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Developing Fırat Nomophobia Scale and investigating its psychometric properties

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Abstract

Objective: We analyzed the nomophobia concept to develop the "Fırat Nomophobia Scale" to determine the level of nomophobia in individuals aged 15–65 years.

Design and Measures: A linguistically and psychometrically validated trial form consisting of 13 statements was applied to a sample of 678 individuals (69% women).

Results: The "Nomophobia Scale" that we developed consisted of a single dimension and eight items, explicating 55.9% of the variance concerning nomophobia.

Conclusions: Our findings suggest that the Fırat Nomophobia Scale is an economical scale with a low number of items and high variance. In addition, it provides valid and reliable measurements.

Practice Implications: The present study signifies the importance of research on nomophobia and determining the risk groups and protection strategies.

KEYWORDS

nomophobia, reliability, scale development, validity

1 | INTRODUCTION

Information and communication technologies have become an integral component of our lives (Kong et al., 2020; Yayan et al., 2019). We are living in an era of mobility, where mobile information and technologies are eagerly and rapidly adopted due to the availability of cheap mobile devices. Smartphones are considered the ultimate level in the evolution of mobile information and technologies (Park, 2019). According to Pew Research Center's "Internet and American Life" project on mobile applications, more than 81% of the American adult population owns a smartphone, and more than 73% use the internet at home (Pew Research Center: Internet Science & Tech, 2019). The rate of use of mobile phones/smartphones in Turkey reached 98.7%, and that of internet use reached 75.3%, as per the findings of the "Survey on Information and Communication Technology Usage in Households" conducted by the Turkish Statistical Institute in 2019 (TUIK, 2019).

Smartphones can easily perform several actions that we routinely practice in our daily lives, such as connecting to the internet readily from anywhere; checking e-mails; messaging; listening to music; socializing by connecting to social media networks such as Facebook, Twitter, Youtube, and Instagram; accessing infinite information easily via search engines; reading any kind of websites and news portals; taking pictures, playing games, banking transactions, shopping, and ordering food (Setyanto & Franksiska, 2021). Because smartphones are ubiquitously available and have numerous capabilities, Kang and Jung state that smartphones contribute beyond communication, information, and entertainment by "fulfilling needs such as learning, self-efficacy, security, and human relations" (Kang & Jung, 2014).

Although smartphones have provided numerous benefits and allowed individuals to meet their basic needs, their use is associated with several disadvantages (Adawi et al., 2018; Kang & Jung, 2014). For example, studies have reported negative psychological effects such as smartphone addiction, stress, uneasiness, and causing

memory impairment with excessive smartphone use (Faiola et al., 2018; O'Connell, 2020). Another problem exacerbated by smartphones is nomophobia (Anshari et al., 2019; Çobanoğlu et al., 2021).

Nomophobia, smartphone addiction, and other distinctions are primarily based on how smartphone users use their smartphones. A smartphone user experiences nomophobia when anxiety or fear over not using a smartphone occurs (Bian & Leung, 2015; Emanuel et al., 2015; Yildirim & Correia, 2015). In contrast, a smartphone user suffers from smartphone addiction when she or he excessively uses a smartphone, regardless of the harmful consequences (Bian & Leung, 2015; Kwon et al., 2013).

Nomophobia is defined as "the fear of being out of mobile phone contact." First coined during a study conducted in 2008 by the UK Post Office to explore anxieties that mobile phone users suffer from, "nomophobia" is considered a modern age phobia, recently presented as a byproduct of our interactions with mobile phones (SecurEnvoy, 2012). King et al. (2013) defined "nomophobia" as "a disorder of the modern world that has only recently been used to describe the discomfort or anxiety caused by the nonavailability of a mobile phone, personal computer, or any other virtual communication device in individuals who use them habitually" (King et al., 2013). In another study (King et al., 2014), nomophobia is defined as "the modern fear of being unable to communicate through a mobile phone or the internet." Nomophobia is a term that refers to a collection of behaviors or symptoms related to the use of a mobile phone. It is a situational phobia related to agoraphobia and includes the fear of becoming ill and not receiving immediate assistance (King et al., 2014). Although the previous definitions appear to embrace the feelings of anxiety resulting from the unavailability of devices such as computers or virtual communication devices, this recent definition is more related to mobile phones and denotes nomophobia as a situational phobia. Over the last 10 years, smartphones have taken over the mobile phone market and have almost replaced the phrase "cell phone/mobile" (Park et al., 2013). The present study discusses nomophobia in relation to smartphones.

Characteristics of individuals with nomophobia can be described as regular users of a mobile phone, nervousness, and anxiety in case of unavailability of the phone, continuously checking the screen for new calls or messages, and keeping the phone on and within reach even while sleeping (Adawi et al., 2019; Bülbüloğlu et al., 2020; Sharma et al., 2021). Such individuals frequently check the phone for calls or messages, never shut down and keep it on all day long, sleep with their smartphones, and spend a great deal because of their smartphones (Adawi et al., 2019; Bragazzi et al., 2019).

Nomophobia is not only observed when the individual is away from the smartphone but also when one is unable to get access to the information sought or whatever is required. Although nomophobia is a concept with an affinity to dependence/addiction, it is considered within the context of phobias. In addition, it is related to irrational fears and several adverse physical and psychological situations due to such fears (Zethy & Octaviani, 2017).

An increasing number of studies have been conducted on nomophobia in recent years, which are in parallel with technological development. These studies have mostly investigated the extent of nomophobia among various professional or student groups (Adawi et al., 2018; Bragazzi et al., 2019; Zethy & Octaviani, 2017). The prevalence of nomophobia varied between 18.5% and 73% in these studies (Gezgin & Çakır, 2016; Ozdemir et al., 2018; Tavolacci et al., 2015).

Besides its prevalence, the primary risk of nomophobia is the adverse effects it has on the psychological health and social, familial, professional, and academic success of the individual (Adawi et al., 2019; Bragazzi et al., 2019). According to the study by Tavolacci et al. (2015), one third of university students, particularly female students, suffer fear of losing their smartphone connection, leading to a deterioration in their academic success and the state of their physical and general health (Tavolacci et al., 2015). In addition, it was reported that smartphone use increased the level of stress in individuals (Bülbüloğlu et al., 2020). In a study by Yildirim et al. (2016) conducted on 537 university students, 42.6% of the students had nomophobia. The worst fears of students with nomophobia were related to access to communication and information (Yildirim et al., 2016).

The literature mentions no scale in Turkey for evaluating nomophobia in individuals between 15 and 65 years of age. Therefore, we planned to develop the "Nomophobia Scale" as a new tool, along with examining its validity and reliability.

2 | DESIGN AND METHODS

2.1 | Purpose of research and type

The development of the Fırat Nomophobia Scale is composed of multiple phases, including examining the theoretical structure, ethical practices, authoring the items, creating the draft form, pilot application, taking specialists' opinions, creating trial form, application of a trial form to the sample, findings (validity and reliability), and finalizing the form.

2.2 | Development of the Fırat Nomophobia Scale

2.2.1 | Examination of theoretical structure

In this phase, the conceptual framework of the subject was determined by scanning the literature relevant to the concept of nomophobia, including a review of previously published studies.

2.2.2 | Writing down the pool of questions

During the literature scan, studies on phobia and nomophobia in the online and printed resources were examined, and the statements

considered to be relevant to these concepts were included in the pool of questions. Afterward, the question pool was made consisting of 15 statements.

2.2.3 | Preparing the draft form

Specialists' opinion was consulted at this stage. It was decided that the 5-point Likert-type questionnaire would be useful and appropriate for this study. Likert-type scales place individuals on the psychological dimension in accordance with predetermined stimulators, scales, or sets of scales (Erkuş, 2014). After deciding on the format of the questionnaire, again by consulting the specialist opinion, a draft form of 5-point Likert type was created, involving the statements as "Not Appropriate at all," "Not Appropriate," "Moderately Appropriate," "Appropriate," and "Definitely Appropriate."

2.2.4 | Pilot application

After the draft form was created, a pilot application was necessary to determine whether these statements were comprehended by the sample population or not. In the literature, 30–50 individuals are considered to be sufficient for a pilot application (Şeker & Gençdoğan, 2006). Therefore, 15 statements of the draft form were directed to a sample of 52 individuals having similar characteristics to the study sample. Because certain statements were misunderstood or not understood at all (revealed during the application step), necessary modifications were made, and a draft form of 13 statements was obtained.

2.2.5 | Expert opinion

To assess the context validity of the scale, the draft form obtained was sent to seven experts such as academicians (statisticians, measuring and evaluation experts, psychologists, and nurses), who are experienced in scale development and health sciences. Their expert opinion was sought. As per experts' suggestions, no statement was omitted from the draft form. However, certain modifications were implemented in certain statements, following the recommendations. Thus, a draft form of 13 statements was obtained. The draft form was changed into a trial form involving the statements of 1 = "Definitely not Appropriate," 2 = "Not Appropriate," 3 = "Moderately Appropriate," 4 = "Appropriate," and 5 = "Totally Appropriate" responses.

2.3 | Sampling and participants

The obtained trial form with 13 statements was implemented to the sample of 678 people having age range between 15 and 65 years, mean age of 25.5 ± 9.1 years, out of which 69% were female. Data were acquired using Google Forms.

Two criteria were considered in this study while determining the required sample size. One of these is the sufficiency of the number of individuals to be included in the sample, and the other one is the Kaiser–Meyer–Olkin (KMO) test implemented for determining the sufficiency of the data obtained from the sample. As for the sample size in studies related to the development of scales, number 100 is described as weak, 200 as medium, 300 as good, 500 as very good, and 1000 as excellent (Çokluk et al., 2014). However, in the KMO evaluation, excellent was defined as a KMO value approaching 1; it was unacceptable below the threshold of 0.50. According to this evaluation, KMO values of less than 0.50 are considered poor, 0.60–0.70 range as medium, 0.80 as very good, and 0.90 as excellent (Tavşancıl, 2005). In this study, a sample size above 500 and a KMO value of 0.909 indicated a very good sample size. The data acquired from the sample were at a sufficient level, in conformance with the requirement.

2.4 | Validity and reliability

To determine the construct validity of the Fırat Nomophobia Scale, PCA, which is one of the techniques of EFA, as well as CFA, was applied. EFA is used to collect items in the scale tool in certain subfactors (Sönmez & Alacapınar, 2016). In factor analysis, when factors are initially introduced, they are not clear because most variables focus on the most important factor with the highest load, making it difficult to attribute meaning and interpret them (Can, 2017). Thus, rotation is implemented, which is essentially the process of clarification. Following rotation, the factors meet the items with a high level of relation, making the interpretation of factors easier. In the rotation process, "oblique rotation techniques" are used if there is a theoretical structure requiring the factors to be interrelated; otherwise, "vertical rotation techniques" are used (Can, 2017; Sönmez & Alacapınar, 2016).

As the factor rotation technique, we preferred the "direct oblimin technique," which is one of the oblique rotation techniques because it was considered that factors could be interrelated. It was aimed to generate a structure of factors that are theoretically interrelated. For the internal validity of the scale, a 27% upper–lower group comparison was implemented. For the reliability of the scale, Cronbach's α (Cronbach alpha) and additionally split-half reliability tests were used.

2.5 | Ethics approval

Ethical approvals required for the study were obtained from University Scientific Research and Publication Ethics Board (E-18457941-050.99-27573).

3 | RESULTS

3.1 | Preliminary statistics

To develop the Fırat Nomophobia Scale, the conformity of the data to factor analysis was first sought. For this purpose, item analysis, KMO coefficient calculation, and Bartlett's test of sphericity were implemented.

3.2 | Item reliability

For item reliability, the correlations of the total points of the items of the data should be above 0.30. It was indicated that the items with the item total point correlation below 0.30 were problematic, and they needed to be removed from the scale (Şencan, 2005). Therefore, the item-total correlations of every item were analyzed; it was observed that five items (M1, M3, M4, M5, and M9) had an item correlation value below 0.30. These items were removed from the study (Table 1).

3.3 | Kaiser–Meyer–Olkin coefficient and Bartlett's test of sphericity

KMO coefficient reveals whether the data matrix is appropriate for factor analysis or not as well as about the conformity of data structure for factor extraction, whereas Bartlett's sphericity test informs about any correlation among variables. To continue with factor analysis, KMO is required to be 0.60 or above, and Chi-square statistics calculated by Bartlett's sphericity test to be significant (Buyukozturk, 2010). Because of the item reliability check, the items with values below 0.30 were removed from the study, and KMO calculation and Bartlett's sphericity test were implemented for the remaining eight items and identified that the data matrix was appropriate for factor analysis (KMO = 0.909; Bartlett's < 0.001).

3.4 | Validity

To test the validity of the scale, construct validity and internal validity were analyzed. Factor analysis and CFA were implemented to determine the construct validity, and upper–lower group comparison was used to determine internal validity.

3.4.1 | Construct validity

The construct validity was analyzed by PCA, which is one of the techniques of factor analyses. By factor analysis, we determined the construct of the scale as well as the items contained within these constructs. Scale-related line chart was used while determining the construct of the scale. In addition, while determining the factorization in the scale, care was taken to have each factor with a specific value greater than 1, explicate at least 5% of the variance, and have the total variance above 50%. Therefore, the selection of items was made. While assigning items to factors, we preferred to have the factor load values of the items to be 0.45 and above. In addition, special care was taken in selecting the items such that they have high load values at one factor and low load values at other factors. Thus, items with a minimum difference of 0.10 between two load values were regarded as adjacent items, hence discarded. According to the obtained findings, this scale with one factor and eight items can explicate 55.9% of the concept-related variance. The load value of factors varies between 0.624 and 0.813 (Table 2).

One-factor and eight-item form obtained as a result of EHA was analyzed to construct model conformity by CFA. Analysis of modification indices revealed that the covariance of the items of number N_{10}–N_{11} (e5<---> e6 = 54.069) and N_7–N_{12} (e7<---> e12 = 15.536) were high, hence error terms of these items were combined. The standardized regression coefficients of the items in the scale varied between 0.520 and 0.777. According to our findings, as a result of the obtained fit indices, the measuring model of the scale was validated. Consequently, fit indices for the one-factor construct were determined as $\chi^2 = 89.319$, $\chi^2/df = 4.96$, CFI = 0.97, GFI = 0.97, AGFI = 0.93, and RMSEA = 0.07. These goodness of fit values obtained in the one-factor construct implies that the model is acceptable (Meydan & Şeşen, 2015; Figure 1).

Internal validity

Internal validity of the scale was tested by "independent groups *t*-test." To achieve this, a 27% upper–lower group comparison was implemented. The average of the group of 27% with a higher score and the group of 27% with a lower score were compared by *t*-test in independent groups. A significant difference is expected between the groups as a result of this comparison. An analysis of the data regarding internal validity revealed that the lower group average was 12.4 ± 2.137, and the upper group average was 29.8 ± 3.800 points. According to the analysis made, the difference between lower group–upper group averages of the scale was significant ($p < 0.001$). According to this finding, the obtained construct can be stated to differentiate between the lower point group and higher point group

TABLE 1 Values of item-total item test correlation

Item no	Item correlation	Item no	Item correlation	Item no	Item correlation
M1[a]	0.298	M6	0.653	M11	0.630
M2	0.758	M7	0.735	M12	0.640
M3[a]	0.280	M8	0.730	M13	0.687
M4[a]	0.221	M9[a]	0.168		
M5[a]	0.198	M10	0.481		

[a]Items with item-item-total correlation results of <0.30 were omitted from the scale.

TABLE 2 Factor items and item factor load values

Item no.	Item	Item factor load
M2	I get nervous when my smartphone is not around.	0.813
M6	I get worried as my phone gets low charge.	0.777
M7	I get tempted to check my smartphone.	0.772
M8	I get stressed when my smartphone is shut down.	0.756
M10	I get worried when my phone is away (tachycardia/difficulty in breathing/shivering etc.)	0.754
M11	***I feel uneasy wherever mobile use is restricted.	0.742
M12	Thought of out-of-network coverage area gives me anxiety.	0.729
M13	I frequently check if my phone is with me or not.	0.624
	Explicated variance = 55.91	

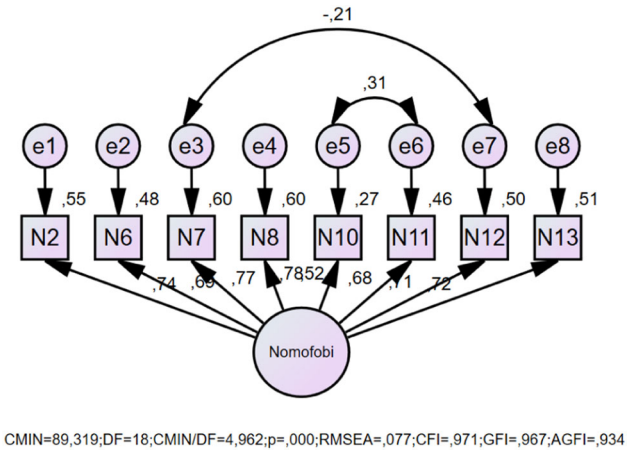

FIGURE 1 Confirmatory factor analysis of the one-factor construct [Color figure can be viewed at wileyonlinelibrary.com]

TABLE 3 Internal validity results of Fırat Nomophobia Scale

Group	*n*	Mean	Standard error	*t*	*p**
Lower group	169	12.43	2.137	−51.819	0.000
Upper group	169	29.81	3.800		

**p* < 0.001.

correctly, and the scale had internal validity (Meydan & Şeşen, 2015; Table 3).

3.5 | Reliability

In Likert-type scales, priority should be given to ensure internal consistency. Internal consistency is related to the extent that items forming the scale conform with each other. The most appropriate method for this purpose is the calculation of Cronbach's α coefficient of reliability (Pallant, 2017; Tezbaşaran, 2008). In this study, split-half test consistency was analyzed in addition to Cronbach's α reliability coefficient to assess the reliability of the scale.

3.5.1 | Cronbach's α

Reliability coefficients in developing the measuring tools for cognitive and affective characteristics can be calculated using different methods. One of these methods is Cronbach's alpha (Cronbach's α) reliability. As for the reliability coefficient, the level of sufficiency in a Likert-type scale is desired to be above 0.70; however, it becomes better as it approaches 1 (DeVellis, 2014; Tezbaşaran, 2008). In this study, Cronbach's α value for the scale, in general, was determined to be 0.89. This value implies that the items in the scale have a high level of reliability; all of them are focused on measuring the same concept.

3.5.2 | Split-half test consistency

The items were grouped in a manner that the odd number of items in the scale form a group. Even number of items form another group, and the correlation between the total points obtained from these groups was analyzed. A significant correlation between the groups in this process implies the reliability of the split-half test of the scale. In this study, the scale was analyzed with respect to the reliability of the split-half test, and the correlation was found to be statistically significant ($r = 0.96$; $p < 0.001$).

4 | DISCUSSION AND CONCLUSION

We developed the Fırat Nomophobia Scale, and its validity and reliability were analyzed. The results showed a one-dimensional structure, and the percentage of variance was determined as 55.9%. This is a considerably high variance for a unidimensional scale and acceptable from the literature point of view. Another proof for the

construct validity of the scale was obtained by testing the obtained construct using CFA. CFA revealed that the goodness of fit values of the one-factor construct was within desired limits.

The scale can significantly differentiate the groups with lower points and those with higher points, thus, confirming its internal validity. Lower and upper group comparison was implemented, which revealed that the scale can successfully differentiate the group with a lower point and that with a higher point.

In this study, the reliability of the scale was assessed by calculating Cronbach's α reliability coefficient. Cronbach's α reliability coefficient was calculated as 0.89, implying that the items in the scale have a high level of reliability and were oriented to measuring the same concept (DeVellis, 2014). Because, according to the literature, Cronbach's α value of 0.60 or below is "unacceptable," between 0.60 and 0.65 "not desired," between 0.65 and 0.70 "least acceptable," between 0.70 and 0.80 "considerable," between 0.80 and 0.90 "very good," and if it is well above 0.90, "the scale should rather be shortened" (DeVellis, 2014).

Another nomophobia-related scale (NMP-Q) was previously developed by Yildirim and Correia (2015) in a study conducted among university undergraduate students in the United States. However, a significant cultural gap and difference in epidemiology between the country of the NMP-Q (US) and Turkey exist, indicating the need for a new scale altogether instead of translating the original nomophobia scale. The factorization of the scale by NMP-Q was realized under four factors. In our study, however, the scale was gathered under one factor and was composed of eight items. The reason the Fırat Nomophobia Scale had one factor and a lower number of items as compared with the study by Yildirim and colleagues was that the phobia-oriented approach was preferred while authoring the items in this scale.

Yildirim and colleagues conducted their study with undergraduate students (mean age of 20) in the United States. Therefore, the sample used in the study was representative of undergraduate students in the United States. In this study. Özdemir and Bektas (2020) conducted validity and reliability studies for the Turkish version of nomophobia in Turkey. However, this study was conducted on children aged 9–18 years, and their average age was 14.1 ± 2.32 years (Özdemir & Bektaş, 2020). The NMP-Q was largely composed of the adolescent group (Al-Balhan et al., 2018; Elyasi et al., 2018). The NMP-Q was not intended for adults. With the global pandemic, adults have become more "nomophobic." One of the important markers of nomophobia is the increased frequency of smartphone use (Bragazzi & Del Puente, 2014). With more time spent at home during the pandemic, individuals have more free time; thus, smartphone use may increase due to the increased opportunities for free-time activities such as scrolling through social media, listening to music, and watching films (Chukwuere et al., 2017). A study by Kayis et al. (2021) in Turkey with individuals aged 18–66 years determined that the increased fear of COVID-19 was associated with an increased risk of smartphone addiction among individuals. Therefore, considering that nomophobia will increase in adults after the pandemic, a new scale should be constructed for adults. In our study, individuals between the ages of 15 and 65 years were selected as the sample population, thus, enabling the scale to have a measuring spectrum representative of the general population. Taking into consideration all these results, it can be stated that the Fırat Nomophobia Scale can be used confidently and economically in nomophobia-related studies.

This scale was developed for determining the level of nomophobia and consisted of one dimension and eight items and can explicate 55.9% of the variance. With its validity and reliability procedures implemented and psychometric characteristics analyzed, this scale features a practical and economical scale to use due to fewer items and shorter expressions.

Thus, we decided to submit the scale to the researchers studying the relevant subject. The reliability of the scale will be increased if it is supported by other studies, where its reliability is tested.

4.1 | Implications for nursing practice

In general, this scale provides certain preliminary evidence on the prevalence of nomophobia among Turkish individuals between 15 and 65 years of age. Moreover, it highlights the importance of research on nomophobia and the necessity of further prospective studies on this subject to determine the risk groups and protection strategies.

It is necessary to address the issue of dependence on smartphones and the consequences of the distraction they create in a clinical setting. Similarly, it is necessary to introduce smartphone use regulations and determine their impact on individuals in an educational setting, as well as in a healthcare setting. Thus, understanding factors that contribute to smartphones and nomophobia among individuals will yield better use of mobile applications in an educational context in the future.

4.2 | Scale instructions

We aimed to develop the "Fırat Nomophobia Scale" to measure the level of nomophobia in individuals in the general population. The analyses conducted showed that the Fırat Nomophobia Scale was at an acceptable level with respect to scope, content, and construct.

The Fırat Nomophobia Scale consists of one dimension and eight items and can explicate 55.9% of the variance on nomophobia. Cronbach's α reliability coefficient of the scale was calculated as 0.89, which indicates a high level of reliability. The scale is a 5-point Likert type with encoding as 1 = "definitely not appropriate," 2 = "not appropriate," 3 = "moderately appropriate," 4 = "appropriate," and 5 = definitely appropriate." On the scale, the minimum score is 8, the maximum score is 40, and there is no reverse-scored item. Increasing points indicate a higher level of nomophobia.

The validity and reliability of the scale were implemented in the general population and are adequate to be used for all individuals of 15 years of age and above. The scale is recommended to be

reimplemented to be used for individuals younger than 15 years of age.

AUTHOR CONTRIBUTIONS

Yalçın Kanbay: Conceptualization; data curation; funding acquisition; investigation; methodology; project administration; supervision; validation, visualization; writing – original draft. **Aysun Akçam**: Conceptualization; data curation; investigation; methodology; validation; visualization; writing – original draft. **Sevil Çınar Özbay**: Conceptualization; data curation; investigation; methodology; validation; visualization. **Özkan Özbay**: Conceptualization; investigation; methodology; validation; visualization. **Meryem Fırat**: Conceptualization; investigation; methodology; validation; visualization.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

Ethical approvals required for the study were taken from University Scientific Research and Publication Ethics Board (E-18457941-050.99-27573).

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