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Nomophobia Scale for Adolescents: A Validity and Reliability Study

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SUMMARY

In this study, it is aimed to develop a scale to determine the nomophobia levels of adolescents. The study included 884 adolescents aged 10-18. The theoretical basis was created by first reviewing the literature to reveal the structure of nomophobia in adolescents, which is the feature to be measured in the study. Similar scales were taken as a basis in the creation of the scale items. An item pool was created in line with the data obtained, and the process of determining the measurement form was carried out simultaneously with the creation of the item pool. Expert opinions were consulted for content validity in line with the validity study after the items of the scale were created. The content validity rate was calculated one by one for the items to be submitted for expert opinion. A pilot study was conducted with a psychologist and 10 adolescents attending secondary school to evaluate the appropriateness of the items and with this application, it was decided that the items were comprehensible. After the application, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted to determine the construct validity of the measurement tool, and Cronbach's alpha reliability coefficients were also calculated to determine its reliability. As a result of the study, it was found that the Nomophobia Scale for Adolescents (one-dimensional and 29 items) is a valid and reliable measurement tool for measuring nomophobia in adolescents. The results proved that the scale has the potential to measure nomophobia precisely and can be used in academic studies.

Keywords: Adolescent, validity, reliability, nomophobia, scale development

INTRODUCTION

Today, smartphone use has become a part of life with the global emergence of technology on a global scale (Aydoğdu, 2018; Kılıçoğlu & Aral, 2024; Schalow, 2017), it has become inevitable to perform simple tasks such as communicating with others or for educational purposes even for those who use it less (Daraj et al., 2023). Smartphones have come to seem almost like an extension of people with the overuse of these devices. Individuals' over-reliance on the devices they hold in their hands and their constant immersion in technology have accelerated their addiction. Even a brief break from the use of smartphones can lead to a range of phobias and anxiety disorders. In other words, smartphones have become "addictive" with the development of the internet and the accompanying technology (in the 1990s) and only a decade later with the advancement of "cellular" technology and portability. (Schalow, 2017).

The concept of addiction, defined as excessive fondness for an object or behavior, is generally associated with the use of substances such as smoking, alcohol and drugs. However, in recent years, it has been argued that some behaviors such as gambling, exercise, eating and sleeping are also addictive. A similar situation applies to technological devices such as computers, internet, online games, tablets and especially smartphones (Ektiricioğlu, Arslantaş, & Yüksel, 2020). Smartphone addiction, called nomophobia, is defined as discomfort or anxiety caused by the absence of a virtual communication tool such as a mobile phone (King et al., 2013), and it is emphasized that withdrawal symptoms are shown in the absence of smartphones (Tran, 2016). Yildirim and Correia (2015) stated that nomophobia is a term that refers to a series of behaviors or symptoms related to smartphone use and refers to the involuntary fear experienced by the individual when the phone cannot be accessed. It is suggested that there are significant relationships between nomophobia and smartphone addiction, and nomophobia is the strongest predictor of smartphone addiction (Aydoğdu, 2021; Semerci, 2019). Lu et al. (2022) emphasize that the concept of nomophobia is not far from phone addiction and can also be defined as the anxiety of being separated from the smartphone because factors such as the increase in the duration of smartphone use, daily usage time, daily frequency of checking smartphones, daily mobile internet usage time can increase the level of anxiety and fear of disconnection from the cell phone, that is, nomophobia (Alwafi et al., 2022). The difference of nomophobia from smartphone addiction is that when a person loses access to his/her cell phone, he/she experiences distress, anxiety and fear (Ren, Liu et al.2023).

Considering that nomophobia is a public health problem specific to the digital age and is an excessive fear of not having access to a smartphone, the great dependence of users on these devices due to the different possibilities they offer makes them increasingly vulnerable and constitutes a greater risk factor for adolescents (Rodríguez et al., 2020). This becomes more important during the adolescent years due to its developmental characteristics. As adolescents grow up using cell phones as a regular part of their lives, they may rely more on smartphones (Busch and McCarthy, 2021). In fact, children attending middle school and lower levels of education may even have to carry smartphones with them to communicate with their families (Yildiz Vatansever & Baltaci, 2022). Vezzoli et al. (2021) emphasize that with the fascination that the smartphone arouses in adolescents, the smartphone can be seen as a real object of desire for many in this age group. Adolescents experience emotions such as anxiety, depression and fear when they cannot communicate with the phone since they have grown up with technology. These effects can negatively affect their psychology, academic life, social and family life (Yıldız Vatansever & Baltacı, 2022). Moreover, risk-taking and thrill-seeking behaviors seen during adolescence increase the susceptibility of adolescents to addictions (Ektiricioğlu, Arslantaş, & Yüksel, 2020; Çelikkaleli, Ata, & Avcı, 2018).

Çelikkaleli, Ata, and Avcı (2018) found that 16% of adolescents were problematic internet users, Muslu and Gökçay (2019) drew attention to the relationship between technology addiction and obesity, Çakır and Oğuz (2017) and MacDonald and Schermer (2021) drew attention to the relationship between smartphone addiction and loneliness. Yıldız Vatansever and Baltacı (2022) emphasized that since adolescents meet all their communication and needs through their phones, the fact that their phones run out of charge or turn off for any reason causes panic in them and determined in their study that middle school children carry chargers with them. Semerci (2019) found that 71% of children attending secondary school did not see themselves as smartphone addicts, but 93% of them were nomophobic at different levels. Caba-Machado et al. (2023) found that nomophobia had a direct effect on anxiety, stress and depression in six months in long-term effects. Galhardo et al. (2023) concluded that adolescents with high levels of nomophobia had more smartphone addiction, psychopathological symptoms and lower quality of life. Argumosa-Villar et al. (2017) found that self-esteem, extraversion, conscientiousness and emotional stability predicted nomophobia. Lin et al. (2021) stated that both nomophobia and addictive use of social media are potential risk factors for insomnia in adolescents and cause insomnia in the long term.

Teker and Yakşi (2021) found that the poor sleep quality of adolescents with severe nomophobia increased 2.99 times. Rodríguez et al. (2020) stated that nomophobia reveals personality disorders and is associated with mental, physical, educational and social problems. Therefore, in order to prevent nomophobia from turning into one of the other types of addiction, awareness raising activities should be carried out (Gökel, 2020), adolescents should be directed to activities that will increase physical activity, sustainable friendship environments should be supported and the time spent with technology should be directed to joint activities. In addition, training programs should be implemented and disseminated to increase adolescents' level of knowledge about technology use (Muslu & Gökçay, 2019). Tran (2016) emphasized that more studies should be conducted to recognize the increasing use of smartphones and the potential behavioral addictions caused by them. Yildiz Vatansever and Baltaci (2022) suggested that awareness seminars should be organized for adolescents about nomophobia and its effects, and students with high nomophobia levels should be identified and directed to sports and artistic activities by teachers, parents and psychological counselors.

It is important to first measure nomophobia-related behaviors in order to eliminate the risk of nomophobia in adolescents. A valid method to identify individuals who use cell phones excessively is thought to help timely and effective treatment management (Jahrami et al., 2022). Although there are various studies in the literature on scale development related to nomophobia (Kanbay et al., 2022; Tarhan, 2022; Yildirim & Correia, 2015), there is a limited number of measurement tools specifically for adolescence in the international literature (Galhardo et al., 2023; Caba-Machado et al., 2023; Vezzoli et al., 2021). Some of these studies focused only on adults (Yildirim and Correia, 2015), while others focused on individuals between the ages of 15-65 (Kanbay et al., 2022), were adaptation studies (Galhardo et al., 2023; Caba-Machado et al., 2023) and were developed for middle and high school students (Vezzoli et al., 2021). However, it was found that there was no national instrument specifically measuring nomophobia in adolescence.

Studies have emphasized that nomophobia has cultural elements, therefore, the preparation of tools suitable for the characteristics and needs of adolescents in each culture is very important in the correct assessment of nomophobia (Galhardo et al., 2023; Caba-Machado et al., 2023). The development of scales for the identification of nomophobia in different languages and countries, and their linguistic adaptation, could enable interesting global assessments of potential cultural and demographic differences in nomophobia severity (Jahrami et al., 2024). Alwafi et al. (2022) also stated that it was difficult to generalize the study to all age groups because the participants were adults. Ren et al. (2024) emphasized that nomophobia should be included in research not only among university students but also in different age groups as a result of increasing mobile phone use. Çolak and Yalçinkaya-Önder (2020) suggested that research on nomophobia can be examined by expanding the sample size

by selecting students from different regions and examining the nomophobia levels of students without limiting the research on nomophobia to students in only one region.

The development of a scale related to nomophobia specific to adolescence will be a source for future studies on the prevalence of nomophobia in adolescence. The prevalence rates of nomophobia are among the basic indicators of the health service needs of the population. These rates can also provide predictions about public health related to nomophobia in the future and form the basis for early intervention and therapy services. Therefore, it is emphasized that nomophobia rates are needed in the society (Jahrami et al., 2022). Based on these ideas, it was concluded that there is a need for an assessment tool that will evaluate excessive phone use in a holistic manner, taking into account the developmental characteristics of adolescents. In this context, it is believed that the development of the Nomophobia Scale for Adolescents, which will provide a comprehensive evaluation of excessive phone use in adolescence, which is considered as a critical period among developmental periods, will make an important contribution to the literature.

The following questions were sought to be answered in the study:

- Is the Nomophobia Scale for Adolescents valid and reliable?

- Does the Nomophobia Scale for Adolescents measure the nomophobia level of adolescents?

METHOD

The study model, population and sample, data collection tools, data collection and data analysis were included.

Study model

It is a scale development study to determine the validity and reliability of a scale for detecting nomophobia in adolescents.

Population

The population of the study consists of adolescents studying in secondary and high schools affiliated to the Ministry of National Education in Erzincan Province in the spring semester of the 2022-2023 academic year. The sample of the study consisted of adolescents studying in schools randomly selected from the aforementioned population. In this context, a total of 884 adolescents who volunteered to participate in the study, 351 adolescents from three middle schools and 533 adolescents from three high schools, were included in the study.

Among the adolescents included in the study, 75.7% were girls, 24.3% were boys, 22.9% were between the ages of 10-12, 49.3% were between the ages of 13-15, and 27.8% were between the ages of 16-18. Of the study group, 8.6% were in fifth grade, 13% in sixth grade, 8.3% in seventh grade, 9.8% in eighth grade, 19% in ninth grade, 17.9% in tenth grade, 17.4% in eleventh grade, and 6% in twelfth grade. 4.2% is the only child in their family, 29.1% had one sibling, 36.5% had two, 14% had three, and 16.2% had four or more siblings. Of the mothers of the adolescents, 42.9% were primary school graduates, 20.5% were middle school graduates, 24% were high school graduates, and 12.7% were university graduates or higher. Of the fathers, 25.5% were primary school graduates, 24.7% were middle school graduates, 28.1% were high school graduates, and 21.8% were university graduates or higher. While 71.5% of adolescents have their own smartphones, 28.5% do not have their own smartphones. While 5% of the adolescents stated that they did not spend any time with their smartphones during the day, 10.9% spent less than one hour, 26.1% spent one-two hours, 31.8% spent two-three hours, and 26.2% spent four hours or more with their smartphones.

Data collection tools

"General Information Form", 'Internet Addiction Scale for Adolescents' and Nomophobia Scale for Adolescents developed by the researchers were used as data collection tools.

General information form: It was developed by the researchers and consists of questions about adolescents' gender, age, number of siblings, mother's and father's education levels, and their ownership of smartphones and spending time with smartphones.

Internet addiction scale for adolescents: It was developed by Taş (2019) to measure the internet addiction levels of adolescents in the 10-18 age group. In the development phase of the scale, the trial form was conducted with 42 adolescents, exploratory factor analysis with 349, confirmatory factor analysis with 215, and test-retest study with 50 adolescents. Content validity was ensured by expert opinion. As a result of the factor analysis, the validity of the nine-item single-factor structure was confirmed. It was determined that the single-factor structure explained approximately 40% of the variance of the scale with 39.901%. The KMO Kaiser-Meyer-Olkin value of the scale

was .820 and Barlett's Sphericity test χ^2= 850,521, p=.000. It was reported that the factor common variances of the scale items were between .300-.500 and the item factor loadings were between .548-.707. The fit indices obtained at the end of CFA were found to be sufficient for the validation of the model. It was found that the item-total correlation of the scale was in the range of .427-.587, the test-retest correlation coefficient r= .72, the Cronbach Alpha internal consistency coefficient was .81, and the t-test results for the lower and upper 27% groups were significant. These results show that the scale is valid and reliable.

Nomophobia scale for adolescents: The process of developing the scale and validity and reliability studies was carried out as shown in the figure below:

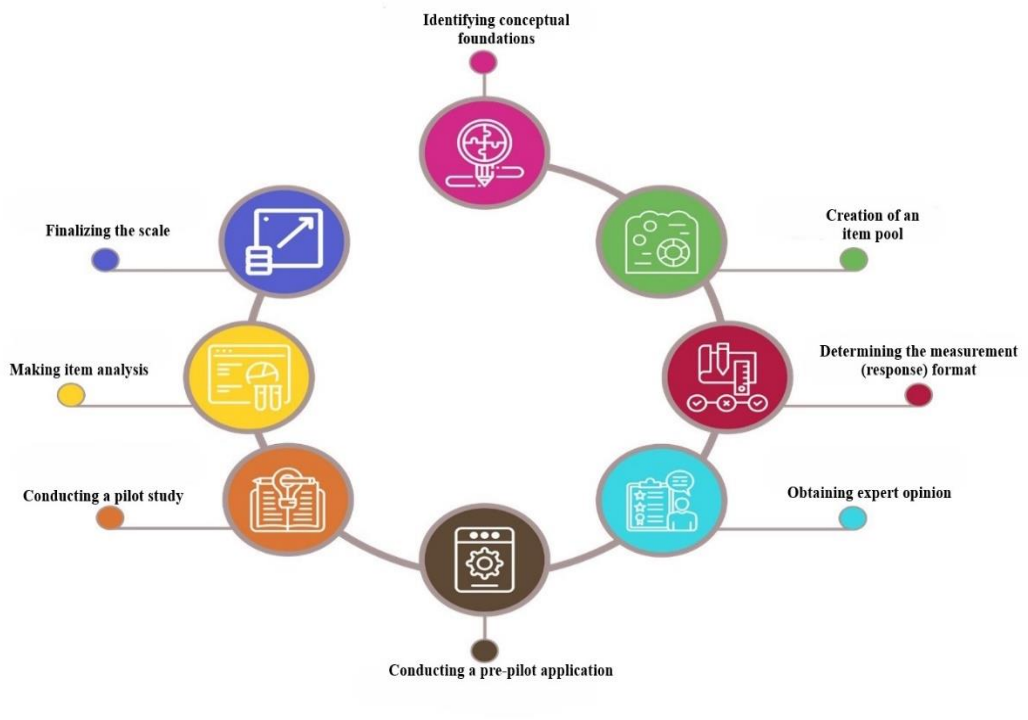

Figure 1. Developmental Stages of The Nomophobia Scale for Adolescents (Aydoğdu, 2019; Yılmaz, 2022).

As seen in Figure 1, a literature review was first conducted to reveal the structure of nomophobia behaviors, which is the characteristic to be measured in the study. In addition, similar scales were taken as a basis in the creation of the scale items. An item pool was created in line with the data obtained. The process of determining the measurement format was carried out simultaneously with the creation of the item pool (Erkuş, 2014). After the items of the scale were created, expert opinions were consulted for content validity in line with the validity study. The items were revised in line with expert opinions. A pilot study was conducted with 10 adolescents in the 10-18 age group to determine the situation regarding the understanding of the items and to reorganize them in case of incomprehension (Büyüköztürk, 2013). As a result of the pilot study, it was decided that the items were comprehensible. After the implementation, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted to determine the construct validity of the measurement tool, criterion validity was tested, and Cronbach's Alpha reliability coefficients were calculated to determine its reliability. The scale was finalized in line with the results obtained.

Data collection

In the study, ethics committee permission was first obtained from Erzincan Binali Yıldırım University Human Research Social and Humanities Ethics Committee (Date: 02/02/2023, Protocol No: 02/06). Afterwards, necessary permissions were obtained from Erzincan Provincial Directorate of National Education. Then, "Nomophobia Scale for Adolescents" was administered to the participants at the schools where they were studying in time periods that would not interfere with the teaching of the courses.

Data analysis

Cross validity was used to determine the factor structure of the scale. For this purpose, the total sample of 884 people was randomly divided into two groups. Since the sample size is sufficient, the data can be randomly divided and analyzed (Doğan et al., 2017). Accordingly, Exploratory Factor Analysis was conducted on the first sample, Sample-I, and then Confirmatory Factor Analysis was conducted on the second sample, Sample-II, according to the structure that emerged. As a factor extraction technique, the unweighted least squares technique (UWLS) was used, which can produce unbiased findings in ranked data sets and in cases such as normal distribution distortion, even if the sample size is sufficient. In addition, parallel analysis was also conducted to determine the dimensionality of the scale more accurately. Whether the factor structure of the scale was confirmed or not was examined with first-order confirmatory factor analysis (CFA). Confirmatory factor analysis (CFA) aims to assess the extent to which a factorial model consisting of factors (latent variables) formed by many observable variables fits the actual data. The model to be examined may define a structure that has been determined using the data of an empirical study or that has been constructed on the basis of a specific theory (Sumer, 2000).

Many fit indices are used to assess the validity of the model in CFA. The most frequently used ones are as follows (Cole, 1987; Sumer, 2000); Chi-Square Goodness, $\chi 2$, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Non-Normed Fit Index (NNFI), Normed Fit Index (NFI), Goodness of Fit Index (GFI). Observed values in the scale model within the range of $X2/d<3$; $0<RMSEA<0.05$; $0.97\leq NNFI\leq 1$; $0.97\leq CFI\leq 1$; $0.95\leq GFI\leq 1$ and $0.95\leq NFI\leq 1$indicate perfect fit, while $4<X2/d<5$; $0,05<RMSEA<0.08$; $0.95\leq NNFI\leq 0.97$; $0.95\leq CFI\leq 0.97$; $0.90\leq GFI\leq 0.95$ and $0.90\leq NFI\leq 0.95$ indicate acceptable fit (Kline, 2005; Sumer, 2000). The relationship between the scores obtained from the scale and the scores of the Internet Addiction Scale for Adolescents was examined to determine the criterion validity of the scale. Positive and high correlation coefficient indicates high convergent validity. As a reliability study, Cronbach's Alpha value was calculated for each factor. Two-half reliability coefficient was also calculated.

FINDINGS

The data obtained within the scope of the study were subjected to validity and reliability tests and the results obtained were reported.

Exploratory factor analysis (EFA)

Exploratory factor analysis technique was used to statistically determine the construct validity of the scale. First, KMO and Bartlett's tests were conducted to determine whether the scale was suitable for factor analysis. In this context, the KMO test measurement result should be .50 and above and the Bartlett sphericity test result should be statistically significant (Jeong, 2004: 70). As a result of this study, the KMO test result was .95 and Bartlett's test of sphericity was found to be significant ($p<0.01$). Accordingly, there are high correlations between the variables, in other words, our data set is suitable for factor analysis (Kalaycı, 2009). It was concluded that the scale could be factor analyzed. In the first analysis, it was determined that there were 5 factors with eigenvalues greater than 1. However, when Figure 2 is analyzed, it can be interpreted that only one factor with a higher eigenvalue than the other factors and a higher variance explained by it is dominant.

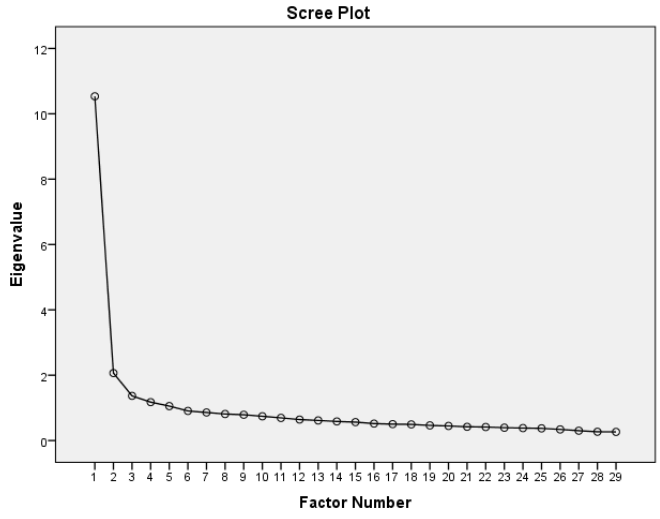

Figure 2. Scatter diagram of the eigenvalues of the factors.

The findings of the parallel analysis also confirmed that the scale measured a dominant trait with a single dimension. In the exploratory factor analysis, the cut-off value for the loadings of the items on the factor was taken as .30. In addition, items with negative factor loadings were also removed from the scale. M7 with a factor loading below .30 was removed from the scale. At the end of the final analysis, the findings of the exploratory factor analysis of the scale are presented in Table 1.

Table 1. Factor Load Values as a Result of Factor Analysis

Item	Common Variance	Factor Load	Corrected Item-Total Correlation
n20	.314	.733	.423
n23	.354	.719	.456
n6	.375	.687	.503
n29	.411	.682	.498
n12	.435	.656	.462
n24	.511	.649	.667
n15	.434	.647	.614
n13	.495	.636	.448
n9	.261	.632	.582
n18	.390	.631	.634
n25	.489	.618	.617
n28	.479	.618	.448
n19	.419	.614	.626
n17	.521	.612	.566
n11	.559	.599	.594
n22	.427	.591	.610
n16	.491	.591	.590
n27	.556	.586	.711
n21	.550	.574	.555
n8	.424	.570	.573
n26	.411	.565	.697
n3	.535	.525	.633
n4	.478	.523	.601
n5	.447	.491	.536
n2	.467	.480	.558
n14	.480	.469	.575
n10	.596	.464	.653
n1	.529	.440	.423

As a result of the exploratory factor analysis, it was concluded that the scale had a single factor. The single factor of the scale explains 35.38% of the total variance. In addition, the eigenvalue of this single factor of the scale is 10.53. These values show that the one-dimensional structure of the scale is at an acceptable level (Çokluk et al., 2018).

The relationship between the total score obtained from the Nomophobia Scale for Adolescents and the total score obtained from the Internet Addiction Scale for Adolescents is .764. This relationship shows a high and positive relationship. The convergent validity of the scale is also high. According to the findings of factor analysis and convergent validity, the results indicate that the validity of the scale is at a high level. The alpha coefficient of the scale was calculated as .94 for Sample-I and the two-half reliability was calculated as .92.

Confirmatory factor analysis (CFA)

In this section, CFA was applied to assess whether the 28-item structure of the single dimension of the scale was confirmed or not. In the first CFA, items with statistically insignificant t values were analyzed. It was determined that the t values of all items of this scale were significant, and the Path diagram is presented in Figure 3.

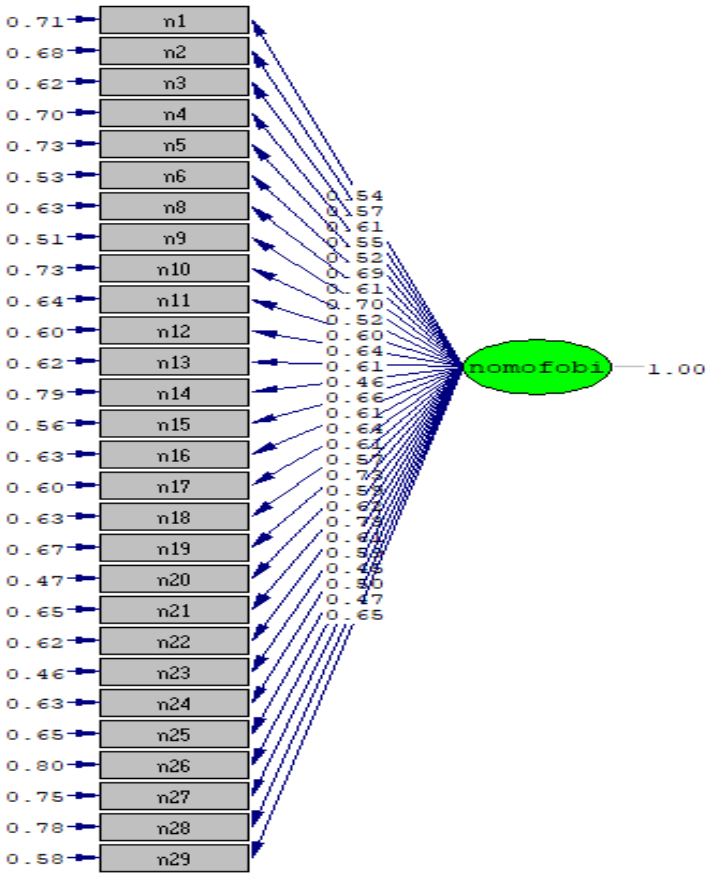

Figure 3. Path Diagram of the scale

The fit indices were found as χ^2=1624.68, X^2/sd= 4.64, RMSEA=0.09, CFI=0.95, NNFI=0.95 and NFI=0.94 When the coefficients showing the relationship between the observed variables and the factors of the model showing the factorial structure of this scale were examined, it was concluded that all coefficients except RMSEA were adequate (Kline, 2005). Considering the fit statistics calculated by CFA, it was decided that the previously determined structure of the scale was generally compatible with the collected data.

Regression values and t values of the items are presented in Table 2.

Table 2. Regression and t Values of the Scale

Items	Regression values	t values	Items	Regression values	t values
M1	.54	11.86	M16	.61	13.89
M2	.57	12.70	M17	.66	14.58
M3	.61	13.96	M18	.61	13.87
M4	.55	12.11	M19	.57	12.82
M5	.52	11.35	M20	.73	17.56
M6	.69	16.13	M21	.59	13.30
M8	.61	13.92	M22	.62	14.08
M9	.70	16.51	M23	.73	17.64
M10	.52	11.36	M24	.60	13.86
M11	.60	13.67	M25	.55	13.38
M12	.64	14.59	M26	.46	9.63
M13	.61	13.97	M27	.50	10.99
M14	.46	9.98	M28	.47	10.18
M15	.66	15.45	M29	.65	14.98

When Table 2 is analyzed, it is determined that the regression coefficients and t values obtained are significant (t>1.92) and the model is confirmed.

The relationship between the total score obtained from the Nomophobia Scale for Adolescents and the total score obtained from the Internet Addiction Scale for Adolescents is .710 for this sample. This relationship shows a high and positive relationship. The convergent validity of the scale is also high. According to the findings of the factor analysis and convergent validity, the results obtained indicate that the validity of the scale is at a high level. The alpha coefficient of the scale was calculated as .94 and the two-half reliability was calculated as .91. Tezbaşaran (1997: 47) states that a reliability coefficient that can be considered sufficient in a Likert-type scale should be as close to 1 as possible. According to these results, it is seen that both the validity and reliability of the entire scale are at a high level.

Scoring of the scale

The developed scale is a 5-point Likert-type and measures a single dominant latent trait. In this respect, the scale consists of a single dimension and 29 items. A total score can be obtained by giving each item a score between 1 and 5 (completely agree-5, agree-4, undecided-3, disagree-2, strongly disagree-1). The minimum score that can be obtained from the scale is 29 and the maximum score is 145. The high total score obtained from the scale indicates that the related trait (nomophobia) is high. There is no cut-off score on the scale.

DISCUSSION

Today, technological devices are available to many people around the world. Day by day, the use of other technological devices, such as smartphones, has become widespread and necessary for many of us to perform daily tasks (Busch & McCarthy, 2021). These devices are constantly evolving to be more attractive and faster, mobile companies are competing to offer new models with more memory, better cameras and batteries, and the number of apps and services is constantly growing. This makes people even more dependent on smartphones (León-Mejía et al., 2021).

People in society are not only dependent on the internet, video games and technology in general, but also fear not having the tools and technological resources to perform basic functions such as relating, communicating, having fun and accessing. As a result of this technological development in contemporary society, nomophobia has become a very common pathology among adolescents. Therefore, adolescents are faced with the problem of nomophobia specific to the digital age, which is caused by the rise of mobile technology in daily life (Rodríguez-García et al., 2020).

It is emphasized that nomophobia is a critical issue for mental health (Alwafi et al., 2022). Efficient and healthy use of mobile technology before adulthood should be encouraged to prevent the emergence and consequences of nomophobia (Rodríguez-García et al., 2020). Since adolescents today have not experienced a life without these technological devices, they accept them as they are and do not question them (Busch & McCarthy, 2021). At the same time, adolescents' limited social life outside of school and family increases the need for smartphones (Yildiz Vatansever & Baltaci, 2022). In a study by Sohn et al. (2019), problematic smartphone use was associated with depression, anxiety, persistent insomnia, increased perceived stress, and impaired academic achievement, and it was emphasized that, in general, people with problematic smartphone use are at higher risk of impaired mental health and daily functioning (Sohn et al., 2019). At this point, Yildirim and Correia (2015) emphasized that with the rapid spread and adoption of smartphones, people may also have a fear of not being able to use the smartphone or mobile phone and/or the services it offers and referred to this situation as nomophobia. He also argued that nomophobia entered our lives as a modern age phobia and explained nomophobia as the fear of not being able to communicate, losing the loyalty allowed by smartphones, not being able to access information through smartphones, and giving up the conveniences provided by smartphones (Yildirim & Correia, 2015). Jahrami et al. (2022) emphasized that most of the people who own mobile phones have mild or moderate nomophobia symptoms. Awareness of the potential bad consequences of this problematic smartphone use, raising awareness and gaining knowledge about unhealthy use is crucial for correcting it and bringing it back to normal usage levels (Busch & McCarthy, 2021).

While nomophobia has emerged as a behavioral addiction to mobile devices, the rapid increase in studies on this topic suggests that it can have profound effects on adolescents' mental health, sleep, learning and other aspects of well-being. As it represents a critical developmental period, the high prevalence of nomophobia symptoms among adolescents is met with particular concern because unchecked nomophobia can lead to other problems in these vulnerable populations (Jahrami et al., 2024). León-Mejía et al. (2021) emphasized that young people are more vulnerable to nomophobia. This result shows the importance of studying nomophobia especially in adolescents.

It may be possible to initiate a therapeutic strategy and prevent nomophobia through awareness programs by determining the prevalence of it and associated factors. Further studies should be conducted to identify the causes of increased cell phone use, investigate the relationship between nomophobia and other risk factors, and support

individuals diagnosed with severe nomophobia (Alwafi et al., 2022). In educational institutions, interventions are needed to prevent and treat nomophobia (Tuco et al., 2023), and it is thought that these interventions should start during adolescence. However, a comprehensive and valid measurement tool is required for this. It is known that the best tool to detect nomophobia is nomophobia assessment tools (Jahrami et al., 2022). Therefore, this study aimed to develop a scale to determine nomophobia in adolescents. The findings obtained for this purpose show that the Nomophobia Scale for Adolescents has high internal consistency, indicating that the validity of the scale is at a high level. The alpha coefficient of the scale was calculated as .94 for Sample-II and the two-half reliability was calculated as .91. This unidimensional scale is a new and powerful measure for determining nomophobia. The Nomophobia Scale for Adolescents is a 5-point Likert-type scale, and a total score is obtained by giving each item a score between 1 and 5. The higher the total score obtained from the scale indicates a high score for the related trait. The Nomophobia Scale for Adolescents is also applicable to both boys and girls in terms of gender. The scale is easy to understand and easy to administer or score. The scale may make it easier for researchers, clinicians, child developers and teachers interested in nomophobia to determine the level of nomophobia in adolescents and to quantify this condition in school or clinical settings.

Suggestions for future studies are as follows:

- The scale can be a source for qualitative studies on nomophobia.
- Using the developed scale, it can be recommended to create intervention programs after determining the level of nomophobia for adolescents at regional, national and international levels.
- The ability of the scale to determine nomophobia for adolescents both specific to the developmental period and from a wide age scale will pave the way for longitudinal studies and reveal the long-term effects of intervention programs.

Limitations

Some participants may have underreported information about their problematic behaviors or may have different levels of awareness about how and how much they use their mobile devices (Vezzoli et al., 2021). Therefore, this may constitute a limitation for self-report measurements. In addition, this study is limited to adolescents. The gradual decrease in the age of smartphone use may suggest that it is important to study with younger age groups.

REFERENCES

Argumosa-Villar, L., Boada-Grau, J., & Vigil-Colet, A. (2017). Exploratory investigation of theoretical predictors of nomophobia using the Mobile Phone Involvement Questionnaire (MPIQ). *Journal of adolescence*, *56*, 127-135.

Alwafi, H., Naser, A. Y., Aldhahir, A. M., Fatani, A. I., Alharbi, R. A., Alharbi, K. G., Almutwakkil, B. A., Salawati, E., Ekram, R., Samannodi, M., Almatrafi, M. A., Rammal, W., Assaggaf, H., Qedair, J. T., Al Qurashi, A. A., & Alqurashi, A. (2022 Prevalence and predictors of nomophobia among the general population in two middle eastern countries. *BMC psychiatry*, *22*(1), 1–9. https://doi.org/10.1186/s12888-022-04168-8

Aydoğdu, F. (2018). Dijital oyun oynayan çocuklarin dijital oyun bağimliliklarinin çeşitli değişkenler açisindan incelenmesi. *Ulakbilge Sosyal Bilimler Dergisi*, 6(31), 1-18. Retrieved from: https://www.ulakbilge.com/makale/pdf/1546243512.pdf

Aydoğdu, F. (2019). Göçmen Aile Çocuklarının Uyum Düzeylerine Sosyal Uyum Eğitim Programının Etkisinin İncelenmesi (Doktora Tezi). Ankara Üniversitesi Sağlık Bilimleri Enstitüsü, Ankara

Aydoğdu, F. (2021). 4-6 Yaş çocukların dijital oyun bağımlılıklarında kardeş etkisi: Nomofobi, akıllı telefon kullanma, dijital oyun oynama. *Çocuk ve Gelişim Dergisi*, 4(7), 34-49. https://doi.org/10.36731/cg.935669

Busch, P. A., & McCarthy, S. (2021). Antecedents and consequences of problematic smartphone use: A systematic literature review of an emerging research area. *Computers in Human Behavior*, *114*, 106414. 10.1016/j.chb.2020.106414

Büyüköztürk, Ş. (2002). *Sosyal Bilimler İçin Veri Analizi El Kitabı. İstatistik, Araştırma Deseni SPSS Uygulamaları ve Yorum.* Ankara: Pegem A yayıncılık.

Caba-Machado, V., Machimbarrena, J. M., Díaz-López, A., Sevilla-Fernández, D., Pérez-Sancho, C., & González-Cabrera, J. (2023). Nomophobia questionnaire short-form: Psychometric properties and longitudinal association with anxiety, stress, and depression in adolescents. *International Journal of Human–Computer Interaction*, 1-11. DOI10.1080/10447318.2023.2215626

Cole, D. A. (1987). Utility of confirmatory factor analysis in test validation research. *Journal of Consulting and Clinical Psychology*, 55, 584-594. https://doi.org/10.1037/0022-006X.55.4.584

Çakır, Ö. & Oğuz, E. (2017). Lise Öğrencilerinin Yalnızlık Düzeyleri ile Akıllı Telefon Bağımlılığı Arasındaki İlişki. *Mersin Üniversitesi Eğitim Fakültesi Dergisi*, 13 (1), 418-429. 10.17860/mersinefd.290711

Çelikkaleli, Ö. , Ata, R. & Avcı, R. (2018). Orta Ergenlik Döneminde Problemli İnternet Kullanımının Demografik Değişkenler Açısından İncelenmesi. *Journal of Computer and Education Research*, 6 (12) , 123-141 . 10.18009/jcer.396974

Çokluk, Ö., Şekercioğlu, G. Büyüköztürk, Ş. (2018). Sosyal bilimler için çok değişkenli istatistik SPSS ve Lisrel Uygulamaları (5. Baskı). Ankara: Pegem Akademi Yayıncılık.

Çolak, M., & Yalçinkaya-Önder, E. (2020). Investigation of Nomophobia Levels of Secondary School Students in Terms of Some Variables. *Educational Policy Analysis and Strategic Research*, 15(3), 100-121. ISSN: EISSN-1949-4289

Daraj, L. R., AlGhareeb, M., Almutawa, Y. M., Trabelsi, K., & Jahrami, H. (2023, July). Systematic review and meta-analysis of the correlation coefficients between nomophobia and anxiety, smartphone addiction, and insomnia symptoms. *Healthcare*, 11(14), 2066. 10.3390/healthcare11142066

Doğan, N., Soysal, S., Karaman, H. (2017). *Aynı Örnekleme Açımlayıcı ve Doğrulayıcı Faktör Analizi Uygulanabilir Mi? Küreselleşen Dünyada Eğitim* (Eds.: Ö. Demirel, S. Dinçer), (s. 373-400), Ankara: Pegem Akademi.

Ektiricioğlu, C., Arslantaş, H., & Yüksel, R. (2020). Ergenlerde Çağın Hastalığı: Teknoloji Bağımlılığı. *Arşiv Kaynak Tarama Dergisi*, 29(1), 51-64. https://doi.org/10.17827/aktd.498947

Erkuş, A. (2014). Psikolojide ölçme ve ölçek geliştirme-I: Temel kavramlar ve işlemler (2. baskı). Pegem Akademi Yayıncılık.

Galhardo, A., Loureiro, D., Massano-Cardoso, I., & Cunha, M. (2023). Adaptation of the European Portuguese version of the nomophobia questionnaire for adolescents, factor structure and psychometric properties. *International Journal of Mental Health and Addiction*, 21(5), 2795-2812. 10.1007/s11469-022-00754-9

Gökel, Ö. (2020). Teknoloji Bağımlılığının Çeşitli Yaş Gruplarındaki Çocuklara Etkileri Hakkındaki Ebeveyn Görüşleri. *Kıbrıs Türk Psikiyatri ve Psikoloji Dergisi*, 2(1), 41-47. https://doi.org/10.35365/ctjpp.20.2.6

Jahrami, H., Fekih Romdhane, F., Pandi-Perumal, S. R., BaHammam, A. S., & Vitiello, M. V. (2024). Global research evidence on nomophobia during 2008-2022: a bibliometric analysis and review. *Psychology, Health & Medicine*, 29(5), 889-904. doi:10.1080/13548506.2023.2268888

Jahrami, H., Trabelsi, K., Boukhris, O., Hussain, J. H., Alenezi, A. F., Humood, A., Saif, Z., Pandi-Perumal, S.R., Seeman, M. V. (2022). The prevalence of mild, moderate, and severe nomophobia symptoms: a systematic review, meta-analysis, and meta-regression. *Behavioral Sciences*, *13*(1), 35. https://doi.org/10.3390/bs13010035

Jeong, J. (2004). *Analysis of The Factors And The Roles of Hrd in Organizational Learning Styles As Identified By Key Informants At Selected Corporations in The Republic of Korea*. Yayımlanmamış doktora tezi. Amerika: Texas A&M University. Major Subject: Educational Human Resource Development.

Kalaycı, Ş. (2009). *SPSS Uygulamalı Çok Değişkenli İstatistik Teknikleri*, Ankara.

Kanbay, Y., Akçam, A., Özbay, S. Ç., Özbay, Ö., & Fırat, M. (2022). Developing Fırat Nomophobia Scale and investigating its psychometric properties. *Perspectives in Psychiatric Care*, 58(4), 2534-2541. 10.1111/ppc.13090

Kılıçoğlu, E. A., & Aral, N. (2024). Examination of the predictive effect of attachment styles and loneliness levels on internet addiction of university students. *Bartın University Journal of Faculty of Education*, 13(2), 396-409.10.14686/buefad.1379767

King, A. L. S., Valença, A. M., Silva, A. C. O., Baczynski, T., Carvalho, M. R., & Nardi, A. E. (2013). Nomophobia: Dependency on virtual environments or social phobia? *Computers in Human Behavior*, 29(1), 140-144. https://doi.org/10.1016/j.chb.2012.07.025

Kline, R.B. (2005), *Principles and Practice of Structural Equation Modeling* (2nd Edition ed.). New York: The Guilford Press.

León-Mejía, A. C., Gutiérrez-Ortega, M., Serrano-Pintado, I., & González-Cabrera, J. (2021). A systematic review on nomophobia prevalence: Surfacing results and standard guidelines for future research. *PloS one*, 16(5), e0250509. 10.1371/journal.pone.0250509

Lin, C. Y., Potenza, M. N., Ulander, M., Broström, A., Ohayon, M. M., Chattu, V. K., & Pakpour, A. H. (2021, September). Longitudinal relationships between nomophobia, addictive use of social media, and insomnia in adolescents. *Healthcare*, 9 (9), 1201. DOI10.3390/healthcare9091201

Lu, X., Liu, T., Liu, X., Yang, H. ve Elhai, J. D. (2022). Nomophobia and relationships with latent classes of solitude. *Bulletin of the Menninger Clinic*, 86(1), 1-19.

MacDonald, K. B., & Schermer, J. A. (2021). Loneliness unlocked: Associations with smartphone use and personality. *Acta Psychologica*, *221*, 103454. DOI:10.1016/j.actpsy.2021.103454

Muslu, M., & Gökçay, G. F. (2019). Teknoloji bağımlısı çocuklarda obeziteye neden olan risk faktörleri. *Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi*, 8(2), 72-79

Rodríguez-García, A. M., Moreno-Guerrero, A. J., & Lopez Belmonte, J. (2020). Nomophobia: An individual's growing fear of being without a smartphone—a systematic literature review. *International Journal of Environmental Research and Public Health*, 17(2), 580. DOI10.3390/ijerph17020580 (early acces)

Ren, S., Ji, S., Liu, X., & Liu, T. (2024). Exploring the structure of college students' adaptability by using cross-lagged path analysis: The role of emotional adaptability. *PsyCh Journal*, 13(2), 276-286. https://doi.org/10.1002/pchj.721.

Schalow, F. (2017). Toward a Phenomenology of addiction: Embodiment, technology, transcendence. Switzerland: Springer International Publishing. ISBN 978-3-319-66942-7, DOI 10.1007/978-3-319-66942-7

Sohn, S. Y., Rees, P., Wildridge, B., Kalk, N. J., & Carter, B. (2019). Prevalence of problematic smartphone usage and associated mental health outcomes amongst children and young people: a systematic review, meta-analysis and GRADE of the evidence. *BMC psychiatry*, *19*(1), 1-10. DOI: 10.1186/s12888-019-2350-x

Sümer, N. (2000). Yapısal eşitlik modelleri: Temel kavramlar ve örnek uygulamalar. *Türk Psikoloji Yazıları,* 3(6), 49-74.

Tarhan, K. N., Tutgun, Ünal, A., Doğan, N., Kurt, A. S., Muradi, P., … Ayyıldız, Y. (2022). Üsküdar Nomofobi Ölçeğinin geliştirilmesi ve psikometrik özelliklerinin incelenmesi. *Current Research and Reviews in Psychology and Psychiatry*, 2(2), 112- 135.

Taş, İ. (2019). Ergenler için internet bağımlılığı ölçeği: Geçerlik ve güvenirlik çalışması. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, 20(2), 875-905. 10.29299/kefad.2019.20.02.011

Teker, A. G., & Yakşi, N. (2021). Factors affecting sleep quality in high school students and its relationship with nomophobia. *J Turk Sleep Med*, 8(3), 216-221. 10.4274/jtsm.galenos.2021.84856

Tezbaşaran, A. (1997). *Likert Tipi Ölçek Geliştirme Kılavuzu.* (İkinci baskı), Türk Psikologlar Derneği Yayını, Ankara.

Tran, D. (2016). Classifying nomophobia as smart-phone addiction disorder. *UC Merced Undergraduate Research Journal*, 9(1). 1-22. https://doi.org/10.5070/M491033274

Tuco, K. G., Castro-Diaz, S. D., Soriano-Moreno, D. R., & Benites-Zapata, V. A. (2023). Prevalence of nomophobia in university students: a systematic review and meta-analysis. *Healthcare Informatics Research*, *29*(1), 40-53. 10.4258/hir.2023.29.1.40

Vezzoli, M., Colombo, A., Marano, A., Zoccatelli, G., & Zogmaister, C. (2021). Test for Mobile phone dependence: psychometric properties and confirmatory factor analysis. *Current Psychology*, 42(1), 714-725. 10.1007/s12144-021-01449-5

Yılmaz, O. (2022). Sosyal bilgilerde dijital vatandaşlık ve eğitimine yönelik eğitim paydaşlarının deneyimlerinin araştırılması (Doktora Tezi). Kastamonu Üniversitesi Sosyal Bilimler Enstitüsü, Kastamonu.

Yildirim, C., & Correia, A. P. (2015). Exploring the dimensions of nomophobia: Development and validation of a self-reported questionnaire. *Computers in human behavior*, *49*, 130-137. 10.1016/j.chb.2015.02.059

Yıldız Vatansever, E & Baltaci, S. (2022). Investigation of the Relationship Between nomophobia and high school entrance exam (LGS) scores in terms of sociodemographic variables. *International Online Journal of Education and Teaching (IOJET),* 9(1). 142-175. ISSN: 2148-225X

NOMOPHOBIA SCALE FOR ADOLESCENTS

Nomophobia in Adolescents Scale measures the nomophobia levels of adolescents aged 10-18 years. The scale consists of one dimension and 29 items. The questions in the scale can be answered as completely agree-5, agree-4, undecided-3, disagree-2, strongly disagree-1. The minimum score that can be obtained from the scale is 29 and the maximum score is 145. The high total score obtained from the scale indicates that the related trait (nomophobia) is high.

Item No	Items
1	Going out of the house makes me nervous because I cannot use my smartphone.
2	I avoid going to places where I cannot use my smartphone.
3	It makes me uneasy to put down my smartphone when my family calls me.
4	I think about my smartphone while having dinner with my family.
5	I cannot listen to the lesson because I think about my smartphone.
6	I cannot relax when I do not have my smartphone with me all the time.
7	I think my life would be better if I stopped using my smartphone.
8	Looking at the screen of my smartphone relaxes me.
9	Carrying my smartphone in my hand relaxes me.
10	If I do not have my smartphone, I do not have friends.
11	I feel better when I communicate online.
12	I feel anxious if my smartphone runs out of battery.
13	I often check my smartphone to make sure it is not running out of battery.
14	I worry about not being able to reach people around me when my smartphone is turned off.
15	I often check where my smartphone is.
16	I am afraid that I will not hear from my friends if my smartphone is turned off.
17	I keep my smartphone with me when I sleep so I can see incoming messages
18	Without my smartphone, I feel uneasy because I cannot communicate instantly with those around me.
19	I get anxious when I think that my friends are trying to reach me when I do not have my smartphone with me.
20	I feel restricted in places where I cannot use my smartphone.
21	I would like to be notified immediately of notifications on my smartphone.
22	I feel nervous when I cannot update my smartphone.
23	I get angry if I cannot check my smartphone all the time.
24	Having limited internet on my smartphone scares me.
25	I do not want to go to places where I cannot connect to Wi-Fi with my smartphone.
26	I cannot do my homework because I am busy with my smartphone.
27	I would rather work on my smartphone than chat with my family.
28	I cannot focus on class because I think about my smartphone.
29	I feel uneasy going to school because I cannot use my smartphone.

ERGENLER İÇİN NOMOFOBİ ÖLÇEĞİ

Ergenler İçin Nomofobi Ölçeği, 10-18 yaş aralığındaki ergenlerin nomofobi düzeylerini ölçmektedir. Ölçek bir boyuttan ve 29 maddeden oluşmaktadır. Ölçekteki sorular tamamen katılıyorum-5, katılıyorum-4, kararsızım-3, katılmıyorum-2, kesinlikle katılmıyorum-1 şeklinde cevaplanabilmektedir. Ölçekten alınabilecek en düşük puan 29, en yüksek puan ise 145'tir. Ölçekten alınan toplam puanın yüksek olması, ilgili özelliğin (nomofobi) yüksek olduğunu göstermektedir.

Madde No	Maddeler
1	Akıllı telefonumu kullanamadığım için evden dışarı çıkmak beni tedirgin ediyor.
2	Akıllı telefonumu kullanamayacağım yerlere gitmekten kaçınıyorum.
3	Ailem çağırdığında akıllı telefonumu elimden bırakmak beni huzursuz eder.
4	Ailemle yemek yerken akıllı telefonumu düşünüyorum.
5	Akıllı telefonumu düşündüğüm için ders dinleyemediğim olur.
6	Akıllı telefonum her an yanımda olmayınca rahatlayamıyorum.
7	Akıllı telefonla uğraşmayı bıraksam hayatım daha iyi olur diye düşünüyorum.
8	Akıllı telefonumun ekranına bakmak beni rahatlatır.
9	Akıllı telefonumu elimde taşımak beni rahatlatır.
10	Akıllı telefonum olmazsa arkadaşlarım da olmaz.
11	Çevrim içi iletişim kurduğumda kendimi daha iyi hissediyorum.
12	Akıllı telefonumun şarjı biterse huzursuz olurum.
13	Akıllı telefonumun şarjının bitmemesi için sık sık kontrol ederim.
14	Akıllı telefonum kapalı olduğunda çevremdekilere ulaşamamak beni endişelendirir.
15	Akıllı telefonumun nerede olduğunu sık sık kontrol ederim.
16	Akıllı telefonum kapalı olursa arkadaşlarımdan haber alamayacağımdan korkarım.
17	Gelen mesajları görebilmek için uyurken akıllı telefonumu yanımda bulunduruyorum
18	Akıllı telefonum olmadan çevremdekilerle anında iletişim kuramayacağım için huzursuz olurum.
19	Akıllı telefonum yanımda olmadığında arkadaşlarımın bana ulaşmaya çalıştıklarını düşündüğümde kaygılanırım.
20	Akıllı telefonumu kullanamadığım yerlerde kendimi kısıtlanmış gibi hissederim.
21	Akıllı telefonuma gelen bildirimlerden anında haberdar olmak isterim.
22	Akıllı telefonumun güncellemelerini yapamadığımda kendimi gergin hissederim.
23	Akıllı telefonumu sürekli kontrol edemezsem sinirlenirim.
24	Akıllı telefonumun internetinin limitli olması beni korkutur.
25	Akıllı telefonumla Wi-Fi'ye bağlanamayacağım yerlere gitmek istemem.
26	Akıllı telefonumla uğraşmaktan ödevlerimi yapamıyorum.
27	Ailemle sohbet etmektense akıllı telefonumla uğraşmak beni rahatlatır.
28	Akıllı telefonumu düşündüğüm için derse odaklanamıyorum.
29	Akıllı telefonumu kullanamayacağım için okula gitmek beni huzursuz eder.