

Prevalence of Social Isolation and Psychometric Properties of Lubben Social Network Scale among Older Diabetic Patients in Abeokuta, Nigeria

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Abstract

Introduction: Social isolation is a global public health challenge. Social isolation may worsen the prognosis of diabetes. Assessment of social isolation among older diabetic adults is important, and the use of valid and reliable measure is necessary. Therefore, the aim of this study was to determine the prevalence of social isolation, and to investigate the factor structure and reliability of the abbreviated version of Lubben Social Network Scale (LSNS-6) among older diabetic patients in Abeokuta, Nigeria.

Methods: A descriptive cross-sectional study was conducted, wherein type 2 diabetic patients aged 50 and above were consecutively recruited from Federal Medical Centre, Idi Aba, and General Hospital, Ijaye. A pre-tested, interviewer-administered, structured questionnaire was used to collect data. The factor structure of the LSNS-6 was investigated using exploratory factor analysis (EFA) with principal axis factoring method of estimation and varimax rotation. Estimates of the internal consistency reliability of the subscales and the overall scale were obtained from alpha coefficients.

Results: A total of 160 respondents with the mean age of 63.2 ± 9.6 years and the mean duration of diabetes of 7.5 ± 6.8 years participated in the study. Sixty-six (41.3%) respondents were socially isolated (LSNS-6 score < 12). The EFA revealed 2 factors (i.e. Family and Friend) which explained 72.6% of the total variance. Cronbach's alpha coefficients for Family and Friend subscales were 0.84 and 0.90, respectively. Stratified alpha for the scale was 0.90.

Conclusion: The prevalence of social isolation among the older diabetic patients was high. Also, the LSNS-6 was found to be a reliable and valid instrument for assessing social isolation in this study population. Assessment and management of social isolation should be incorporated into diabetes treatment plan for older diabetic patients.

Keywords: Social isolation; Older diabetic patients; Lubben social network scale; Factor structure; Reliability

Introduction

Social isolation is a global public health challenge. Social isolation causes substantial health risks, with magnitude comparable to the damaging impact of cigarette smoking on health [1]. Social isolation is a risk factor for infection, inflammation, depression, cognitive decline, cardiovascular disease, and all-cause mortality [2-5].

Humans are a social species and are designed to depend on one another for survival. Social isolation is a complex phenomenon; thus, it has various definitions in the literature. For example, social isolation has been defined as the absence of or a decrease in the number of social interactions, contacts and relationships with other people, particularly family and friends [6]. Social isolation has two dimensions, namely social disconnectedness and loneliness. Social disconnectedness is the objective dimension of social isolation and can be measured by the composition and size of social network and by the frequency of interactions with individuals a person can share meaningful and supportive relations [7]. Loneliness, also known as perceived isolation, is the subjective dimension of social isolation. Loneliness represents the qualitative aspect of personal relationships, and can only be described by the person who experienced it in terms of a deficit between actual and desired quality and quantity of engagement or within the social context [6,8].

Social isolation is a global phenomenon with increasing prevalence. In 1982, Fisher and Phillips [9] reported that less than 5% of Americans were socially isolated; however, McPherson et al. [10] documented in 2006 that about 25% of Americans were socially isolated. Iliffe et al. [11] reported in 2007 that the prevalence of social isolation was more than 15% among older individuals in London; but in 2018, Evans et

al. [12] found a social isolation prevalence of about 27% among older people in the United Kingdom. Bahramnezhad et al. [13] reported in 2017 from Iran that 30.3% of the elderly were socially isolated. Aoki et al. [14] documented in 2018 that 27.3% of older adults were socially isolated in Japan.

Lubben Social Network Scale (LSNS) is one of the most commonly used instruments for assessing social isolation among community-dwelling populations [15]. The original version of the LSNS is a 10-item scale. The LSNS has been translated into many languages, including German, Chinese, Japanese and Korean; and applied to older adults of diverse socio-demographic backgrounds [15]. Although LSNS was specifically developed for use among elders aged 65 and older, studies have demonstrated that the LSNS can be reliably utilized among younger populations [16-18]. In view of improving the psychometric properties and ease of administration of LSNS-10, Lubben and Gironde [19] developed the abbreviated version of the LSNS, which is a 6-item scale (LSNS-6). Lubben et al. [15] investigated the psychometric

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properties of LSNS-6 among older adults from Germany, Switzerland, and the United Kingdom; and reported that the scale had a 2-factor structure, namely Family and Friends, and high internal consistency reliability, as Cronbach's alpha ranged from 0.80 to 0.89. Kurimoto et al. [20] reported a Cronbach's alpha of 0.82 for the Japanese version of the LSNS-6 among the elderly community residents in Japan. Chang et al. [21] documented that LSNS-6 had 2 dimensions with high Cronbach's alpha values (0.83-0.95) among older adults in China.

Chronic disease has been linked to social isolation [22,23]. Diabetes mellitus is a chronic disease characterized by hyperglycemia and abnormalities in carbohydrate, fat, and protein metabolism [24]. Diabetes is associated with many complications, including heart attack, stroke, kidney failure, leg amputation, vision impairment, and nerve damage [24]. Diabetes has a huge impact on physiological and psychosocial performance of the affected patients, and this could be worsened by social isolation [24-26]. Moreover, studies have shown that the risk of social isolation increased with age [27-29]. Thus, assessment of social isolation among older diabetic adults is important, and the use of valid and reliable measure is necessary. Studies on social isolation among older adults in Nigeria are lacking. Therefore, the aim of this study was to determine the prevalence of social isolation, and to investigate the factor structure and reliability of the LSNS-6 among older diabetic patients in Abeokuta, Nigeria.

Methods

We conducted a descriptive cross-sectional study among type 2 diabetic patients aged 50 years and older in Abeokuta, Ogun State, Nigeria. Selected health institutions were Federal Medical Centre, Idi-Aba (a tertiary and major referral hospital in Ogun State) and State Hospital, Ijaye (the largest secondary hospital in Abeokuta). The study sample comprised diabetic patients visiting outpatient department of the selected hospitals at the time of the study. Potential participants were consecutively recruited into the study. Data were collected using a pretested, interviewer-administered, structured questionnaire. Social isolation was assessed using the LSNS-6. The study proposal was reviewed and approved by the Ogun State Health Research Ethics Committee, Abeokuta, Nigeria.

A total score of the LSNS-6 below 12 indicated social isolation [15]. Summary statistics were computed for sample characteristics and the LSNS-6 items Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (MSA) and Bartlett's test of sphericity were employed to assess the suitability of the data for exploratory factor analysis (EFA). The assumption of multivariate normality of the LSNS-6 items was tested using the Mardia's test. The number of factors to retain in the EFA was determined using the Kaiser's rule, and parallel analysis. The factor structure of the LSNS-6 was investigated using EFA with varimax rotation. Factor loadings between -0.30 and 0.30 were regarded as random variations from zero. Internal consistency reliability of each subscale was estimated using the Cronbach's alpha, and that of the total scale using the stratified alpha. All analyses were carried out in R, version 3.4.4 (R Core Team, Vienna, Austria).

Results

A total of 160 respondents were included in the study. The mean age of the respondents was 63.2 ± 9.6 years. The majority of the respondents were female (63.7%). Few (12.5%) respondents had no formal education. Most (95.0%) respondents belonged to the Yoruba ethnic group. The mean duration of diabetes was 7.5 ± 6.8 years. More than half (56.3%) of the respondents had at least one chronic disease

with diabetes (comorbidity). The mean number of medications taken by the respondents daily was 3.5 ± 1.5 (Table 1).

Table 2 shows the descriptive statistics for the LSNS-6. The means for the Family subscale, Friend subscale and overall scores were 7.76 ± 3.45 , 5.21 ± 4.01 and 12.96 ± 6.04 , respectively. Sixty-six (41.3%) respondents were socially isolated.

The overall coefficient of KMO test was 0.68, and the individual measures of sampling adequacy values ranged from 0.64-0.74, suggesting that the items shared common factors. Bartlett's test of sphericity was statistically significant ($P < 0.001$), indicating that the correlation matrix was not an identity matrix. Mardia's test showed that the LSNS-6 data were not multivariate normal, as both the skewness ($\hat{\gamma}_{1,p} = 8.63, P < 0.001$) and kurtosis ($\hat{\gamma}_{2,p} = 61.70, P < 0.001$) significantly deviated from multivariate normality. The Kaiser's rule and parallel analysis suggested retention of 2 factors. Table 3 shows the rotated factor matrix of the LSNS-6. Factor 1 (Family) was associated with items 1-3, and factor 2 (Friend) with items 4-6. The percentages of variance explained by factors 1 and 2 were 38.9% and 33.7%, respectively.

Cronbach's alpha coefficients for Family and Friend subscales were 0.84 and 0.90, respectively. Stratified alpha for the scale was 0.90 (Table 4).

Discussion

We determined the prevalence of social isolation, and investigated the factor structure and reliability of the LSNS-6 among older diabetic patients in Abeokuta, Nigeria. We found that the prevalence of social isolation was more than 40%; and the LSNS-6 was composed of two dimensions and had high internal consistency reliability.

Characteristic	Mean \pm SD/n (%)
Age (years)	63.2 \pm 9.6
Age group (years)	
50-59	62 (38.8)
60-69	53 (33.1)
≥ 70	45 (28.1)
Gender	
Male	58 (36.3)
Female	102 (63.7)
Marital status	
Married	117 (73.1)
Divorced	11 (6.9)
Widowed	32 (20.0)
Education	
No education	20 (12.5)
Primary	24 (15.0)
Secondary	45 (28.1)
Higher	71 (44.4)
Religion	
Christianity	124 (77.5)
Islam	36 (22.5)
Ethnicity	
Yoruba	152 (95.0)
Igbo	5 (3.1)
Others	3 (1.9)
Duration of diabetes mellitus	7.5 \pm 6.8
Comorbidity	
No	70 (43.7)
Yes	90 (56.3)
Number of medications	3.5 \pm 1.5

Table 1: Characteristics of Respondents (N=160).

Item	Mean \pm SD
How many relatives do you see or hear from at least once a month?	3.22 \pm 1.26
How many relatives do you feel at ease with that you can talk about private matters?	2.33 \pm 1.39
How many relatives do you feel close to such that you could call on them for help?	2.21 \pm 1.31
How many of your friends do you see or hear from at least once a month?	2.19 \pm 1.66
How many friends do you feel at ease with that you can talk about private matters?	1.55 \pm 1.36
How many friends do you feel close to such that you could call on them for help?	1.46 \pm 1.37
Family subscale score	7.76 \pm 3.45
Friend subscale score	5.21 \pm 4.01
Total scale score	12.96 \pm 6.04

Table 2: Descriptive statistics of the LSNS-6.

Item	Factor		Communality (h^2)
	Family	Friend	
How many relatives do you see or hear from at least once a month?	0.58		0.36
How many relatives do you feel at ease with that you can talk about private matters?	0.97		0.95
How many relatives do you feel close to such that you could call on them for help?	0.83		0.71
How many of your friends do you see or hear from at least once a month?		0.74	0.57
How many friends do you feel at ease with that you can talk about private matters?		0.97	0.96
How many friends do you feel close to such that you could call on them for help?		0.89	0.80
Eigenvalue	3.15	1.66	
Variance explained (%) (Total variance=72.6%)	38.9	33.7	

Table 3: Factor matrix of the LSNS-6 with varimax rotation.

Dimension	Number of items	Reliability	
		Cronbach's α	Stratified α
Family	3	0.84	0.90
Friend	3	0.90	
Total	6	0.81	

Table 4: Internal consistency reliability of the LSNS-6.

More than 40% of the respondents were socially isolated. This result was higher than the findings from United States [9,10], the United Kingdom [11,12], Japan [14], and Iran [13]. The review of the literature showed an increasing trend of social isolation prevalence among older adults. In addition, variations in the reported prevalence rates may be attributed to differences in study designs, sample characteristics, and methods of assessment of social isolation.

Previous studies on EFA have demonstrated that the sample size affects the quality of factor solutions [30-32]. In the present study, the ratio of sample size to number of the LSNS-6 items was about 27:1. This is consistent with the recommendation of Everitt [33] for sample size in EFA. The results of the KMO test and Bartlett's test of sphericity suggested that the data were suitable for EFA. Significant deviation of the data from multivariate normality justified the use of principal axis factoring method of extraction in EFA. We did not use the maximum likelihood estimation method because it relies on the assumption of multivariate normality of the scale's items. It has been documented that when the assumption is violated, model parameter estimates may not be accurate, and in some cases the algorithm will fail to find a factor solution [34-36]. In the present study, the EFA revealed a 2-factor structure, comprising Family and Friend dimensions. These results agree with the findings of Lubben et al. [15], and Chang et al. [21].

The reliability estimates of the instrument (including the subscales) ranged from 0.84-0.90, and these were greater than the recommended value of 0.70 [37], indicating that the measure had sufficient internal consistency reliability. Lubben et al. [15], Kurimoto et al. [20], and Chang et al. [21] reported similar findings.

This study had some limitations. The study design was cross-

sectional; hence, test-reliability could not be evaluated. Also, the findings from this study might not be generalizable to non-diabetic patients, as the study sample was diabetic patients (homogenous population). Moreover, confirmatory factor analysis was not conducted to validate the factor structure of the LSNS-6 generated by EFA, which might improve the validity of our findings. Nonetheless, this study provides the first evidence on the prevalence, dimensionality, and reliability of the LSNS-6 among older diabetic patients in Nigeria.

In conclusion, the prevalence of social isolation among older diabetic patients in Abeokuta, Nigeria was high. Also, the LSNS-6 was found to be a reliable and valid instrument for assessing social isolation in this study population. Assessment and management of social isolation should be incorporated into diabetes treatment plan for older diabetic patients.

Disclosure

The authors have no potential conflicts of interest to disclose.

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