

Examining the Impact of Smartphone Dependency on Anxiety and Depression Symptoms Among Individuals Aged 25-35 Years Old: A Quantitative Study

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ABSTRACT

Nomophobia is characterized by a pervasive anxiety experienced when an individual is separated from their smartphones. Prior research has documented the prevalence of nomophobia along with the impact of nomophobia in both anxiety and depression for samples of college or university aged individuals. In contrast, there is only scarce or emerging research on the prevalence and mental health impact (anxiety and depression) of smartphone dependency among adults aged between 25 and 35 years old in the year 2020. The target age of participants for this quantitative study was chosen because they would have been the early adopters of smartphones when smartphones were initially available for the general population use starting in 2007. This research study showed that 64% of the sample of 25 and 35 years old participants had a diagnosable level of Nomophobia. Moreover, this research study showed that corresponding increases in self-reported Nomophobia scores among 24-35 year old participants had a corresponding increase in both their self-reported anxiety and depression scores. The research study concludes by proposing further longitudinal research on the effects of Nomophobia, further examination of the causal relation between the variables examined in this study, and recommending educational policies that encourage digital balance for using smartphone use among 24-35 year olds.

Keywords: Nomophobia, Smartphone Dependency, Anxiety, Depression.

INTRODUCTION

Based on the recent research literature, nomophobia is characterized by a pervasive anxiety experienced when an individual is separated from their smartphones (Rodríguez-García et al., 2020, Samaha et al., 2019, Yildirim & Correia, 2015). This fear often manifests as agitation, irritability, and panic, reflecting the deep-seated dependency on smartphone technology. Nomophobia is not merely a trivial concern but a significant psychological issue that can impact an individual's daily functioning and mental health. To provide a historical and sociological

context, mobile phones have evolved from simple communication tools to multifunctional smartphone devices integral to various aspects of daily life, including social interaction, information retrieval, security access, and entertainment (Han & Cho, 2016). This transformation has intensified the reliance on smartphone technology, leading to the development of nomophobia. As smartphones became more embedded in social, personal and professional practices in the 21st century, the fear of losing access to these devices has grown proportionately (Rodríguez-García et.al., 2020).

Previous research has revealed varying prevalence rates of nomophobia. According to a study by Yildirim and Correia (2015), approximately 50-70% of smartphone users exhibit symptoms of nomophobia. This high prevalence underscores the significance of nomophobia as a modern psychological concern affecting a substantial portion of the population. It has been previously documented that younger populations, particularly adolescents and young adults, are more susceptible due to their higher engagement with digital technologies (Bianchi & Phillips, 2005). Additionally, some studies suggest that females may experience higher levels of nomophobia compared to males, although findings on gender differences are mixed (Sohn et.al. 2019). The typical smartphone user will check their device 47 times a day, most of whom will do so even when it interrupts quality time with family and friends (Richter, 2015). Smartphone use may begin immediately upon awakening and is often the last act performed before sleeping at night. Nearly 50% of smartphone users have attempted to decrease smartphone usage, with only 30% doing so successfully (Richter, 2015).

The constant need for connectivity and fear of missing out can lead to heightened anxiety levels. Empirical studies have established a significant correlation between nomophobia and anxiety (Elhai et al., 2017, Nauert, 2018). For example, Yildirim and Correia (2015) found that higher levels of nomophobia were associated with increased anxiety levels among a sample of university students. Similarly, a longitudinal study by Elhai et al. (2017) demonstrated that nomophobia contributed to higher anxiety and stress levels in college students, highlighting the psychological impact of smartphone dependence. Nomophobia's impact on experiencing anxiety also has physiological manifestations including increased heart rate and elevated cortisol levels. The stress response triggered by nomophobia often leads to heightened physiological arousal, contributing to the overall experience of anxiety (Elhai et al., 2019). These psychophysiological responses reinforce the connection between nomophobia and anxiety, illustrating the complex interplay between psychological and physiological factors.

Nomophobia's pervasive nature can also contribute to depressive symptoms. The pressure to remain constantly connected and the fear of social exclusion can lead to feelings of sadness, hopelessness, and diminished self-worth (Thomée et al., 2011). The constant digital engagement can exacerbate feelings of isolation, further intensifying depressive symptoms. Several studies have found a significant relationship between nomophobia and depressive symptoms. For instance, a study by Sharma et al. (2019) revealed that nomophobia was a significant predictor of depression among adolescents.

In terms of an overarching theoretical framework, the habit theory of addiction (Oulasvirta et. al., 2012) is a strong explanatory framework for the phenomenon of nomophobia. Smartphone dependency can be conceptualized using this habit theory of addiction because smartphone dependency forms persistent habitual acts (Messinis, 2002). The habit-forming qualities of

smartphones are evident when habitual smartphone use occurs, followed by withdrawal symptoms when the device is taken away. Neurobiological research indicates that smartphones stimulate the brain's reward system, reinforcing compulsive usage and dependence (Turel & Bechara, 2016). This stimulation can create a cycle of anxiety and stress when individuals are separated from their smartphones. As with other addictions or dependency, withdrawal symptoms brought on by having a smartphone device taken away may cause significant discomfort that may lead to anxiety and depression (Oulasvirta et al., 2012).

Purpose of the Study

Nearly all of the existing research literature on the impact of smartphone dependency on mental health disorders, such as anxiety and depression, focuses on adolescents and college or university-aged students. In contrast, there is only scarce or emerging research on the prevalence and mental health impact (anxiety and depression) of smartphone dependency among adults currently aged between 25 and 35 years old. The target age of participants for this study was chosen because these would have been the early adopters of smartphones when smartphones were initially available for the general population to use starting in 2007 (i.e the initial market launch of the Iphone) (Lee, 2014). This study used the Beck Depression Inventory (BDI) and Beck Anxiety Inventory (BAI) scales in measuring the dependent variables of depression and anxiety, respectively. The Beck Inventories are measurement tools that have been well-validated and used as screening or diagnostic tools for identifying elevations of depression and anxiety among mental health clients by mental health professionals for decades (Fydrich et.al. 1992, Wang & Gorenstein, 2013). To measure the independent variable of smartphone dependency, the researchers used the validated Nomophobia Questionnaire (NMP-Q) developed by Yildirim and Correia (2015). Figure 1 below summarizes the conceptual framework of the current research study.

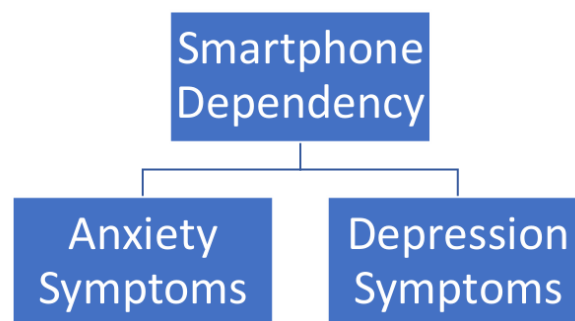


Figure 1: Conceptual Framework

Research Questions

1. What is the prevalence (in percentage) of smartphone dependency as measured by the Nomophobia Questionnaire (NMP-Q) with a sample of 25–35-year-old adults?
2. Is there a linear relationship between smartphone dependency severity as measured by the Nomophobia Questionnaire (NMP-Q) and the experience of anxiety severity as measured by the Beck Anxiety Inventory among a sample of 25–35-year-old adults?
3. Is there a linear relationship between smartphone dependency severity as measured by the Nomophobia Questionnaire (NMP-Q) and the experience of depression severity as measured by the Beck Depression Inventory among a sample of 25–35-year-old adults?

METHODOLOGY

Participants

Participants were 109 people recruited via the crowdsourcing platform Amazon Mechanical Turk workforce. The inclusion criteria for the current research study were that all participants must aged between 25 to 35 and own a smartphone device at the time of their participation in the online survey (between August 28, 2020 and October 2, 2020). The majority of the participants (78.9%) were employed full-time. Seventy-five percent of participants indicated that they self-identified as heterosexual, with 20% of participants identifying as bisexual. Annual household incomes amongst participants ranged from under \$29,999 to \$100,000 or more. Predominantly, participants of the study earned between \$50,000 and \$74,999 per year.

Instrumentation

First, there were demographic questions such as age, sexual identity, employment status, and annual income were asked of all participants at the start of the online survey. To measure whether smartphone dependency was correlated to symptoms of anxiety or depression in the sample of participants aged 25 to 35 years old, three reliable scales were utilized in the online survey. To determine whether there are qualities of smartphone overuse or dependency among participants, the Nomophobia Questionnaire (NMP-Q) developed by Yildirim & Correia (2015) was used in the study. This scale is a self-report measure to determine whether the respondents were experiencing smartphone dependency. This scale relies on a 7-point Likert scale ratingsystem with answers ranging from 1=strongly disagree to 7=strongly agree. Twenty total questions were asked of respondents focused on all surrounding potential circumstances that may indicate smartphone dependency. Although this scale was originally developed to measure smartphone dependency among undergraduate students, it was easily adaptable to a slightly higher age range of 25-35 year olds which was the focus of the current study. Participants with NMP-Q scores in the range of 60–99 were classified as having moderate nomophobia. If the NMP-Q score was between 100 and 140, the individual's nomophobia level was considered severe (Yildirim & Correia, 2015).

Next, to measure anxiety levels in participants, the Beck Anxiety Index was included in the questionnaire (Fydrich et.al. 1992). The Beck Anxiety Index (BAI) is a brief survey made up of 21 questions that ask participants to rate levels of related anxiety on a score value of 0 (not at all) to 3 (severely). The scoring system used to determine results is simple, as a higher total score indicates more severe anxiety symptoms. The BAI score range is 0–63. A total score of 0–7 on the BAI is considered minimal range for anxiety, 8–15 is mild anxiety, 16–25 is moderate anxiety, and 26–63 is severe anxiety. The BAI has been found to discriminate well between anxious and nonanxious diagnostic groups and, as a result, is useful as a screening measure for anxiety. The reliability coefficient for the BAI is 0.92; the test–retest reliability is 0.75 (Fydrich et.al. 1992).

Lastly, to measure potential depressive symptoms in participants, the Beck Depression Inventory (BDI) II was used (Wang & Gorenstein, 2013). The BDI II has been one of the most trusted and widely used scales among psychometric tests in measuring the severity of depression.

The BDI II is a brief, 21-question survey that can be self-administered and scored. The Beck Depression Inventory II maintains the ability to reach a wide array of people due to

its accessibility and simplistic use of language. Cut-off score guidelines for the BDI II are given with the recommendation that thresholds need to be adjusted based on the characteristics of the sample. A total score of 0-13 on the BDI II is considered a minimal range of depression, 14-19 is mild depression, 20-28 is moderate depression, and 29-63 is severe depression. The BDI-II has clinical sensitivity with a coefficient alpha equal to 0.92. and an internal consistency (coefficient alpha) ranging between 0.92 - 0.94 depending on the sample (Wang & Gorenstein, 2013).

Procedure

All participants were recruited and monetarily incentivized through Amazon's Mturk online recruitment service to participate in the online survey. The participants provided their voluntary consent and completed the online survey on the secure and confidential SurveyMonkey platform between August 28, 2020 and October 2, 2020. Any incomplete online surveys were removed from the data analysis of the current research study.

RESULTS

- **Research Question 1: What is the prevalence (in percentage) of smartphone dependency as measured by the Nomophobia Questionnaire (NMP-Q) with a sample of 25-35-year-old adults?**

Descriptive statistics were used to analyze data collected regarding the prevalence of smartphone dependency across participants included in the study. As determined by the validated NMP-Q Scale, there was a substantial prevalence of smartphone dependency amongst participants in the study. Findings showed that 70 out of 109 participants had NMP-Q scores above 60, representing 64% of the sample population, which indicated as having smartphone dependency.

The published proportion of Nomophobia in a prior study 89% (0.89) (American Academy of Sleep Medicine, 2020) used a sample of 327 college aged students (18-22 years old) was compared with the proportion of Nomophobia from the current sample of 109 participants aged 25-35 years old (64% or 0.64). A one-sample, two-tailed t-test showed that the proportion of participants who could be considered experiencing nomophobia (i.e. NMP-Q scores above 60) from the current sample of 25-35 year old participants for the current study (64% or 0.64) was statistically lower than the published proportion of nomophobia in a prior study of 89% (0.89) that used a sample of 18-22 year old college-aged participants, $Z = -8.3$, $p < 0.001$, $CI = 0.5499 - 0.7301$.

- **Research Question 2: Is there a linear relationship between smartphone dependency severity as measured by the Nomophobia Questionnaire (NMP-Q) and the experience of anxiety severity as measured by the Beck Anxiety Inventory among a sample of 25-35-year-old adults?**

The linear regression analysis showed that there was a statistically significant linear relationship between the independent variable of the self-reported Nomophobia scores, via the NMP-Q, and the dependent variable of self-reported anxiety scores, via the BAI, among all the participants in the survey, $F(1, 106) = 32.87$, $p < 0.001$. Overall, the research project found an Rsquare value of 0.24 which means that 24% of the self-reported anxiety scores are predicted

by the variance in the self-reported Nomophobia scores of the participants. The positive slope of 6.59 ($\beta = 6.59$, $t = 5.73$, $p < 0.001$) indicates a positive linear relationship where there is a corresponding increase in self-reported Nomophobia scores among participants alongside the increasing self-reported anxiety scores among the same participants.

- **Research Question 3: Is there a linear relationship between smartphone dependency severity as measured by the Nomophobia Questionnaire (NMP-Q) and the experience of depression severity as measured by the Beck Depression Inventory among a sample of 25–35-year-old adults?**

The linear regression analysis showed that there was a statistically significant linear relationship between the independent variable of the self-reported Nomophobia scores, via the NMP-Q, and the dependent variable of self-reported depression scores, via the BDI, among all the participants in the survey, $F(1, 106) = 32.19$, $p < 0.001$. Overall, this research study found an R-square value of 0.23 which means that 23% of the self-reported depression scores are predicted by the variance in the self-reported Nomophobia scores of the participants. The positive slope of 5.94 ($\beta = 5.94$, $t = 5.67$, $p < 0.001$) indicates a positive linear relationship where there is a corresponding increase in self-reported Nomophobia scores among participants alongside the increasing self-reported depression scores among the same participants.

DISCUSSION

The first purpose of this current study was to identify the prevalence (in percentage) of smartphone dependency as measured by the Nomophobia Questionnaire (NMP-Q) with a sample of 25–35-year-old adults. The findings of the current study showed that 64% of the sample participants aged 24–35 years old had NMP-Q scores above 60 which indicated as having smartphone dependency. This research finding aligns with previous research that approximately 50–70% of smartphone users exhibit symptoms of nomophobia (Yildirim and Correia, 2015). Moreover, the current research study shows 64% of the sample participants aged 24–35 years old had NMP-Q scores above 60, which indicated as having smartphone dependency, was statistically lower than the published proportion of Nomophobia from a prior study indicating 89% (American Academy of Sleep Medicine, 2020) that used a sample of 327 college-aged students (18–22 years old). This suggests that there was a significant difference of diagnoseable Nomophobia between college-aged sample versus a sample of 24–35 years old individuals.

Future research can investigate if a longitudinal design would show if the diagnoseable percentage prevalence of Nomophobia reduces over time from a college-aged (or universityaged) participants as they transition towards 24–35 years old and then towards middle age (ex. 40–65 years old).

The second purpose of this current study is to examine if smartphone dependency as measured by the Nomophobia Questionnaire (NMP-Q) with a sample of 24–35 year old participants had any statistically significant linear relationship with the self-reported anxiety (as measured by the BAI) and self-reported depression (as measured by the BDI) among the aforementioned sample of participants. This research study showed that corresponding increases in self-reported Nomophobia scores among 24–35 year old participants had a corresponding increase in both self-reported anxiety and depression scores among the same participants. In examining

the sample data in more depth, the researchers found that sixty-three percent of participant responses indicated that they have very low anxiety to mild anxiety (BAI scores 0-15) (see Table 1 below).

Table 1: Beck Anxiety Inventory Scores

0-15	69	63%
16-25	20	18%
36+	21	19%

While the sample of participants did self-report that they suffered from some anxiety symptoms based on the BAI, it was surprising that a higher prevalence of moderate (BAI scores 16-25) to severe anxiety (BAI scores > 36) based on the cutoff scores on the BAI was not documented from the sample of participants. Future research should be conducted to examine if increasing levels of Nomophobia directly affect increasing levels of anxiety symptom severity versus the possibility of individuals having pre-existing levels of anxiety increasing the level of Nomophobia experienced among 24-35 year-old participants.

Moreover, thirty percent of participants had response rates that indicate a lack of depressive symptoms (BDI scores of 1-7) with ups and downs that are considered to be within a normal affective range for mood. It was expected by the researchers of this study that a higher rate of participants would have reported experiencing more severe symptoms of depression based on the cutoff scores on the BDI. The second-largest group of respondents comprised of 24% of the population included in the study indicated “severe depression” with BDI scores between 31-40. Only six percent of the sample population indicated that they are extremely depressed (BDI score above 40), 6% indicated borderline clinical depression (BDI scores between 17-20), 17% indicated mild mood disturbances (BDI scores between 8-16), while the final 17% indicated moderate depression (BDI scores between 21-30) (see Table 2 below).

Table 2: Beck Depression Inventory Scores

1-7	33	30%
8-16	19	17%
17-20	7	6%
21-30	18	17%
31-40	26	24%
>40	7	6%

While the participants’ self-reports did indicate they suffer from symptoms of depression based on the BDI, this research study showed there is an overall 70% prevalence of moderate to severe depression based on the cutoff scores on the BDI amongst participants. As such, it appears that increasing levels of Nomophobia have a more pronounced linear relationship with depression in a sample of 24-35 year old participants. Future research should be conducted to examine if increasing levels of Nomophobia directly affect increasing levels of depression symptom severity versus the possibility of individuals having pre-existing levels of depression increasing the level of Nomophobia experienced among 24-35 year old participants.

At the conclusion of this study, raising awareness about the impact of Nomophobia on the mental health of 25-35 year-old smartphone users (and across all age groups who use

smartphones) is crucial for public health initiatives. Educational programs that highlight the signs and symptoms of nomophobia along with offering strategies for managing nomophobia can help individuals and communities address this issue proactively. Increased awareness of Nomophobia can promote healthier smartphone use practices and support mental well-being. Moreover, public health policies should consider integrating digital wellness programs into educational and workplace settings. Promoting healthy smartphone use practices and providing resources for mental health support can help mitigate the negative effects of nomophobia (Elhai et al., 2017, Elhai et al., 2018, Elhai et al., 2019). Overall, developing policies that encourage a digital balance of using smartphone use and mental health support can improve overall well-being among 25-35 year old participants.

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