, b, 2020) was used to interpret the verbatim data gathered from the respondents. Reflexive thematic analysis is a widely used qualitative data analysis method that aims to identify, analyze and report patterns or themes within the data (Arena *et al.*, 2022; Braun and Clarke, 2019b). It is particularly valuable when researchers aim to explore data without imposing preconceived theoretical frameworks, allowing themes to emerge from the data itself (Nowell *et al.*, 2017). The analysis was conducted in six stages as recommended by Braun and Clark (2019a, b, 2020).

The researchers jointly discussed during the coding process, theme selection and sub-themes as an interpretation of verbatim data. The researchers changed some initial codes that were perceived as redundant and irrelevant and revised them to better reflect the data. After that, the researchers jointly grouped and merged codes that had the same content and meaning into separate categories. The researcher then analyzed the categorized data using a thematic approach (Braun and Clark, 2006, 2019a, b, 2020). The researchers were jointly involved in the discussion of each of the categories created when they grouped data by the codes they had created.

Trustworthiness

This study refers to the concept of trustworthiness by Lincoln and Guba (1985), which includes credibility, transferability, dependability and confirmability. To achieve trustworthiness in this study, the researcher first ensured that the research results reflected reality. The researcher, together with the respondents, discussed the verbatim data that had been created to ensure that the verbatim data corresponded to what the respondents had stated, without reduction or addition (Nowell *et al.*, 2017). The researcher actively utilized

reflexive journaling to document personal reflections on values, interests, insights from the data and personal biases (Fréchette *et al.*, 2020; Benner, 1994). Additionally, researcher triangulation was applied to minimize the impact of individual biases and subjectivity that a single researcher might introduce to the study (Van Manen, 2006; Nowell *et al.*, 2017). This study also employed a collaborative process for the identification and validation of key patterns, ideas or concepts (themes) and their subcategories (subthemes) in qualitative data analysis. Multiple team members participated in reviewing and confirming emerging themes and subthemes to enhance the credibility and reliability of the findings (Nowell *et al.*, 2017). This can be achieved through reflexivity, which is honestly revealing the researcher's experiences, views and assumptions that may influence the research results (Braun and Clark, 2019a, b, 2020).

At the conclusion of the study, the researcher presented a research manuscript report that encompassed the final results of the thematic analysis, comprising themes and subthemes derived from the verbatim data. This report was shared with the respondents to seek their confirmation and approval. Moreover, the researcher actively encouraged the respondents to provide feedback and recommendations pertaining to the final data analysis.

Limitations

This study has limitations that must be carefully considered. First, the respondents were drawn from a university, with a sample size of 10 people. All students included in the study were from the middle class. It is important to note that this sample may not fully represent the phenomenon of nomophobia among students due to differences in socioeconomic and cultural backgrounds. However, we addressed this limitation by selecting only students who scored moderate to high levels of nomophobia. Second, the researchers acknowledge that the sample used in the study may not be fully representative of the broader target population or a larger group, as previously mentioned. Therefore, generalizing the findings of this research must be done carefully, being cautious and thoughtful to avoid hasty conclusions.

Results

This section presents the thematic responses according to the themes raised in the data analysis process. Themes and subthemes are described along with relevant quotes from the transcript as supporting evidence. The readers can see the theme and sub-theme in Table 1. According to Cooper *et al.* (2012), phenomenological research highlights the common elements of a phenomenon rather than individual experiences. This study aims to explore how respondents interpret the use of smartphones in their daily lives. The themes developed describe the experiences of the respondents in interpreting the use of smartphones. The findings indicate four important themes, namely that smartphones have become an important part of life, smartphones trigger negative effects, anxiety/worry when not carrying a smartphone (nomophobia) and attachment and dependent on mobile phones. The quotes from the interview will be presented to reinforce the theme findings from the verbatim data. Respondent names will be coded as R1–R10 to maintain confidentiality.

Theme 1. Smartphone has become an important part of life

The first theme that emerged relates to the role of smartphone in the respondents' lives. Smartphone has become an important part of their lives. They cannot detach themselves from smartphone in their daily lives because of its many important application functions that are needed and helpful in their daily lives. Five subthemes were found that cause smartphone to become an important part of respondents' lives. These five subthemes are: smartphone has a functional role as a means of communication, it helps with mobilization, serves as a digital

No	Theme	Subtheme	Coding for theme
1	Smartphones have become an important part of life	- Communication function - Mobility function (Google Maps) - Digital payment function - Search for important information function - Entertainment function	- Smartphones are useful for communicating with family/ friends - Applications on smartphones (maps) are useful for directions when traveling - Applications on smartphones can be used for digital payments - Smartphones through available applications can be used to search for/acquire information - Applications on smartphones can be used for entertainment purposes such as watching movies, reading comics, listening to music
2	Smartphones trigger negative effects	- Cause distraction/divert attention - Cause radiation on the eyes - Cause sleep problem	- Application notifications on smartphones divert attention from doing tasks - Headache and eye strain - Urge to constantly watch Korean dramas, read novels and comics without regard to time and duration - Often staying up late due to using a cell phone - Feeling sleepy in the morning due to using a phone late at night
3	Anxiety and worry when not with smartphones (nomophobia)	- Feeling worried when not carrying a smartphone because of fear of losing communication with family or friends - Feeling afraid of getting lost when not carrying a smartphone while traveling - Feeling anxious/worried when not carrying a smartphone because unable to use important smartphone applications (losing convenience) during important activities - Feeling anxious/worried about missing important information when not carrying a smartphone - Feeling confused and restless if not carrying a cell phone	- Fear of getting lost when forgetting to bring a smartphone - Worrying when the smartphone is left behind when arriving at campus for class - Feeling anxious/worried about missing important information due to not carrying a smartphone - Always checking the smartphone at all times - Never accidently turning off the smartphone - Smartphone is always on - The feeling of confusion, restlessness, if not bringing a cell phone
4	Attachment and dependent to mobile phone	- Insecure feeling - Stress of uncertainty - Need for comfort	- Feeling insecure in facing constant life changes - Need an object that can be used to deal with a problem and uncertainty (secure base) - Need for security and comfort (safe haven)

Source(s): Authors work

Table 1.
Theme, subtheme and coding

payment function, serves as a function for searching for important information and serves as a source of entertainment.

Mobilization function. The second important function of a mobile phone is its direction indicator application when traveling (maps). One of the most popular and widely available on Android phones is Google Maps. When respondents are traveling, they need maps, especially since all respondents currently do not master directions and details of the roads in Yogyakarta. As students, they need maps when going to a location, so the mobile phone will always be brought as a directional tool. Respondents 3 and 4 emphasized this.

> If I forget my phone, I never do that, . . . but if I'm afraid of getting lost, then yes . . . because I don't know the roads in Jogja. . .. (R3)

> It's the same with my friends . . . if it's yesterday or today, we always prepare ourselves by opening the maps . . . see which road to take . . . which way to go. . . (R4)

Important information search function. The fourth subtheme that emerged regarding why mobile phones are important tools in respondents' lives is the function for searching important information. There are several applications on mobile phones that can be used to search for information. One of the most popular is Google. Everyone will use Google as a search engine in the virtual world. In addition, most mass media has provided online versions that can be accessed via the Internet. Mobile phones become important tools for searching that information, especially if that information is essential and important for individuals. This is as emphasized by Respondents 2 and 3.

> Besides, we can access a lot of information through our mobile phones. . . (R2)

> Okay . . . information related to my affairs such as college, assignments, and some other things. . . (R3)

Entertainment provider function. The following subtheme that appeared in all respondents is the function of smartphones as an entertainment provider. There are many applications that provide entertainment on Android or iOS smartphones. The most popular ones are Youtube, Spotify, Netflix, Wetpad and many more. The need for entertainment has become an important part of an individual's life. Entertainment is a relaxing activity that can reduce stress and pressure. Individuals seek entertainment to escape from exhaustion and boredom, as stated by Respondents 1 and 2.

> If on my smartphone it can also entertain me . . . practical function, communication, and entertainment . . . so I can watch videos, listen to music, or read comics . . . like that. . . (R1)

> Besides that, we can also make smartphones as one of the means of entertainment. . . (R2)

Communication function. All respondents stated that smartphone has a function as a communication tool. Especially for communicating with family, friends or lecturers. Therefore, smartphone is always brought when respondents are doing important activities such as studying, on campus or traveling. As social beings, individuals need communication ties to facilitate their daily activities. In addition, through communication, individuals can fulfill their belongingness needs. Positive communication with others will form deep emotional bonds, which will foster feelings of well-being. The function of smartphone as a communication tool is stated by Respondent 1:

> Smartphone is very important to me, on the smartphone, because if I am asked to choose, losing my wallet or losing my smartphone, then I will choose to lose my wallet . . . so in my opinion, smartphone is important . . . and it can also be used for communication . . . if we want to communicate, we can . . . inform our friends, I am not in the place . . . or we are going out . . . we can be informed through smartphone . . . so if there is no smartphone, I think it's a bit difficult. . . (R1)

Digital payment function. The third function that makes mobile phones an important tool in respondents' lives is digital payment. There are applications on mobile phones that can be used for buying and selling processes and payments, such as Gopay, OVO, Dana, Qris, mobile banking and many more. This digital payment function has replaced cash, so it is better to forget the wallet than to forget the phone. As conveyed by Respondent 1.

> My phone is very important to me, in my phone, I can . . . because if I am asked to choose between forgetting my wallet and forgetting my phone, then I will choose to forget my wallet. If I forget my phone, when we want to pay for something, we can use electronic features to make payments, such as Qris, Shopee Pay, Gopay . . . if we bring a wallet, it's hard to go anywhere, even though there is money and automatic teller machine (ATM) in the wallet. . . (R1)

Theme 2. Smartphones trigger negative effects

The second theme found from the verbatim analysis of the four respondents is that smartphones trigger negative effects. Two negative effects triggered by smartphones are causing distractions (attention diversion) and radiation on the eyes. Distraction is attention diverted to other activities while doing important tasks. All respondents conveyed this and acknowledged that smartphones cause distractions for them. The second effect is the radiation from the smartphone screen that causes tired eyes, eye twitching, fatigue and headaches.

Distraction effects. The negative effect of distraction occurs when respondents are working on their college assignments, then smartphone application notifications ring, and then they check and end up interested in opening video posts or links that appear. Without realizing it, respondents became more absorbed in enjoying information, videos or other things on their smartphones, so that the tasks they had to do were neglected. This was conveyed by Respondents 5 and 6.

> It's not the smartphone itself, but the applications inside it that can be a distraction, even when we want to do something else, we get distracted . . . smartphone applications sometimes create distractions. . . (R5)

> If I am doing an assignment . . . and receive a notification from WhatsApp or other media applications, sometimes I get distracted . . . so I set my smartphone to a distraction-free mode . . . I set it at 9 pm . . . so there are no more notifications coming in. . . (R6)

Radiation effects from smartphone screens. The second subtheme that emerged from the negative effects of smartphones is the radiation created by smartphone screens that disrupt eye function. The negative effects of this radiation are felt when all respondents have been exposed to smartphone screens for a long time. This impact is gradually and cumulatively felt by respondents, and if it becomes stronger, it will trigger pain, blurriness, fatigue, twitching in the eyes and headaches. This was conveyed by Respondents 7 and 8.

> The radiation . . . it makes the eyes blurry . . . then . . . tired . . . it goes up to the brain . . . usually . . . like a headache . . . that's what happens . . . when we play with the smartphone too much. . . (R7)

> I have never had a headache . . . but only my eye that feels a bit uncomfortable . . . but it's only one eye, . . . if that happens, I rest and sleep . . . or . . . sleep earlier. . . (R8)

Sleep problem. One of the other negative impacts is sleep disturbance. Respondents stated that due to using their phones late at night, their sleep time is reduced. Several respondents only sleep 3 h in the night. As a result, they feel drowsy in the morning. This lack of sleep time affects the quality of sleep, which causes activities in the morning to be disrupted as well. The consequences of sleep deprivation include decreased concentration during lectures, feelings

of fatigue and soreness in the body, disturbed mood, increased irritability, decreased motivation and heightened sensitivity. As stated by Respondents 8 and 10 below.

> Lack of sleep makes me easily irritable, my mood becomes negative . . . sometimes it makes me lazy to attend lectures. . . (R8)

> Another impact that I feel is . . . reduced sleep time . . . sometimes I only sleep for 2 hours at night . . . as a result, in the morning I feel drowsy, my body feels tired and sore. . . (R10)

Theme 3. Anxiety and worry when not with a mobile phone

The third theme obtained from the analysis of verbatim data from respondents is the emergence of anxiety or worry when away or not carrying a mobile phone. This phenomenon, according to previous studies, is called nomophobia. All subjects stated that they would retrieve their mobile phone if they forgot to bring it when they were out and about. Four subthemes were found from this worry, namely the interruption of communication with family/friends, the loss of important information, the fear of getting lost while traveling and anxiety about not being able to use important applications on their mobile phones.

Worried/anxious about being disconnected from communication. All respondents admitted that they would feel anxious and worried when not carrying their mobile phones with them. One of the reasons why they feel worried is the interruption of communication with family, friends and significant others. Especially since all respondents are away from their families in Jogja, their mobile phones are the main means of receiving news from their families or communicating with them, as well as with their friends. This is as stated by Respondents 9 and 10.

> I feel worried . . . in case my family wants to contact me suddenly . . . and coincidentally, I don't bring my mobile phone . . . so it's quite worrying. . . (R9)

> Nowadays, communication is also done through various features on mobile phones . . . not just through phone calls/SMS . . . now it's done through WhatsApp, email, etc.. . . (R10)

Fear of losing information. The second subtheme that emerged is that if respondents do not bring their mobile phones, they become anxious and worried about losing information or not being able to access it. This becomes a trigger for anxiety when they do not bring their mobile phones. Mobile phones are smart communication tools that respondents use to search for and obtain information. The Android or OS system in mobile phones is an operating system that can connect respondents with millions of virtual information. This is illustrated by the statements of Respondents 2 and 4 below.

> It depends on the information, . . . it's related to me . . . if it's outside of me . . . it's up to me . . . like lectures . . . news from family. . . (R2)

> But not at that time . . . but after knowing the information . . . it's like I'm late to know the information . . . it's not just uncomfortable . . . it's regretful, disappointed . . . why didn't I get the information earlier . . . why didn't I open my mobile phone earlier . . . and so on . . . can be left behind . . . some because they're left behind . . . some because they're not opened. . . (R4)

Fear of getting lost while traveling. Fear of getting lost while traveling without a mobile phone is one of the concerns that emerged and was felt by all respondents. Especially since all respondents are out-of-town students in Yogyakarta, they need the Google Maps application when traveling around the city of Yogyakarta. The mobile phone becomes a mobilization aid for respondents by providing map applications that can provide directions to their destination. As stated by Respondent 2:

> If I forget it, I'll definitely take it . . . I often experience that . . . at that time, I wanted to visit and see the campus . . . because it was my first time in Jogja, I didn't know where campus 1 was, campus 2, 3, 4, I didn't know . . . so I really needed Google Maps . . . so when I wanted to go to . . . ah ah . . . XXI cinema . . . to watch a movie, right, sir . . . in the city, sir . . . in Jogja . . . which way do we go home . . . which way do we go there . . . it's different again . . . so if . . . for example, I don't bring maps . . . I bring my mobile phone . . . I'll be confused later. . . (R2)

Anxious about not being able to use important application functions on the mobile phone (losing comfort). The fear of not being able to use the functions of the applications on the mobile phone when not bringing it emerged and was felt by all respondents. There is a sense of unease when not bringing the mobile phone while respondents are doing important activities such as studying or working. Respondents acknowledged that at present, everything can be done and accessed through the Internet. To access the Internet, respondents need their smartphones (mobile phones). This is as expressed by Respondent 3 below.

> If you ask me, I'm more worried, . . . because now everything is accessed through the internet, right, . . . from lecture information, to news from parents . . . they also use the internet now . . . so if, for example, the data package is already used up . . . we have to top up . . . because to connect to the computer, we also need it. (R3)

The next question that the researcher asked the respondents was how high their anxiety intensity was, on a scale of 1–10 (How intense is your anxiety? From a scale of 1–10?). A score of 1 indicates no anxiety, while a score of 10 indicates excessive anxiety. Of the four respondents, three said their anxiety was at a score of 7, indicating moderate anxiety, while six respondents chose a score of 9, indicating high anxiety. As stated by Respondents 4 and 2 below:

> For now, because there is a lot of important communication through WhatsApp, my anxiety level is 8, sir . . . if, for example, I don't have it with me . . . for now. (R4)

> As for me, sir, I'm at a score of 5. (R2)

Theme 4. Attachment and dependent on mobile phones (psychological dynamic process)

The fourth theme, namely, attachment to mobile phones, was obtained after analyzing the verbatim data of ten respondents. This theme is related to the emergence of strong psychological dynamics of attachment to mobile phones among the respondents. The underlying question for obtaining this fourth theme was why the respondents were dependent or highly attached to their mobile phones, as if they could not separate themselves from them. What are the psychological dynamics that occur within the respondents? How is the strong bond formed between the respondents and their mobile phones? Are there internal factors that trigger the emergence of this strong attachment to mobile phones? Through the process of data analysis, three sub-themes were found to be the internal factors that trigger the emergence of strong attachment and dependent on mobile phones, namely, insecure feelings, the need for comfort and the stress of uncertainty.

Insecure feeling. All respondents confirmed that they experience an insecure feeling when they are unable to use their smartphones. This insecure feeling triggers anxiety and worry, irritability, restlessness, confusion and an inability to be calm. When they are unable to use their smartphones, it is as if they are thrown out of the world of information, lose connection with the outside world, feel unable to do anything without the help of their smartphones, anxious and frustrated because they cannot access important information or communicate with others, feel disconnected from social groups or activities followed through the phone, such as social media or chat groups and feel worried about the inability to meet job demands or important tasks involving the use of phones. As expressed by the respondents below:

> When I don't bring my smartphone, it can make me frustrated and anxious, because I cannot monitor the development of my social media circle. (R7)

> If my smartphone is left behind and cannot be used, I will lose confidence whether I will be able to do my tasks. . . (R10)

> If I don't bring my phone, I will feel insecure. . . (R3)

Need for comfort. The need for comfort is a fundamental psychological requirement possessed by every individual. In the context of smartphone usage, individuals may feel comfortable and secure using them as smartphones can fulfill some basic psychological needs. Some of these fundamental needs include the need to connect with others, the need to feel safe and protected, the need for information, the need to alleviate boredom and the need for a sense of control.

Smartphones allow individuals to stay connected with those who are important to them, whether through voice calls, text messages or social media. Social interactions like these can provide a sense of connection and social support that are necessary for psychological well-being. Smartphones can also provide a sense of security and protection by enabling individuals to contact help or obtain information in emergency situations or when feeling unsafe. Additionally, smartphones can provide quick and easy access to various information that can satisfy individuals' curiosity and information needs. Moreover, smartphones can provide entertainment and fill leisure time by playing games, watching videos or reading interesting content. Lastly, smartphones enable individuals to feel in control of their situation and life by allowing them to schedule, manage tasks and manage personal content. As expressed by some respondents below:

> Of course, through my smartphone, I entertain myself when I'm bored, such as watching movies, reading books, or listening to music. . . (R9)

> My phone helps me communicate with family and friends. . . (R5)

> In an emergency, I need my phone to contact my family. . . (R2)

Stress of uncertainty. The stress of uncertainty can occur when individuals feel they have no control over a situation or do not have enough information to make informed decisions. In the context of mobile phone use, phones can help reduce the stress of uncertainty in several ways, such as accessing fast information, staying connected with others for support and enabling control and planning.

Mobile phones allow individuals to quickly and easily search for and obtain information, including information about situations that create uncertainty. With access to more information, individuals may feel more confident in making decisions or handling stressful situations. Mobile phones also enable individuals to stay connected with others, including family, friends or co-workers. This social interaction can provide the necessary social support to cope with stress caused by uncertainty. In addition, phones allow individuals to plan and organize their schedules more effectively, including scheduling activities and remembering important tasks. By planning and organizing their schedule, individuals may feel more organized and in control of the situation. With access to information, connection with others and the ability to plan and organize their schedule, individuals may feel more prepared and confident in dealing with situations that create uncertainty. This finding is confirmed by the statements of some respondents.

> Sometimes I feel a lot of uncertain changes, . . . so I certainly need a tool (smartphone) to deal with it. . . (R9)

> In this fast-changing and uncertain era, . . . the phone becomes an important thing in hand to prepare ourselves. . . (R8)

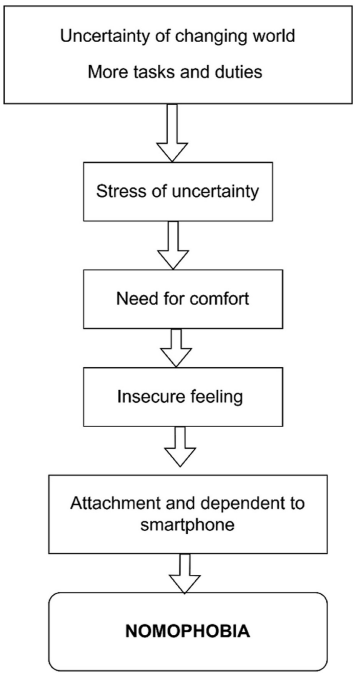
> Uncertainty makes me stressed, . . . so I use the phone to make myself feel safe and comfortable in facing the changes. . . (R3)

Based on the above explanation, it can be concluded that insecure feelings, the need for comfort and the stress of uncertainty are internal factors that trigger individuals' attachment to their smartphones. This attachment creates a feeling of dependence, so when individuals cannot use their smartphones, they will feel anxious and worried. This anxious and worried state then develops become nomophobia. Nomophobia, the fear of being without a mobile phone or unable to use it, can manifest through various signs and levels of anxiety. One common trigger is the anxiety associated with low battery levels, as individuals fear disconnection when their phone's power is running out. Signal anxiety, stemming from concerns about poor or no network reception, is another prevalent factor contributing to nomophobia. The fear of missing out (FOMO) can lead to heightened anxiety about being disconnected from important events, updates or social interactions if not constantly online. Additionally, individuals may experience communication dependency, relying heavily on their phones for social interaction and feeling anxious when unable to connect with others. Nomophobia can also be fueled by the constant need for social approval through social media, as well as work or academic pressures that instigate anxiety about missing crucial messages or updates. Security concerns may amplify nomophobia, as individuals worry about their personal safety or the ability to call for help in emergencies without a mobile phone. Dependency on specific apps and services, social situations and navigation apps can further contribute to the fear of being without a phone. The intensity of nomophobia varies among individuals, influenced by personal experiences, lifestyle and the role of technology in daily life. Based on the findings above, the psychological dynamics that occur in respondents can be illustrated in Figure 1.

Discussion

Mobile phones are the most commonly owned device among teenagers aged 12 and above and are also the most frequently used device for accessing the Internet (Ofcom, 2021). Across Europe, the most common age for a child to first own a mobile phone is 10 years old (GSMA and the Mobile Society Research Institute, 2016), with 91% of 12–15-year-old in the UK owning their own smartphone (Ofcom, 2021). Similarly, in the USA, 53% of children have a smartphone at age 11, increasing to 69% at age 12 (Rideout and Robb, 2019). Meanwhile, mobile phone users in Indonesia continue to increase. According to the Central Statistics Agency (BPS), 355.62 million people in Indonesia had mobile phones in 2020. This number grew by 4.2% compared to 2019, which was 341.28 million (Widi, 2022). In 2021, the Central Statistics Agency (BPS) reported that the percentage of mobile phone users in the country reached 65.87%, an increase from 62.84% in 2020 (Sadya, 2022).

Currently, it is estimated that 99% of students in Indonesia have a mobile phone in their pocket. It is almost impossible to find a student who does not own a mobile phone. Students use their phones for various purposes, including finding library sources, information, taking selfies, communicating, updating status, surfing social media, playing online games, doing coursework/school assignments, watching films, paying bills, eMoney, ePay and listening to music. Most students are attached and dependent on their phones because of the Internet connection that can connect them to the digital world (Chan *et al.*, 2022). The sophistication of mobile phones also can be used positively by students to directly search for learning resources through Internet connections (Bull and McCormick, 2012). However, when cell phones are used more for entertainment purposes, it will have a negative impact on academic performance (Levine *et al.*, 2012). Tindell and Bohlander's



Source(s): Authors work

Figure 1.
Psychological dynamic process of attachment/ dependent on smartphone

(2012) study found that students often use their phones during lectures, which then triggers distractions in the learning process.

This study found four main themes related to the psychological dynamic and personal meaning of respondents regarding the use of cell phones by students. The first theme is that cell phones have become an important part of individuals' lives. The second theme is related to the negative impact of cell phone use. The third theme is related to anxiety and worry when not carrying their cell phone. The fourth theme is related to the psychological dynamic process of attachment to the phone.

The first theme: smartphones have become an important part of life

For the first theme finding, why has the cell phone become an important part of individuals' lives? This is because the function of the phone has been able to replace other tools to facilitate the achievement of individuals' daily goals. Several studies describe that smartphones expand the "self" of humans beyond the human body and that smartphones become part of the "human self." For example, smartphones can be considered an extension of the human body (Davel, 2017; Katz, 2003; Walsh and White, 2007), part of the user's identity (Vykoukalová, 2007) and part of the individual's daily life (Ling, 2004).

The relationship between smartphones and the human self can be conceptualized as the extended-self thesis (Belk, 2013; Clark and Chalmers, 1998), which argues that the human self is not internally limited to the body but can be extended outside the body through interaction between humans and technology. The concept of self-extension (extended self) and how this self-extension is formed through smartphones can be grouped into three different forms, namely, functional, anthropomorphic and ontological (Sui and Sui, 2021).

Functional self-extension is a form of self-extension that relies on the practical functionalities and capabilities offered by smartphones (Sui and Sui, 2021). Individuals perceive their smartphones as extensions of their abilities, skills and cognitive capacities. For instance, people may view their smartphones as a quick means to access information, stay organized, manage schedules or efficiently perform various tasks. The smartphone becomes an essential tool that enhances their functional capabilities and becomes integral to how they navigate and engage with the world.

Anthropomorphic self-extension is a form of self-extension in which individuals anthropomorphize or attribute human-like qualities and characteristics to their smartphones (Sui and Sui, 2021). They perceive their devices as companions, helpers or even extensions of their social selves. People might talk about their smartphones as if they have personalities or emotions, and they develop emotional attachments to these devices. Anthropomorphic self-extension occurs when individuals form deep connections with their smartphones, making them an integral part of their social and emotional lives.

Ontological self-extension involves the philosophical and existential aspects of self-identity in relation to smartphones (Sui and Sui, 2021). Individuals experiencing ontological self-extension view their smartphones as a core component of their being and existence. The device becomes inseparable from their sense of self and existence in the modern world. This form of self-extension is rooted in how individuals perceive their own identities in today's technologically interconnected society, where smartphones play a central role in communication, information sharing and social interactions.

Five subthemes of the important functions of cell phones for individuals were found, namely, the first function of communication, the second function of direction guidance (mobility), the third function of digital payment, the fourth function of searching for important information and the fifth function of entertainment. These five important functions are called functional extensions of cell phones. Throughout history, humans have pursued the goal of improving physical and mental abilities and for thousands of years, technology has been developed as a tool to transcend human limitations and enhance one's capabilities (Masci, 2016). As an external object, a phone can become a part of the self when it can be controlled like an arm or a leg. The more control one has over their phone, the closer it becomes to an inseparable part of the self (Park and Kaye, 2019).

As a communication tool, phones cannot be ignored as they have connected people in a communication channel that surpasses distance and time. As social creatures, individuals need interaction with others, both verbally and non-verbally, directly or indirectly, face to face or through video calls (Gong *et al.*, 2019). The fulfillment of positive interpersonal communication is directly correlated with an individual's psychological well-being and happiness (Kroencke *et al.*, 2022; Eganov *et al.*, 2020). Phones have provided an unparalleled means of facilitating communication with others (Ma'azer Al Fawareh and Jusoh, 2017). Communication with family and close friends is crucial to maintaining social networks, building social trust and increasing a sense of ownership and happiness (Gong *et al.*, 2022; Langlinais *et al.*, 2022).

Phones are also useful as devices that provide direction when traveling. The well-known and often-used application is Google Maps. Through this app, individuals can travel to places they have never been to without fear of getting lost. This makes the phone a device that must be carried when traveling. The function of providing direction (facilitating mobility) is a subtheme of the important role that phones play in an individual's life. Phones can also be used for digital payments. Applications such as GoPay, OVO, Dana, Shopeepay and Qrist on phones can be used to replace physical currency payments. Even banking transactions such as transfers and payments can be made through mobile banking on phones. Phones have replaced the function of physical currency that used to be carried in a wallet. However, not all transactions in stores or shops can currently use e-payment.

Currently, mobile devices are becoming smarter and instantly connected to the internet, allowing users to explore the virtual world. Google, the most widely used information search engine worldwide, is embedded in mobile devices, enabling individuals to find essential information within seconds. This function is what makes mobile devices play a significant role in individuals' lives. Without the convenience of information search, individuals may lose connection with the outside world and experience an FOMO (Sha *et al.*, 2019). In addition, mobile devices provide 24-h unlimited entertainment. Anyone can access desired entertainment such as movies, videos, photos, music, games and novels. Entertainment is one of the essential needs of individuals. However, excessive fulfillment of this need may trigger long-term negative effects such as depression, anxiety symptoms, academic performance decline and problematic smartphone use (Sha *et al.*, 2019; Rozgonjuk *et al.*, 2018; Giunchiglia *et al.*, 2018). Through smart mobile devices, individuals can satisfy their desires for entertainment, alleviate boredom and fatigue and serve as an escape mechanism during stress and pressure (Lepp *et al.*, 2014). Previous studies indicate that students tend to use their mobile devices more for entertainment purposes than academic purposes, which may lower their academic performance (Lepp *et al.*, 2015).

The second theme: smartphones trigger negative effects

Based on the interview with the respondents, it was found that mobile devices have both positive and negative impacts on them. Three negative impacts mentioned were distractions, sleep problem and screen radiation on the eyes. These findings align with previous research, which found that mobile devices serve as a source of distraction, procrastination and multitasking/task-switching (Levine *et al.*, 2012) that negatively affect academic performance. There are four potential causes of these distractions. First, visual and auditory notifications on the mobile screen distract attention during lectures or task completion (Junco and Cotten, 2012). Second, the fear of missing out on online activities and the desire to stay constantly connected to the Internet (Chen and Yan, 2016) also contributes to attention diversion. Third, the use of mobile devices during class or task completion as a result of addiction behavior and cyberslacking (Lin and Chiang, 2017), and finally, due to low learning motivation, students experience boredom and seek entertainment through their mobile devices as an escape mechanism (Hawi and Samaha, 2016). These factors make mobile devices a source of distraction for individuals, which may affect their academic performance in the long run.

Apart from distractions, respondents also reported negative effects of screen radiation, which include eye strain, blurry vision, eye irritation and headache. Cell phone radiation has been a subject of concern for many years due to its potential negative effects on human health. Some of the negative effects of cell phone radiation include increased risk of cancer, impact on fertility, sleep disturbances, eye strain and increase in anxiety and depression. Studies have shown that cell phone radiation may increase the risk of certain types of cancer, particularly, brain tumors (International Agency for Research on Cancer, 2011). Research has suggested that exposure to cell phone radiation may have a negative impact on male fertility, such as decreased sperm count and motility (Agarwal *et al.*, 2008). The blue light emitted from cell phone screens can disrupt the body's production of melatonin, leading to sleep disturbances and insomnia (Cao *et al.*, 2019). Extended use of cell phones can cause eye strain, dry eyes and other vision problems (Stringham *et al.*, 2017). Excessive cell phone use also can be linked to increased anxiety and depression (Rosen *et al.*, 2013). However, it should be noted that there is still debate among experts about the extent of the negative effects of cell phone radiation on human health. While some studies have suggested a significant risk, others have found no conclusive evidence of harm.

The sleep problem is a consequence experienced by respondents due to excessive mobile phone use and nomophobia. All respondents stated that they lacked sleep at night due to

excessive mobile phone use, with an average of only 3–4 h of sleep per night. These findings are consistent with previous research that found a relationship between problematic mobile phone use and nomophobia with sleep problem. Several studies have found a link between excessive mobile phone use and poor sleep quality. A study by Chellappa *et al.* (2011) found that exposure to the blue light emitted by mobile phone screens can suppress the production of melatonin, a hormone that regulates sleep. Lepp *et al.* (2013) found that college students who reported high levels of mobile phone use also reported poorer sleep quality and higher levels of daytime sleepiness. Furthermore, Thomée *et al.* (2011) found that heavy mobile phone use was associated with an increased risk of sleep disturbances and symptoms of depression and stress. Another study by Demirci *et al.* (2015) found a similar finding that nomophobia was associated with poor sleep quality and an increased risk of sleep problems. In summary, previous studies have suggested that excessive mobile phone use, including nomophobia, can have a negative impact on sleep quality. These negative effects may be due to exposure to blue light, as well as the potential for mobile phone use to interfere with normal sleep patterns and cause psychological distress.

The third theme: anxiety and worry when not with smartphones (nomophobia)

This study also found that all respondents were found to experience worries or anxiety when they did not have their mobile phones. There were four sub-themes that emerged, namely, anxiety about being disconnected from communication, anxiety about missing information, anxiety about getting lost when travelling and worries about losing the comfort of the phone's functions. The finding that all respondents in the study experienced worries or anxiety when they did not have their mobile phones highlights the phenomenon of nomophobia, which is a type of anxiety disorder characterized by the fear of being without a mobile phone or being unable to use it (Yildirim and Correia, 2015).

The four subthemes that emerged in the study, namely, anxiety about being disconnected from communication, anxiety about missing information, anxiety about getting lost when traveling and worries about losing the comfort of the phone's functions, are consistent with previous research on nomophobia (e.g. Chóliz, 2012; Yildirim and Correia, 2015). These subthemes reflect the various reasons why individuals experience anxiety when they are separated from their phones.

For example, anxiety about being disconnected from communication is related to the need for social interaction and the fear of missing out on important events or news. Anxiety about missing information is linked to the need for constant access to information and the fear of being uninformed or behind on current events. This anxiety is related to the need for social interaction and the fear of missing out on important events or news. Several studies have shown that mobile phone use is closely related to social connectedness (Bian and Leung, 2015; Kim and Lee, 2011). When individuals are separated from their mobile phones, they may feel isolated and disconnected from their social network, which can cause anxiety and distress (Jenaro *et al.*, 2007). In addition, the FOMO has been identified as a significant factor in mobile phone addiction (Elhai *et al.*, 2018; Lin *et al.*, 2016). FOMO refers to the apprehension that others are having rewarding experiences that one is not, which can lead to anxiety and a compulsive need to stay connected to mobile devices. Overall, the anxiety about being disconnected from communication is a complex psychological phenomenon that is closely related to social and emotional factors.

Anxiety about getting lost when traveling is related to the reliance on mobile phones for navigation and the fear of being lost or stranded without a means of finding one's way. Research suggests that anxiety about getting lost when traveling can be attributed to the reliance on mobile phones for navigation and the fear of being lost or stranded without a means of finding one's way. In a study by Sung *et al.* (2016), it was found that individuals with

high levels of nomophobia, or fear of being without a mobile phone, were more likely to use their phones for navigation purposes.

Furthermore, a study by Kang *et al.* (2017) found that individuals who experienced anxiety when separated from their mobile phones perceived their phones as a "safety device" that provided a sense of security and comfort when traveling in unfamiliar places. This suggests that the fear of getting lost when traveling without a mobile phone may be linked to a sense of vulnerability and insecurity. This anxiety may also stem from a sense of vulnerability and insecurity without the perceived safety and comfort provided by mobile phones.

Worries about losing the comfort of the phone's functions are related to the need for the phone as a tool to achieve personal goals and the fear of losing access to its practical functions. These findings are consistent with previous research that has identified the importance of mobile phones in modern society and the role they play in fulfilling basic human needs, such as social connection and information seeking (Bianchi and Phillips, 2005; Ling and Yttri, 2002). When individuals perceive that their access to these needs is threatened or compromised, they may experience feelings of anxiety or worry. Although based on the respondents' statements, three respondents stated that their anxiety levels were moderate (Score 5 out of 10) and seven persons stated high (Score 8 out of 10). However, subjectively, all respondents experienced uncomfortable feelings when not having their phones. Overall, this study's finding on nomophobia is consistent with previous research on the psychological effects of mobile phone use and addiction. It highlights the importance of understanding the psychological dynamics of mobile phone use and how it affects individuals' daily lives and well-being.

The fourth theme: attachment and dependent to mobile phone

This study also found the psychological dynamics process of strong attachment and dependent on smartphones. There are three internal factors that cause individuals' dependence and attachment to their phones. These three internal factors are caused by rapid environmental changes that trigger the emergence of uncertainty. These changes that create uncertainty trigger the stress of uncertainty, insecure feelings and the need for comfort. These psychological dynamics processes can be explained through attachment theory. According to Fraley (2019), the term "attachment" refers to an emotional bond in which a person seeks proximity to an attachment figure, utilizing them as a safe haven during times of distress and as a secure base for exploring the world. Attachment theory is a well-known construct within psychological research, addressing issues related to interpersonal relationships, personality development, psychotherapy and parenting (Holmes, 2014). Bowlby first introduced attachment theory in 1958, emphasizing the importance of children's emotional bonds with their primary caregivers, which provides a reliable explanation for the intense distress experienced by children separated from their primary caregivers. Beyond the infant-caregiver relationship, research has expanded to investigate the effects of attachment on adult psychological functioning (Fraley and Roisman, 2019; Pietromonaco and Beck, 2019). Evidence from literature suggests that attachment figures, such as parents, peers and partners, often play crucial roles in the development of children, adolescents and adults (Cicirelli, 2010; Fraley, 2019).

In addition to forming emotional bonds with other people, individuals may also develop an attachment to material possessions, which is referred to as "material possession attachment" (Kleine and Allen, 1995; Kleine *et al.*, 1995). This attachment may involve legal or physical possession of an object or merely a psychological sense of ownership. Similar to interpersonal attachment, the attachment to material possessions is unique to the owner and the loss of a treasured object may cause a sense of personal loss (Hsu and Tseng, 2016). While the objects of material possession attachment can vary among individuals, smartphones have become a common and widespread object of attachment in modern society, with many users

developing an intimate relationship with their phones (Asante, 2019; Kim *et al.*, 2013; Konok *et al.*, 2016; Trub and Barbot, 2016, 2019).

Conclusion

This study aims to explore the personal and intimate experiences of individuals with their smartphones. The phenomenological approach was used as the reference framework for this study. There were four major themes that emerged from the interviews with the respondents, namely, the phone has become an inseparable part, negative impacts, anxiety when unable to use the phone and attachment to smartphone. All respondents felt of anxiety being without their smartphones and this anxiety has caused mild dysfunction and problems that interfere with the individual's daily functioning. Nevertheless, the construction and conceptualization of nomophobia are still relatively new, in infancy and inconclusive, thus requiring further exploration through cross-sectional, longitudinal, experimental and in-depth qualitative studies, particularly, in multicultural contexts. Therefore, caution is needed in understanding nomophobia to avoid the tendency to pathologize.

Implications

The results of this research indicate that excessive smartphone usage has negative impacts both psychologically (nomophobia) and physiologically (screen radiation, tired eyes, eye twitching, fatigue and headaches). Although smartphone usage can also bring benefits to individuals, as long as they are used for positive activities such as learning, completing tasks or homework. However, the findings of this research show that smartphone usage is often predominantly for excessive entertainment activities (listening to music, watching movies, reading novels, simply checking friends' social media updates), thus distracting from more important and urgent activities.

In the functional context, it is recommended that individuals be more mindful of their smartphone usage and strive to strike a balance between utilizing their device's capabilities for productive purposes and avoiding excessive dependency that may lead to distractions or information overload. This includes limiting excessive smartphone usage for entertainment purposes, restricting aimless and irrelevant Internet browsing and implementing effective time management when using smartphones.

For smartphone users from the ontological context, the advice is to critically evaluate their digital presence and ensure that their online activities align with their true values and self-perception, promoting responsible and ethical smartphone use. Engaging in fasting or break sessions by completely turning off the smartphone at specific times and utilizing that time for activities such as reading books, writing, engaging in spiritual practices or exercising is also advisable.

In the anthropomorphic context, individuals are advised to reflect on the potential emotional dependence on their smartphones and consider establishing healthy boundaries to avoid excessive reliance on these devices to fulfill emotional needs. One practical recommendation is to engage in self-reflection, where individuals take some time to ponder their smartphone usage patterns and emotional attachment to the device. They should ask themselves why they feel the need to constantly check their phone and how it impacts their emotions and overall well-being.

A critical reflection

It is crucial to undertake a critical examination of the findings and avoid rushing into pathologization, which refers to the tendency of interpreting normal symptoms as indicative of a disease or mental disorder (Conrad and Schneider, 1992). In the field of mental health,

pathologization often leads to overdiagnosis or a refusal to accept certain behaviors as within the realm of normality (Conrad, 2005). It involves labeling ordinary behavior as problematic and deviant, subsequently necessitating intervention, treatment or medication (Sholl, 2017). This raises the question: Is anxiety resulting from not having a phone considered abnormal or normal behavior? When considering the factors contributing to this anxiety (nomophobia), the research findings demonstrate that apart from the essential functions' smartphones serve in helping individuals achieve their goals and carry out daily activities, they also indicate the presence of feelings of insecurity, stress due to uncertainty and the need for comfort. These factors drive individuals to excessively use smartphones as a means of alleviating stress by engaging in more online entertainment media. Individuals with anxious personalities are more prone to developing a dependence on their smartphones as a way to seek comfort and security.

Sui and Sui (2021) argue that most research on nomophobia overlooks the contextual factors that give rise to this phenomenon and instead pathologizes the need for communication and the significant functions of smartphones. They contend that it is understandable for individuals to experience anxiety when they are without their phone during times when they need it to pursue their interests. The reasons why individuals feel anxious in such situations are multifaceted and should not be reduced to a personal phobia. According to Sui and Sui, the current conceptualization of nomophobia places undue pressure on individuals to overcome their presumed "phone phobia," instead of acknowledging that the pervasive use of smartphones in contemporary society is shaped by social and environmental factors beyond their control. However, based on the findings of this research, excessive smartphone use causes harmful effects and leads to an increase in problematic use, which subsequently results in negative consequences in individuals' lives.

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