Validity and reliability of the Lubben Social Network Scale-Revised (LSNS-R) on older adults in Turkey

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Abstract

The aim of the study was to evaluate the validity and reliability of the Lubben Social Network Scale (LSNS-R) on older adults living nursing homes in Turkey. The study included 120 older adults who were aged 65 and over $(64.2\%$ females, $M_{age} = 78.84$, $SD = 13.21$, range $= 65–91$). The language and content validity, construct validity and reliability of the Turkish version of the scale were tested. The Turkish version of LSNS-R had a high internal consistency with a Cronbach's alpha of 0.94. In the test–retest reliability assessment, ICC was 0.95 ($p < 0.001$). In this study, the KMO value was found to be .857, which is considered very good. The factor loadings for the construct validity of the scale showed that this two-factor model showed acceptable fit to the data (RMSEA $= 0.108$, GFI $= 0.872$, CFI $= 0.969$, IFI $= 0.969$, RFI $= 0.927$, RMR $= 0.107$). In conclusion, these findings indicated that the Turkish-adapted version of LSNS-R is a reliable and valid instrument to measure social ties and social networks among older adults living nursing homes. The potential practical implication of the findings is that by using this scale, researchers can identify the isolated older adults. This can be an important step in the identification of vulnerable individuals who live in nursing homes.

Keywords Ageing · Loneliness · Older adults · Reliability · Social network · Validity

Introduction

Population ageing is a phenomenon common to throughout the world. Decrease in mortality rates, increase in life expectancy at birth and older ages, decline from high to low fertility rates led to an increase in older age population (WHO 2015). The population of the older adults aged 60 and over is increasing by 3% every year, and Europe has the largest percentage (25%) of the population aged 60 and over in the world (UN 2017). In Turkey the percentage of the population 60 years and older age reached 8.5% in 2017 (TURKSTAT 2017). Older age is a vulnerable period of the life span due to social isolation and feelings of loneliness (Holt-Lunstad et al. 2015). According to Peplau (1982), loneliness is a subjectively

uncomfortable or unpleasant experience that results from the contradiction between one's perceived social network and her/his social expectation. Older adults experience an elevated risk of loneliness because of sociodemographic, social and health characteristics (Fokkema et al. 2012; Prieto-Flores et al. 2011). Some studies report that prevalence of loneliness in older adults range from 3 to 34% in European countries (Stickley et al. 2013; Sundström et al. 2009) and in Turkey, the loneliness prevalence ranges from 30% to 47% among older people (Haney et al. 2017; Bilgili et al. 2012).

Inadequate social network leads to feelings of social isolation and loneliness among older adults (Masi et al. 2011). Social isolation is defined as a measurable social relationship deficit (Hawkley and Cacioppo 2010). There is extensive evidence that social ties are extremely important to health and well-being of older adults (Uchino et al. 2012; Kawachi and Berkman 2001). It has been stated that social ties have a positive effect on the physical and mental health (Lubben et al. 2006), increase resistance to stress (Uchino 2006), and enable faster recovery from diseases (Bisschop et al. 2003; Lubben and Gironda 2003). Social ties can play an important role in helping the older adults adopt healthy lifestyle behaviors such as diet, exercise, smoking and providing information and advice on their health needs (Umberson et al. 2010). A meta-

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analysis demonstrated that social ties have a positive effect on older adults' life satisfaction and self-esteem (Pinquart and Sörensen 2000). On the other hand, older people with weak social ties face more risks in terms of all causes of death (Shankar et al. 2013; Berkman and Syme 1979), morbidity (Tomaka et al. 2006), cardiovascular diseases, hypertension, inflammation (Holt-Lunstad et al. 2015), depression (Santini et al. 2015), loneliness, social isolation (Elsayed et al. 2019), and cognitive decline (Zunzunegui et al. 2003).

Social relationships have been as essential to in the nursing home resident as quality of life (Custers et al. 2012). Nursing home residents develop relationships unintentionally while simply trying to have a life in the facility (Roberts and Bowers 2015). Although studies show that nursing-home residents do engage in interactions and some develop close relationships with fellow residents and staff (Roberts and Bowers 2015; Ice 2002). Researchers have reported that the relationships in the facilities are likely to be transient and devoid of intimacy and meaningfulness compared to relationships with family and lifelong friends (Park 2009; Windriver 1993).

Development of reliable tools to identify the isolated older adults can be an important step in the identification of vulnerable individuals (Sansoni et al. 2010). The Lubben Social Network Scale (LSNS) is one of the widely-used instruments to assess perceived social support received from family, friend and neighbors (Lubben 1988; Sansoni et al. 2010). The LSNS was developed specifically for use among older adult populations (Lubben 1988) and has been translated into different languages and demonstrated highly desirable traits for assessing social isolation among older adults in China (Chang et al. 2018), Korea (Hong et al. 2011), Mongolia (Myagmarjav and Burnette 2013), Portugal (Ribeiro et al. 2012), Sweden (Baigi et al. 2008), Germany, Switzerland, and United Kingdom (Lubben et al. 2006). It has been used with a wide variety of health indicators (Boulos et al. 2017; Crooks et al. 2008; Iliffe et al. 2007). Previous studies on the LSNS revealed that low social network scores were associated with dementia risk (Crooks et al. 2008), persons with mood or cognitive problems (Iliffe et al. 2007), resilience levels (Wells 2012), social isolation (Iliffe et al. 2009), risk of malnutrition (Boulos et al. 2017), loneliness (Schnittger et al. 2012) and poor health status (Sakurai et al. 2019) and lower quality of life (Lim et al. 2013). The LSNS was later modified to the LSNS-Revised (LSNS-R) in order to better specify and distinguish the nature of family and friendship social networks (Lubben et al. 2006). To the best of our knowledge, LSNS-R has been used with Hispanic Americans in Los Angeles (Lubben and Gironda 2003), Korean Americans (Hong et al. 2011) and Sweden (Baigi et al. 2008). In recent years there has been an increasing interest in social network among older adults in Turkey, but there are is no valid and reliable scale for measuring the social isolation of the older adults. The aim of this study was to evaluate the validity and reliability of the Turkish-adapted Lubben Social Network Scale-Revised (LSNS-R) administered on older adults who live in nursing homes in Turkey.

Methods

Participants and Procedure

The sample for this research was composed of 120 older adults who live in a nursing home with the highest number of older people in Ankara, the capital of Turkey. The inclusion criteria were aged 65 and over, who had no hearing loss, and were able to communicate effectively. The minimum sample size could be 5 to 10 persons for each item of the scale (Hair et al. 2009; Costello and Osborne 2005) so the sample size was calculated as 120 for the 12-item Lubben Social Network Scale-Revised (LSNS-R). The participants were asked to complete the LSNS-R after a two-week interval for test–retest reliability. The instrument took approximately 15 min to be administered to older people by the primary investigator. The data were collected between March and May 2019.

Instruments

The Socio-Demographic Characteristics Form consists of questions regarding gender, age, marital status, and educational status.

Lubben Social Network Scale

The LSNS was first developed in 1988 by Dr. James Lubben (Lubben 1988). The aim of the scale is to measure the quality, intimacy, and frequency of participants' social relationships. The LSNS is a scale that calculates social isolation by measuring the level of perception of social support in individuals and assesses social networks with family, friends and neighbors (Lubben 1988). The LSNS was later modified to the LSNS-Revised in order to better specify and distinguish the nature of family and friendship social networks (Lubben et al. 2006). In this study psychometric properties of the Turkish adaptation of the LSNS-R were evaluated.

The LSNS-R measures the social involvement of individuals, including their family and friends (Lubben and Gironda 2003). The LSNS-R scale measure the size, closeness and frequency of contacts of a respondent's social network with reference to the level of perceived support they receive from family and friends (Lubben and Gironda 2003). The LSNS-R is a 12-item self-report questionnaire and has two dimensions: social networks with family (first 6 items) and friends (second 6 items). The items are rated on a five-point Likert scale. Participants were asked to how many family or friends, they could talk or call for help and the answers were structured as

(0 = none, 1 = 1 person, 2 = 2 persons, 3 = 3 or 4 persons, 4 = 5 to 8 persons, and 5 = 9 or more persons), when of contact with friends and family support for each other and the answers were structured as *(0 = never, 1 = seldom, 2 = sometimes, 3 = often, 4 = very often, 5 = always)* and how often they see or hear with friends or family and the answers were structured as *(0 = less than monthly, 1 = monthly, 2 = few times a month, 3 = weekly, 4 = few times a week, 5 = daily).* The total score of each factor is evaluated by scoring from 0 to 5. The total score is obtained by adding up scores for each item and ranges from 0 to 60, a high score indicating high level of social ties (Lubben et al. 2006; Lubben and Gironda 2003). The scale takes between 5 and 10 min to complete.

Translation Procedures

The translation and cross-cultural adaptation process was conducted in accordance with the published guidelines (Beaton et al. 2000). First, the cultural suitability of the LSNS-R was reviewed by the authors through conceptual analysis. The validation procedure included Turkish translation, back translation, language content validity, and the pilot test. Cultural characteristics were taken into account in all these stages. The LSNS-R scale was translated into Turkish by three faculty members, one from the nursing faculty, one from the medical school and one from the Department of Translation and Interpretation (Behling and Law 2000). A unified analysis of the scale was conducted by the researchers to reach a consensus. In order to review the grammar structure and its suitability to the Turkish language, the first Turkish version was presented to a faculty member from the Department of Turkish Language and Literature, and minor revisions were made in line with the suggestions. Turkish translated scale was back translated into English by faculty members from a different nursing faculty, a medical school and the Department of Translation and Interpretation. The translators knew the Turkish culture and were experts in their fields. After the content analysis, the pre-final version of the Turkish version of LSNS-R was tested on 30 older people as a pilot study (Tsang et al. 2017). No additional changes were made in the scale items. The older adults who were included in the pilot study were not included in the research sample.

Statistical Analysis

The statistical analysis of the data was performed using the IBM SPSS Statistics (ver. 23.0; SPSS, Chicago, IL, USA). Frequency, percentage, mean and maximum/minimum values were calculated using descriptive statistics to define the variables. The level of significance was determined at $p < 0.05$. In order to determine the content validity of the scale, the content validity ratio (CVR) and the content validity index (CVI) values were calculated. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) techniques were utilized to assess whether the LSNS-R is appropriate in terms of construct validity. The IBM SPSS AMOS 24 program was used for confirmatory factor analysis. Principle component analysis was used in exploratory factor analysis. The Bartlett Sphericity test and Kaiser-Mayer-Olkin (KMO) tests were used to determine the adequacy of scale content and sample size. The factor structure and factor loadings of the scale were examined with confirmatory factor analysis. The path diagram of the scale was created. In order to determine the relationship between repeated measurements, t-test and Pearson Correlation test were used in paired groups.

Results

Characteristics of the Participants

In total, 120 older adults aged 65 and over were included in the study. The average age was 78.84 years old ($SD = 13.21$) ranging from 65 to 91. 64.2% of the participants were female and 35.8% were male. The characteristics of the participants are presented in Table 1.

Reliability

Internal Consistency

In order to test the reliability of the scale, the Cronbach's alpha reliability coefficient was calculated. Total item correlation analyses were conducted to determine the internal validity of the items. A Cronbach's alpha value between 0.70–0.90 indicates the best internal validity (Wu 2012). The Cronbach's alpha value for this study was calculated as 0.947, which was high enough.

Table 1 Characteristics of the participants ($n = 120$)

	n	%
Age (years)		
65–72	36	30,0
73–80	40	33,3
81 and over	44	36,7
Sex		
Female	77	64,2
Male	43	35,8
Level of education		
Illiterate	20	16,7
Primary school	36	30,0
Secondary school	24	20,0
High school	19	15,8
University	21	17,5

Test-Retest Reliability

It is calculated by finding the correlation between the scores of the individuals in the first application and the scores they receive in the second application (Guttman 1945). The Interclass Correlation Coefficient is used for this purpose. The correlation coefficient obtained is the reliability coefficient of the test. If the reliability correlation is 1, it is understood that there is no change in the rows. The reliability correlation of 0 indicates that there is no relationship between the rows. According to the table below, the reliability of the scale was high when test-retest was done. The total item correlation coefficients for the scale are given in the Table 3.

Validity

Content Validity

The Davis (1992) was used for content validity (Simsek 2007; Davis 1992). In this technique, each item in the scale is evaluated on a 4-point scale: (a) The item is appropriate, (b) The item needs minor revision, (c) The item needs major revision, and (d) The item is inappropriate. After the back-translation process, the scale was sent to faculty members for content validity. The faculty members were asked to evaluate each item in the scale on the 4-point scale. In the Davis technique, the content validity index which is calculated by dividing the number of experts who marked the options a (The item is appropriate) and b (The item needs minor revision) for each item by the total number of experts providing opinions is expected to be over 0.80. Based on expert opinions, the content validity index (CVI) value of the scale was calculated to be 98%, meaning that content validity was ensured (Polit et al. 2007).

Construct Validity

EFA and CFA techniques were utilized to assess whether the LSNS-R is appropriate in terms of construct validity. The KMO value showed that the data were suitable for factor analysis. The KMO value of 0.90 is excellent, while 0.80, 0.70, 0.60, and 0.50 indicate very good, good, average, and weak values, respectively (Tabachnick and Fidell 2007; Kaiser 1970). In this study, the KMO value was found to be 0.857, which is considered to be very good. The Bartlett's Test of Sphericity value was calculated as 2134.720 ($p < .001$) as seen in Table 2. According to the Bartlett test, the data were correlated with each other. This is another indicator of suitability for factor analysis (Jonhson and Christensen 2014; DeVellis 2012). The factor analysis and rotation component matrix showed that the data gathered around two factors, which explained 80% of the variance in the data. According to this matrix, the first six variables were under the second factor, while the second group of six variables were under the first

Table 2 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,857
Bartlett's Test of Sphericity	Approx. Chi-Square	2134,720
	df	66
	Sig.	,000

factor. Table 3 shows the factor structure of the scale, the factor loadings, and the rates of the variance explained.

However, when the values were evaluated, it was found that the model developed was not sufficiently compatible. For this reason, first, the values of factor loadings were examined in order to determine the values to be removed from the model. These values are shown in the structure of the model (Fig. 1). There were no values lower than 0.5 and that needed to be removed from the model. In order to improve the goodness of the model, the evaluation of the modification indices was started (Fig. 1). These values are shown in the structure of the model (Fig. 2). For each factor structure 1 and 2, two set of outcomes as described are shown: modification indices higher than 10 allowing correlation (r_10). When considering each factor structure, it can be seen that the higher chi-squared value is obtained by the models in the two situation throughout all factor structures. A review of modification indices that error turns corresponding to f_1–1 and f_1–2, f_1–5 and f_1–1, f_1–2 and f_1–5 were correlated. And also, f_2–7 and f_2–8, f_2–7 and f_2–10, f_2–9 and f_2–10 were correlated. Therefore, the 7 error terms were allowed to covary freely in the revised model. The areas of poor fit can be identified by localized areas of strain and examination of modification indices (Harrington 2009). As a result, the values in Table 2 were obtained by improving the model without the need to remove any items. The final structure of the model is given below (Fig. 2).

CFA is conducted to control whether a data set complies with a predetermined structure (Wu 2012). The most commonly used ones are Chi-Square Goodness (χ^2), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Normed Fit Index (NFI), and Goodness of Fit Index (GFI). As a result, the second model (Fig. 2) and values were obtained (RMSEA = 0.108, GFI = 0.872, CFI = 0.969, IFI = 0.969, RFI = 0.927, RMR = 0.107). The factor loadings for the construct validity of the scale showed that this two-factor model showed acceptable fit to the data (chi-square / df = 2.444, p = 0.00) (Bentler 2006; Hu and Bentler 1999).

Discussion

The aim of the present study was to investigate the factor structure, the reliability and validity of the Turkish version of the LSNS-R on older adults who live in nursing homes.

Table 3 Results of The Exploratory Factor Analysis and The Interclass Correlation Coefficient for LSNS-Tr

Lubben Social Network Scale-R	Component		Interclass Correlation Coefficient
	Factor1	Factor2	
1. How many relatives do you see or hear from at least once a month?	,212	,795	0.989
2. How often do you see or hear from the relative with whom you have the most contact?	,175	,825	0.988
3. How many relatives do you feel at ease with that you can talk about private matters?	,320	,854	0.987
4. How many relatives do you feel close to such that you could call on them for help?	,311	,858	0.992
5. When one of your relatives has an important decision to make, how often do they talk to you about it?	,322	,846	0.993
6. How often is one of your relatives available for you to talk to when you have an important decision to make?	,374	,821	0.988
7.How many of your friends do you see or hear from at least once a month?	,834	,247	1.0
8.How often do you see or hear from the friend with whom you have the most contact?	,776	,345	1.0
9.How many friends do you feel at ease with that you can talk about private matters?	,904	,293	1.0
10. How many friends do you feel close to such that you could call on them for help?	,894	,294	0.976
11. When one of your friends has an important decision to make, how often do they talk to you about it?	,896	,275	0.988
12. How often is one of your friends available for you to talk to when you have an important decision to make?	,894	,268	0.988

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization

a Rotation converged in 3 iterations
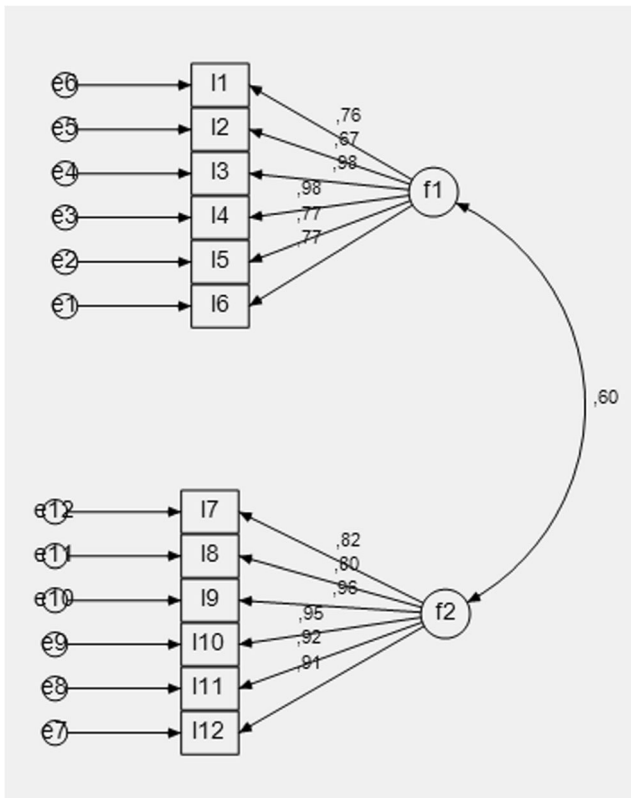
Fig. 1 Factor loadings for LSNS-Tr. Model 1: The First Structure of The Model
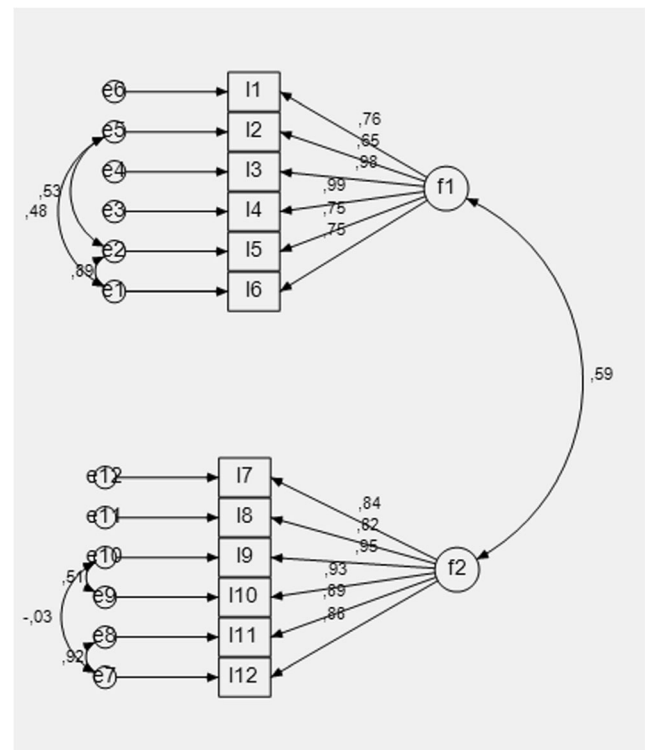
Fig. 2 Final Factor loadings for LSNS-Tr. Model 2: The Final Structure of The Model

The Turkish version of the LSNS-R was determined to have the same two-factor structure as the original version, and adequate reliability was demonstrated with favorable values for internal consistency and test-retest reliability. In agreement with the previous studies (Lim et al. 2013; Baigi et al. 2008; Chi et al. 2001; Lubben and Gironda 2003) the Cronbach's alpha coefficient of the LSNS-R was found to be high. The degree of internal consistency observed in the present study ($\alpha = 0.947$) was higher than that of the original validation study ($\alpha = 0.78$) (Lubben and Gironda 2003) and Korean version ($\alpha = 0.84$) (Hong et al. 2011). Test-retest analysis is important for the reliability of the scale as it is not possible to reach correct results without this measurement (Hopkins 2000). However not all studies have conducted test-retest analysis (Sansoni et al. 2010; Lubben and Gironda 2003; Hong et al. 2011). There is a need for future studies to evaluate test-retest for reliability (Lubben and Gironda 2003). The present study contributes to reliability with test–retest data. The scale was given to 30 individuals two weeks after the first test in order to identify the time independence of the scale. The test-retest reliability coefficient of the scale was found to be $\kappa = 0.857$.

LSNS-R content analysis was performed based on expert opinions. CVI should be >0.80 in order to be able to confirm that there is agreement between the experts' opinions (Polit et al. 2007). The CVI value of the scale was calculated to be 98%, which ensures content validity. The results of CFAs provide evidence for the two-factor structure of the Turkish version of the LSNS-R. This finding is in line with previous validation studies on the original version (Lubben and Gironda 2003) and the Korean version (Hong et al. 2011) of the LSNS-R, which consistently yielded a two-factor solution. In the Turkish version, the CFA of the 12-item LSNS-R showed acceptable fit the data ($\chi^2 = 2.444$; $GFI = 0.87$; $CFI = .96$; $RMSEA = .10$). In the original version of the LSNS-R it is determined that this scales could be used as a bi-dimensional means of measurement. Other compliance indices in CFA were not regarded in the original study (Lubben and Gironda 2003). In the Korean version of the scale bi-dimensional model yielded a poor model fit ($\chi^2 = 221.93$, $df = 53$, $CFI = .77$, $TLI = .71$, $RMSEA = .15$) (Hong et al. 2011). However, in the Korean version of LSNS-R showed that the two items about mutual support among family had the highest loadings (.83 for 'Family item 5' and .77 for 'Family item 6'), indicating a high level of mutual dependency in kinship networks among Korean Americans (Hong et al. 2011). In Turkish version, these items were also high. Turkish and East Asian culture are similar in some ways. The peoples of East Asia and Turkey have a notable tradition of elder respect and shared this tradition for many generations (Kalaycı et al. 2016; Mjelde-Mossey and Walz 2006; Sung and Kim 2003). The value of filial piety is still relevant in Turkey and East Asian, as people in these societies continue to feel a strong sense of responsibility in supporting their elderly parents and family (Bulduk 2014; Chow 2004).

Conclusion

In conclusion, Turkish version of the LSNS-R has two factor structure as the original one and this study showed that Turkish-adapted version of LSNS-R is a reliable and valid instrument to measure social ties and social networks among older adults aged 65 and over who live in nursing homes. The study was carried out with older adults age 65 and over who live in nursing homes, some limitations need to be acknowledged that require caution in the generalization of the findings. Initially, a random sampling method was used. This situation caused a decrease in the number of samples. The study was carried out in a single nursing home, so the results cannot be generalized to all older adults' population. Therefore, additional studies need to be conducted on larger samples with non-community-dwelling participants.

Despite the limitations, this study assessed that LSNS-R will allow for early determination of social ties and social networks as social ties are extremely important to health and well-being of older adults. The potential practical implication of the findings is that by using this scale, researchers can identify the isolated older adults. This can be an important step in the identification of vulnerable individuals who live in nursing homes.

Author Contributions Study concept and design: Dr. NKA[1].
Acquisition of subjects and/or data: Dr. NKA[1], BK[2].
Analysis and interpretation of data: Dr. NKA[1], BK[2].
Preparation of manuscript: Dr. BK[2].

Compliance with Ethical Standards

Conflict of Interest The authors declare no conflict of interest.

Ethical Approval In order for the study to be carried out, permission was obtained from the Ministry of Family, Labor and Social Services. Permission was also obtained from the Ethics Committee of Hacettepe University (35853172–604.01).

Informed Consent Informed consent was obtained from all individual participants included in the study. Participation in the study was voluntary, and written consent was obtained from the participants. The participants were informed verbally and in written form that they could withdraw from the study any time without giving any reason. For the validity and reliability study of the LSNS-R scale, written permission was obtained from Professor Lubben, who developed the scale. Guidelines for

reporting reliability and agreement studies (GRRAS) checklist was used to enhance the quality and transparency of this research (Kottner et al. 2011).

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