

ORIGINAL ARTICLE

Predictive Effects of Nomophobia, Netlessphobia, and Sleepiness on Fatigue

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Main Points

- The results showed that nomophobia, netlessphobia, and sleepiness predicted fatigue.
- Nomophobia and netlessphobia predicted sleepiness.
- Nomophobia and netlessphobia explained 18% and 30% of the total variance, respectively.

Abstract

This study investigated the predictive effects of nomophobia, netlessphobia, and sleepiness on fatigue. The sample consisted of 907 students from a public university. Data were collected using Demographical Information Form, the First Netlessphobia Scale, the First Nomophobia Scale, the Epworth Sleepiness Scale, and the Chalder Fatigue Scale. Therefore, structural equation modeling was used to identify factors affecting fatigue. The structural equation modeling was performed using the Analysis of Moment Structures. The results showed that nomophobia, netlessphobia, and sleepiness predicted fatigue, explaining 31% of the total variance. Nomophobia and netlessphobia predicted sleepiness, with nomophobia and netlessphobia explaining 18% and 30% of the total variance, respectively.

Keywords: Fatigue, nomophobia, netlessphobia, sleepiness, student

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Introduction

Advances in information and communication technologies have drastically changed all aspects of daily life, increased the number of people using smartphones and other devices, and led to the emergence of new habits (Rodríguez-García et al., 2020). Smartphones are easy to use and can provide access to the Internet anywhere, anytime. Therefore, more and more young people use smartphones for online activities (Jeong et al., 2016).

The Internet has become an integral part of our lives, causing some of us to experience digital deprivation (Kanbay et al., 2022). For example,

technology has become so pervasive in the lives of university students that they suffer from technology addiction and digital deprivation when they have no access to their smart devices (Anshari et al., 2019). In recent years, this has led many researchers to focus on nomophobia and netlessphobia. These two phenomena cause many problems, such as sleep problems. For example, university students use the Internet and smartphones excessively, which leads to nomophobia and netlessphobia, resulting in sleep problems (Torpil et al., 2022).

Nomophobia is a psychological condition in which one experiences anxiety and fear when one has no connectivity to one's phone (Kanbay et al., 2022;

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King et al., 2014; Yildirim & Correia, 2015). The association between nomophobia and sleep disturbances, short-term memory impairment, dizziness, high blood pressure, interpersonal sensitivity, obsessive-compulsive disorder, and depression is alarming (Davoudi et al., 2020; Gonçalves et al., 2020).

Netlessphobia is a psychological condition in which one experiences anxiety and fear when there is no Internet connection (Kanbay et al., 2022). People who feel great anxiety and worry when they lack an Internet connection are called “netlessphobics.” A person is considered netlessphobic if they spend most of their time online, feels uneasy without an Internet connection, and actively seek ways to connect to the Internet.

Adolescents who use the Internet excessively suffer from muscle joint pain (Borhany et al., 2018), fatigue (Yang et al., 2019), and sleep problems (Do & Lee, 2018). This is because they remain in a fixed position for a long time, leading to more pressure on various parts of the body (Koca & Berk, 2019). People with smartphone addiction experience musculoskeletal pain and physical fatigue depending on how often they use the Internet (Bachleda & Darhiri, 2018).

We think that sleepiness, nomophobia, and netlessphobia cause university students to experience fatigue. We must ensure that university students have high academic performance, meaningful social relationships, fulfilling college lives, and good health to avoid such problems. We need to identify the adverse impact of nomophobia and netlessphobia on university students' health and formulate strategies and measures to ensure that they develop the necessary competencies and skills before stepping into work life. In addition, there is a growing body of research on the impact of nomophobia and netlessphobia on health. Although researchers have addressed the relationship between nomophobia and sleepiness (Erten et al., 2022; Teker & Yakşi, 2021), no researchers have ever focused on the mediating role of fatigue. Therefore, this study aimed to determine the predictive effect of nomophobia, netlessphobia, and sleepiness on fatigue in university students. In line with this study, the following questions were created:

- Does nomophobia have a predictive effect on fatigue?
- Does netlessphobia have a predictive effect on fatigue?
- Does sleepiness have a predictive effect on fatigue?

Material and Methods

Study Design

This study investigated the predictive effects of nomophobia, netlessphobia, and sleepiness on fatigue. This study is a relational study. The relational model aims to determine the state and/or degree of covariance between two or more variables (Karasar, 2013).

Participants

The study population consisted of 10,654 students enrolled at the university during the 2020 – 2021 academic year. The sample size was determined using the formula for a known population.

A power analysis was performed to determine the sample size. The results showed that a sample of 370 would be sufficient enough to detect significant differences. The inclusion criteria were (1) volunteering and (2) being accessible. The sampling method used

in this research was convenience sampling method. Researchers distributed an online data collection link to participants through various platforms to collect data. Data were collected between October 2 and November 30, 2022. The sample consisted of 907 students. Participants had a mean age of 21.5 ± 2.2 (minimum = 17 and maximum = 38). More than half of the participants were women (60.2%).

Data Collection Tools

The data were collected using the Demographical Information Form, the Firat Netlessphobia Scale, the Firat Nomophobia Scale, the Chalder Fatigue Scale, and the Epworth Sleepiness Scale.

Demographical Information Form

The form consists of two questions including age and gender.

Firat Netlessphobia Scale

The Firat Netlessphobia Scale was developed by Kanbay et al. (2022). The instrument consists of eight items rated on a 5-point Likert-type scale. The scale explains 60.7% of the total variance concerning netlessphobia. It has a Cronbach's alpha (α) of 0.93, indicating high reliability. Kanbay et al. (2022) established the validity and reliability of the scale on participants older than 18.

Firat Nomophobia Scale

The Firat Nomophobia Scale was developed by Kanbay et al. (2022). The analyses show that the Firat Nomophobia Scale has acceptable construct and content validity. The instrument consists of eight items rated on a 5-point Likert-type scale (“1 = Not appropriate at all,” “2 = Not appropriate,” “3 = Moderately appropriate,” “4 = Appropriate,” and “5 = Definitely appropriate”). The scale explains 55.9% of the total variance concerning nomophobia. It has a Cronbach's alpha (α) of 0.89, indicating high reliability. No items are reverse scored.

The Chalder Fatigue Scale

The Chalder Fatigue Scale was developed by Chalder et al. (1993). It is a 14-item scale addressing the symptoms of physical fatigue (items one to eight) and mental fatigue (items 9 – 14). The items are rated on a 4-point Likert-type scale. In the present study, the “physical fatigue” and “mental fatigue” components had Cronbach's α scores of 0.83 and 0.80, respectively.

The Epworth Sleepiness Scale

The Epworth Sleepiness Scale was developed by Johns (1991) and adapted to Turkish by Agargün et al. (1999). The instrument consists of eight items. The total score ranges from 0 to 24. A higher score is associated with increased sleepiness. The Turkish version has a Cronbach's α of 0.80 (Agargün et al., 1999).

Data Analysis

The data were analyzed using the Statistical Program for Social Sciences (SPSS) IBM version 26 software package (IBM SPSS Corp.; Armonk, NY, USA), and the AMOS. Path analysis, a structural equation model, was used to determine the effect of independent variables on the dependent variable. Firstly, the data were first checked for missing data and outliers. Then, normality and homogeneity tests were conducted. Path analysis, a type of structural equation modeling, was used to determine the factors affecting fatigue (Anderson & Gerbing, 1988). This technique involves one or more linear regression equations that describe

how internal constructs relate to external ones (Sümer, 2000). Structural equation modeling is more robust than other methods because it assumes a causal structure exists between a set of latent variables.

Ethical Considerations

The study was approved by the Publication Ethics Committee of Artvin Coruh University (date: July 4, 2022; number: E-184 57941-050.99-54396). All students were briefed about the research procedure and purpose. Written informed consent was obtained from the participants who agreed to take part in the study.

Results

Measurement model: Measurement models were examined to determine the fit of the measurement tools with the sample.

A confirmatory factor analysis (CFA) was performed to examine the measurement model of the Fırat nomophobia scale. The

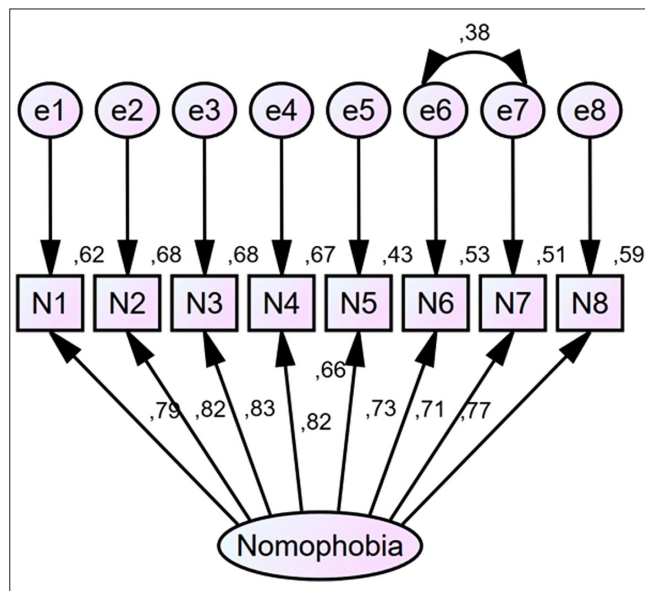


Figure 1. Measurement Model for Nomophobia.

results showed a high covariance between Items No. 6 and No. 7 (0.38). Modification indices (MI) involve evaluating elements together to improve the model (Byrne, 2011). Therefore, their error terms were covaried, and the analysis was repeated. The results showed that the construct provided the required fit values (CMIN/DF = 3.43; GFI = 0.90; CFI = 0.93; AGFI = 0.91; RMSEA = 0.08) (Figure 1).

A CFA was performed to examine the measurement model of the Fırat netlessphobia scale. The results showed a high covariance between Items Ne1 and Ne2. Therefore, their error terms were covaried, and the analysis was repeated. The results showed that the construct provided the required fit values (CMIN/DF = 2.71; GFI = 0.93; CFI = 0.99; AGFI = 0.90; RMSEA = 0.07) (Figure 2).

A CFA was performed to examine the measurement model of the Epworth sleepiness scale. The results showed no adequate goodness of fit. Therefore, MI were analyzed. There was a high covariance between Items S1 and S2. Therefore, their error terms were covaried, and the analysis was repeated. The results showed that the construct provided the required fit values (CMIN/DF = 4.21; GFI = 0.94; CFI = 0.93; AGFI = 0.99; RMSEA = 0.06) (Figure 3).

A CFA was performed to examine the measurement model of the CFS. The error terms between Items F1 and F2 were covaried, and reanalyzed to increase the goodness of fit values of the model. The results showed that the construct provided the required fit values (CMIN/DF = 4.41; GFI = 0.90; CFI = 0.90; AGFI = 0.92; RMSEA = 0.08) (Figure 4).

A path was drawn on sleepiness through nomophobia and netlessphobia. Another path was drawn from fatigue through sleepiness. Therefore, modification indices were checked, and error terms of some items were covaried, starting from the highest modification index (Ne1 – Ne2; No. 19 – No. 20; S26 – S28, and F1 – F2). As a result of these covariates, the goodness of fit values indicated that the model was valid as a whole (CMIN/DF = 3.92; GFI = 0.910; CFI = 0.90; AGFI = 0.90; RMSEA = 0.05). In conclusion, the relevant paths of all variables included in the initial model were found to be significant, and therefore, the model was accepted as is (Figure 5).

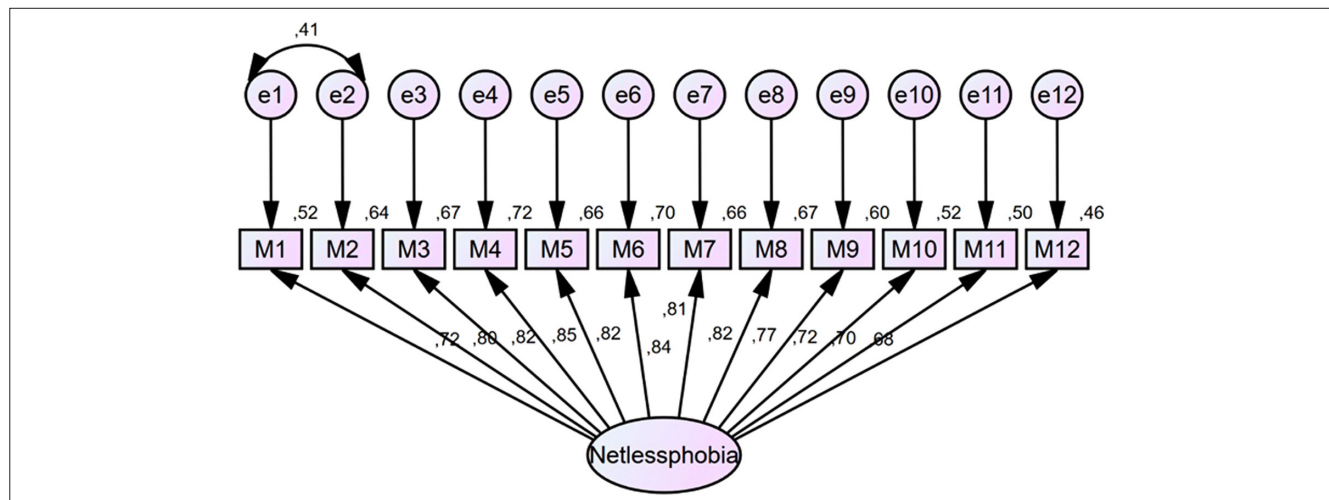


Figure 2. Measurement Model for Netlessphobia.

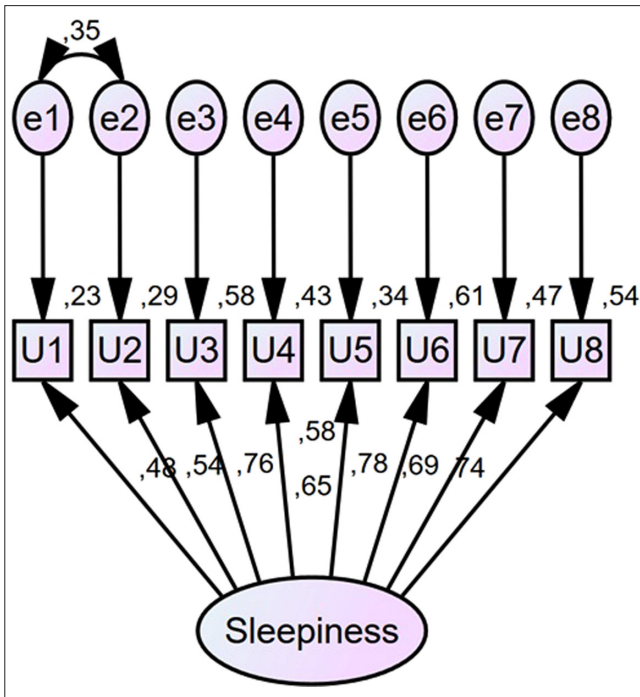


Figure 3. The Measurement Model for Sleepiness.

The results showed that netlessphobia $\rightarrow$ sleepiness was significant ($t = 4.226$; $p < .001$) and that netlessphobia affected sleepiness ($R^2 = .18$). Nomophobia $\rightarrow$ sleepiness was also significant ($t = 2.599$; $p < .05$), with the former affecting the latter ($R^2 = .30$). Nomophobia and netlessphobia explained 22% of the total variance concerning sleepiness ($R^2 = .22$). The pathway between sleepiness and fatigue showed that (sleepiness and fatigue) the former had a statistically significant effect on the latter ($t = 11.259$; $p < .05$) ($R^2 = .56$). The model indicated that nomophobia, netlessphobia, and sleepiness explained 31% of the total variance concerning fatigue (Table 1).

Discussion

This study addressed the predictive effects of nomophobia, netlessphobia, and sleepiness on fatigue. This section discussed the results in line with the literature. The results showed that nomophobia and netlessphobia affected sleepiness. In other words, participants with high levels of nomophobia and netlessphobia were more likely to have high levels of sleepiness. Khan (2008) investigated the adverse effects of excessive mobile phone use on the mental well-being of medical students from Riyadh. He reported that most students suffered from memory disturbances (40.56%), sleeplessness (38.8%), impaired concentration (34.27%), fatigue (24.48%), hearing problems (23.07%), headache (16.8), and facial

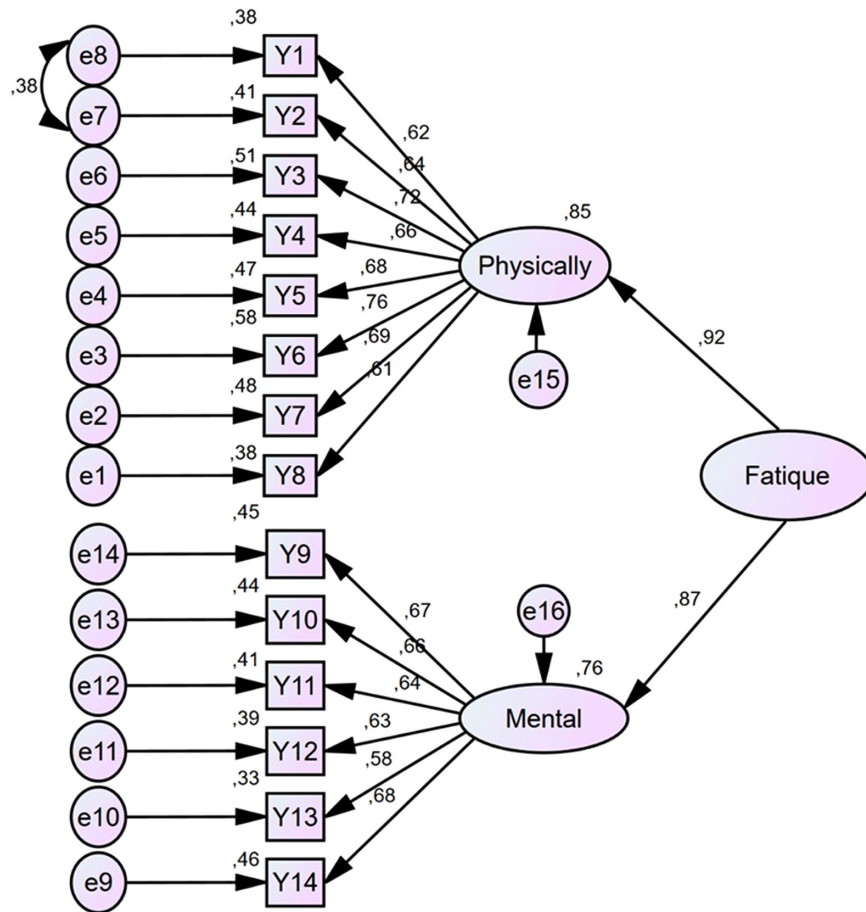


Figure 4. Measurement Model for Fatigue.

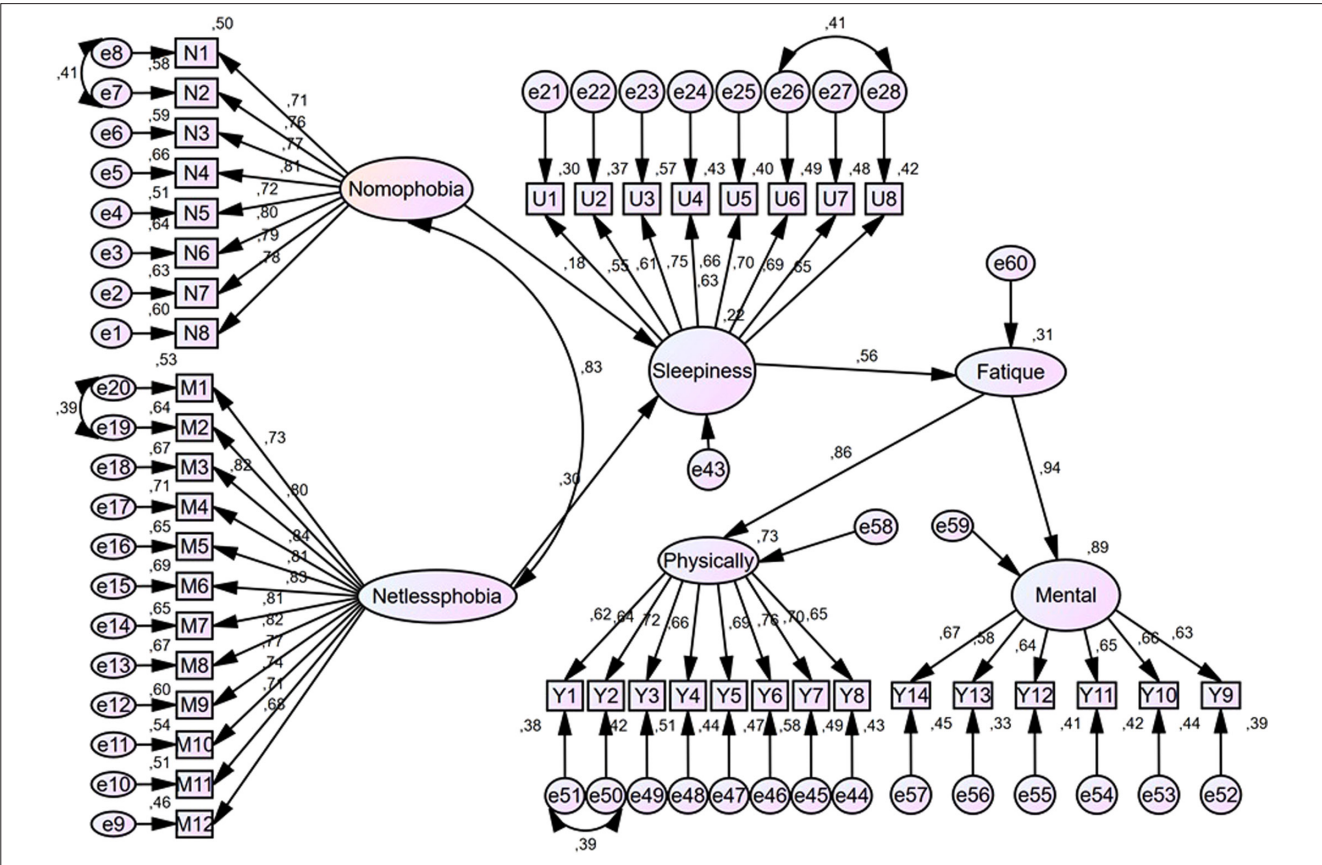


Figure 5. An Initial Model of Factors Affecting Ffatigue.

Table 1.
Standardized Regression Weights and Significance Level

Variable		Implicit Structure	Standardized Regression Weight	R ²	t	Sig.
Sleepiness	<---	Netlessphobia	0.301	.18	4.226	0.000
Sleepiness	<---	Nomophobia	0.185	.30	2.599	0.009
Fatigue	<---	Sleepiness	0.555	.56	11.259	0.000

dermatitis (16.78). Torpil et al. (2021) maintain that people with nomophobia also experience sleep problems. Research shows a link between nomophobia, daytime sleepiness, and sleep quality (King et al., 2014; Torpil et al., 2021). Torpil et al. (2021) found that university students with nomophobia suffered from sleepiness and poor sleep quality. Sülün et al. (2020) reported a positive correlation between smartphone addiction and daytime sleepiness among adolescents. People exposed to screens, especially in the evening and at night, secrete less melatonin hormone, making it harder for them to fall asleep. Using a smartphone in bed for more than 30 minutes before falling asleep triggers poor sleep quality. Therefore, people who cannot fall asleep due to poor sleep quality turn to their smartphones to pass the time. In other words, there is a bidirectional relationship between smartphone addiction and sleep quality. Prolonged nighttime smartphone use before sleep results in altered sleep patterns, making it harder to fall asleep. Students with smartphone addiction use their phones more at night. Consequently, they experience sleep disturbance, poor sleep quality, fatigue, and insomnia (Exelmans & Van den Bulck, 2016; Lemola et al., 2015; Saputra & Inayah, 2021;

Tugtekin et al., 2020). In short, our results are consistent with the literature.

This study showed that sleepiness had a significant effect on fatigue. In other words, participants with high levels of sleepiness were more likely to experience high levels of fatigue. Saygılı et al. (2011) also found a positive relationship between sleepiness and fatigue among university students. Fatigue is a symptom of sleep disorders. Therefore, we can state that there is a bidirectional relationship between sleepiness and fatigue.

This study showed that nomophobia, netlessphobia, and sleepiness explained 31% of the total variance concerning fatigue. Research also shows that nomophobia and netlessphobia lead to sleepiness and fatigue (Elhai et al., 2018; Farooqui et al., 2018; Fırat et al., 2021; Tugtekin et al., 2020). The sleepiness caused by excessive and uncontrolled use of mobile technologies is accompanied by fatigue. Therefore, more nomophobic, netlessphobic, and sleepy people experience more fatigue. Sleepiness explained 56% of the total variance concerning fatigue, while nomophobia,

netlessphobia, and sleepiness explained 31% of the total variance concerning fatigue. Our lives are evolving in different directions with technological developments. Moreover, the health problems brought about by the digital age are becoming universal. We think that our results will make an important contribution to the literature as they point out the global health problems caused and will continue to be caused by excessive or improper use of digital mobile devices.

Nomophobia and netlessphobia affect sleepiness, which has a significant effect on fatigue. Nomophobia, netlessphobia, and sleepiness explain a significant percentage of fatigue.

Limitations and Directions/Suggestions for Future Research

This study had four limitations. First, more research is warranted to better understand the relationship between nomophobia, netlessphobia, sleepiness, and fatigue. Secondly, this study adopted a cross-sectional design, which does not reveal cause-and-effect relationships. Thirdly, the sample consisted only of university students because adolescents are at a higher risk for developing nomophobia and netlessphobia. Future research should explore the same hypothesis with larger or smaller samples.

Ethics Committee Approval: The study was approved by the Scientific Research and Publication Ethics Committee of Artvin Çoruh University (Date: July 4, 2022; number: E-18457941-050.99-54396).

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

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