

Validation of Expanded form of Lubben Social Network Scale among Community-Dwelling Geriatric Population in India

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Abstract

Background: For assessing social networks in the elderly and the social support they receive and to predict social isolation, a proper valid and reliable short-scale screening tool is necessary. The present study aims to estimate the internal consistency and structural validity of the Lubben Social Network Scale (LSNS-18) among community-dwelling Indian older adults. **Materials and Methods:** We have administered the LSNS-18 scale to 500 older adults (>60 years) and performed confirmatory factor analysis (CFA) and structural equation modeling for the validation. Cronbach's alpha was done for estimating the internal consistency. **Results:** The LSNS-18 was easily answerable and the only minimum time is required for administration. CFA identified three domains with six items for each domain that demonstrated a good fit for the older adults with the internal consistency of 0.91. **Conclusion:** These findings suggest that LSNS-18 may be a valid tool for assessing the social network of the elderly and help to predict the risk for isolation in this vulnerable group.

Keywords: Confirmatory factor analysis, elderly, internal consistency, isolation, social support network

INTRODUCTION

Ageing is one of the common phenomena and people in old age will experience physiological, psychological, and social challenges.^[1] Recently, old age population shows increasing trend because of declination in fertility rates, mortality, and increased life expectancy.^[2] The graying population in India which was just 7.5% in 2001 has increased to 8.3% by 2011. The senior citizen population in India was predicted to be around 19% by the year 2050.^[3] As per (UNFPA-2017 "India ageing report"), Tamil Nadu has 11.2% of elderly population with the life expectancy of 73 years for females and 69 years for male.^[4]

Loneliness and social isolation are considered to be more serious problem which affects a significant portion of the older adult population, but still, it was underappreciated public health risks. Living alone, suffer from loss of family or friends, chronic illness, and sensory impairments are more likely to exacerbate the loneliness in older adults.^[5] According to the World Health Organization, prevention of social isolation is one of the important aspects to recognize in promoting good health among elderly.^[6] As per the National Health, Social Life, and Aging Project, social isolation includes two important key

aspects: physical separation from others (objective isolation) and feelings of loneliness or lack of social support (subjective isolation).^[5]

There are evidence, which shows that social isolation is becoming very common with increasing age, and elderly those who have smaller networks are tend to suffer from the feelings of loneliness.^[7] The shrinking social networks can be due to low perceived social support and increased loneliness. Lack of social connectedness may results in elevated risk of suicides, disability, morbidity, and mortality and other diseases.^[8] Studies showed that lack of social connectedness is now considered now considered as major risk for causing physical as well as mental health problems.^[9] Studies shows that loneliness and stressful social ties are contributing high risk of

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disability, poor recovery from illness, and early death.^[10] Social network refers to connections and contacts and influenced by values and norms, its structural aspect characterized by size, density, boundedness, and homogeneity.^[11] Since impeding explicit distinctions among terms related to social relationships, it was found to be difficult in developing a proper and clear definition of social network.^[12]

Developing an instrument that is valid and reliable which helps to screen for social isolation has become even more decisive for gerontology studies and also for health-care practitioner those especially deal with older adults.^[13] One of the widely used short-scale instruments to screen for isolation and to assess social integration among community-dwelling older adults is the Lubben Social Network Scale (LSNS).^[14] This scale was translated into many languages (e.g., Chinese, German, Japanese, Korean, and Spanish) and was found to be applied to elderly population with different ethnic backgrounds.^[15-17] Later, when reliability issues were noted for original LSNS in previous studies, the revised LSNS (LSNS-R and LSNS-18) was developed.^[13] Even though studies are largely stated respectable psychometric qualities for the LSNS, there was no cross-group evaluation of the performance of this scale.^[18] In recent times, various modified versions of LSNS have been reported, including the development of an abbreviated version.^[11] The Lubben Social Network-18 scale (LSNS-18) comprises of three domains: family, friends, and neighbours network.

Some researchers have alienated social networks into two dimensions: one is structural and the other is interactional, while others state that social networking is a combination of structural and functional dimensions.^[19] Due to the social network importance in late life health, it is imperious to validate instruments used to screen social isolation. Most of the crossnational as well as crosscultural validation studies have confirmed that the LSNS short scale is one of the best and standard tools for screening social isolation among communitydwelling older adults.^[20] In India, as of now, there was no psychometric confirmation studies of social network scale performed. It is essential to identify and support the older adults at risk or suffering from loneliness. As public health measures such as social distancing and self-isolation for the COVID-19 pandemic are implemented until the situation improves, a focus on this vulnerable population is critical. Especially most vulnerable and deprived social groups should be given special attention. In the present study, validation of abbreviated version of LSNS 18 scale has been done among rural and urban community-dwelling elderly populations.

MATERIALS AND METHODS

Participants and procedure

This community-based cross-sectional study includes elderly population in the age group of 60 and above and who had no hearing loss and were able to communicate effectively. Using a multistage random sampling technique, the sample size was calculated ($n=480$) based on the assumption that there

was a 50% presence of social networks in the population, 5% precision, and a 20% non-respondent rate. The sample size was rounded to 500, of social network in the population, 5% precision, with 20% nonrespondent rate. House-to-house interview was done using systematic random method. From the institution's field practice area, 250 people from the rural population (Kattankulathur) and the urban population (Tambaram) were chosen for the study. Institutional ethics clearance was obtained from the host institution before the participants were recruited (ref: 1733/IEC/2019). Formal permission to use the LNLS-18 tool was obtained from the Dr. Lubben (author) through E-mail. Informed consent was obtained from participants after providing a brief description of all the components of the study. Following informed consent, the included participants completed the questionnaires with a face-to-face interview by a bilingual interviewer. The estimated time to complete the questionnaire was calculated to be about 15 min and response rate was 100%. All the responses were coded and entered into Excel sheet. Missing item responses were replaced with mean. This study was executed between the month of January and March 2020.

Outcome measurement

Lubben Social Network Scale-18

For measuring social networks, the LSNS-18 scale has three domains, each with six items: family (6 items), friends (6 items), and neighbors (6 items). This five-point scale assesses the intimate network of the person and the network size, whom they can talk, call for help, and frequency of contact and support reciprocity with their network members. Total scores are based on a weighted average of the 18 elements, which range from 0 to 90.^[18]

Quantitative validation

The responses to the LSNS-18 were analyzed with a series of statistical tests for evidence of construct validity and internal reliability using explanatory factor analysis (EFA) and confirmatory factor analysis (CFA).

Statistical analysis

For EFA, principal component analysis (PCA) was used to explore the factors with eigenvalues >1.2 .^[21] The Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity analysis were used to analyze the PCA criteria for defining the factor structure. Also, Cronbach's alpha of >0.90 is considered for the internal consistency.^[22] The following CFA indices were used to evaluate model fitness: root mean square error of approximation (RMSEA), standardised root mean square residuals (SRMR), goodnessofit index (GFI); comparative fit index (CFI), approximate goodness of fit indices (AGFI), normed fit index (NFI), 2; degrees of freedom (df) and its subsequent ratio with $2/df$.^[23,24] After evaluating the model fit, we calculated average variance extracted (AVE) for discriminant validity. Analysis of moment structure (AMOS) was performed to evaluate the relationship between the structural path and factors by structural equation modeling with AMOS software version. 22.

RESULTS

Principal component analysis

We have found KMO index of 0.93, which is >0.06 and the data set is suitable for factor analysis. Bartlett's test of sphericity also noted with high significance. PCA of 18 items yielded a three-factor model that accounted for 42.89% of the variance [Figure 1]. Items in the questionnaire are well loaded [Table 1] with respective factors. Correlation coefficients show significant and positive correlation with one another.

Confirmatory factor analysis

Hypothesized model illustrated the items (observed) and factors (unobserved) in the Figure 1.

In Table 2, the significant χ^2 value ($P = 0.001$) does not imply support for the three-model factors. It can be interpreted as the model has a good fit for the observed data, but the P value

for Chi-squared test is not significant ($P < 0.05$). CFI (0.87), GFI (0.82), AGFI (0.86), NFI (0.79), SRMR (0.06), and RMSEA (0.05) values represent that three-factor model fits to satisfactory. Discriminant validity of this model can be examined by the correlation coefficients and the AVE in Table 3.

Internal consistency

Cronbach's was estimated for the items and factors. All the extracted factors had good internal consistency of 0.9 [Table 1].

DISCUSSION

Present study is done to validate the LSNS-18 as a screening tool for social isolation and to assess the intimate social network among elderly. All 18 items are well loaded with their respective factors, inter factor correlations also good and explained for two third of variance. This study extended and qualified with findings using PCA and CFA and it can be used to examine with larger sample of community-dwelling older adults in urban as well as rural regions of the Tamil Nadu. Even though the analysis strategies and sample size are differ in the international and national studies, the psychometric properties of the LSNS-18 were highly appropriate.^[25] Finding in our studies are in line with previous studies which was done to validate on the original version of LSNS^[11,18] and Korean version of LSNS.^[26] CFA of the 12 item for the turkish version

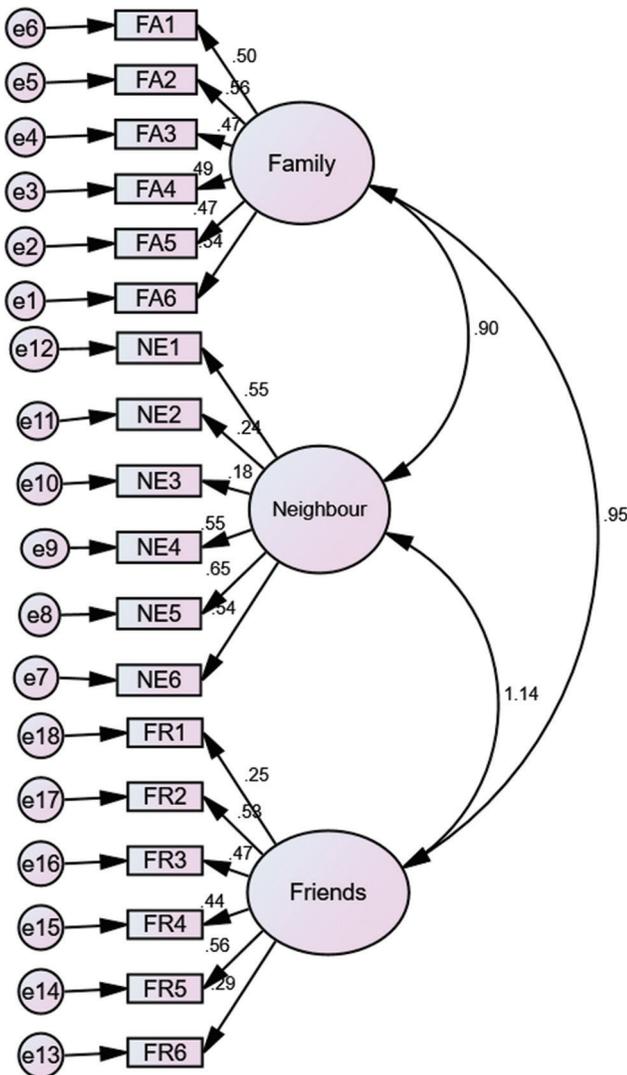


Figure 1: Structural equation modeling path diagram for the Lubben Social Network Scale 18 item questionnaire

Table 1: Factor loadings and communalities (h^2) of each item by principal component analysis

| | Family | Neighbors | Friends | h^2 |
|--|--------|-----------|---------|-------|
| FA1 | 0.498 | 0 | 0 | 0.478 |
| FA2 | 0.558 | 0 | 0 | 0.44 |
| FA3 | 0.497 | 0 | 0 | 0.435 |
| FA4 | 0.467 | 0 | 0 | 0.518 |
| FA5 | 0.452 | 0 | 0 | 0.606 |
| FA6 | 0.529 | 0 | 0 | 0.472 |
| NE1 | 0 | 0.58 | 0 | 0.556 |
| NE2 | 0 | 0.516 | 0 | 0.4 |
| NE3 | 0 | 0.652 | 0 | 0.448 |
| NE4 | 0 | 0.538 | 0 | 0.627 |
| NE5 | 0 | 0.51 | 0 | 0.4 |
| NE6 | 0 | 0.55 | 0 | 0.448 |
| FR1 | 0 | 0 | 0.405 | 0.627 |
| FR2 | 0 | 0 | 0.551 | 0.472 |
| FR3 | 0 | 0 | 0.53 | 0.409 |
| FR4 | 0 | 0 | 0.55 | 0.544 |
| FR5 | 0 | 0 | 0.49 | 0.409 |
| FR6 | 0 | 0 | 0.51 | 0.472 |
| Cronbach's Alpha | 0.93 | | | |
| Percentage variance | 18.26 | 27.81 | 35.58 | 42.89 |
| KMO | 0.95 | | | |
| Bartlett's test of Sphericity approximate χ^2 | 3789 | | | |
| df | 429 | | | |
| Significant | 0.00 | | | |

KMO: Kaiser-Meyer-Olkin

Table 2: Goodness-of-fit indices

| Statistics | GFI | AGFI | NFI | CFI | RMSEA | SRMR | TLI | χ^2 | df | χ^2/df | P |
|--|------|------|------|------|-------|------|------|----------|-----|-------------|-------|
| Model fit for basic model with three domains | 0.82 | 0.86 | 0.79 | 0.87 | 0.05 | 0.06 | 0.89 | 1185 | 313 | 3.78 | 0.001 |

GFI: Goodness-of-fit index, AGFI: Adjusted goodness of fit, NFI: Normed fit index, CFI: Comparative fit index, RMSEA: Root mean square error of approximation, SRMR: Standardized root mean square residual, TLI: Tucker Lewis index, χ^2 : Model Chi square, df: Degrees of freedom

Table 3: Correlation matrixes and average variance extracted

| | Family | Neighbors | Friends |
|-----------|--------|-----------|---------|
| Family | 0.57 | | |
| Neighbors | 0.884 | 0.59 | |
| Friends | 0.949 | 0.91 | 0.55 |

of LSNS-R exhibited acceptable fit for that population data and original version of this revised scale resolute that this can be used for bi-dimensional means of measurement.^[27] Whereas, other compliance indices in CFA were not regarded in the original study.^[11] Another study with korean version of LSNS scale showed poor model fit for bi-dimensional model.^[26] Perhaps Spanish translated version of LSNS-6 reflected improved measurements for the same scale and validation with Mongolians also showed respectable internal consistency.^[28] Refining metrics' on social isolation among at risk population will be one of the key elements not only for research purpose but also for social public health intervention and clinical guidance.^[29]

At this present study LSNS-18 administration time was very minimal and also helped to acquire high response rate. Integrating this scale into standard health data collection might improve the elderly care in community clinics and also helps clinicians to enhance their understanding of older adults social and behavioral risks and also helps indirectly in facilitating targeted interventions for this vulnerable population. CFA was used to examine the LSNS-18 and we recognized that the data is well fit. Researchers are encouraged to measure social integration scales on a number of levels, using both psychometric and functional criteria to determine their therapeutic utility.^[29] Studies also recommended that social isolation might end up with some health problems like depression and high blood pressure among older adults.^[30] Social networks function is an important resource for information and support in the lives of older adults, it is vital to assess the extent of social network ties and the quality of social network especially among this elderly population.^[26] The conceptual factor and the empirical factor structures are seems to be similar and also provided additional evidence of construct validity. Present study shows that the internal factor structure and its psychometric properties support the use of LSNS-18 in large measure of public health practice.

CONCLUSION

This study shows that LSNS-18 version is valid and reliable instrument to measure the social network ties for an old age

above 60 years. For screening the social isolation among elderly LSNS-18 and its three subscales will be a useful tool. It will help for gerontologist and other health workers who were dealing with this vulnerable individual.

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Conflicts of interest

There are no conflicts of interest.

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