An exploratory factor analysis and reliability analysis among Malaysian elderly

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Article Info	ABSTRACT
	Low awareness and underdeveloped instruments evaluating elderly Malaysians' well-being, social support, and independence necessitate lubben social network scale (LSNS), social provisions scale (SPS), Katz activities of daily living (ADL), and life satisfaction index (LSI) development and evaluation involving 201 60-year-old males and females (purposive samples) in Kuching and Bintulu participated (June to August 2022). Exploratory factor analysis (EFA) examined the construct validity of LSNS, SPS, Katz ADL, and LSI, whereas principal axis factoring (paf) and orthogonal (varimax) rotation with Kaiser Normalisation validated their psychometric properties and internal consistency reliability using Cronbach's alpha. Social integration (0.94), reassurance of worth (0.91), attachment (0.90), sense of reliable alliance (0.78), and guidance (0.74) have eigenvalues >1 in the SPS-10 EFA; good Cronbach's alpha reliability values. Family (0.77) and friends (0.73) of LSNS-6 factors have eigenvalues >1, good Cronbach's alpha reliability values. Acceptance-contentment (0.87) and Achievement-fulfilment (0.72) had eigenvalues >1 in the Life Satisfaction Index-Z EFA, good Cronbach's alpha reliability values. In the EFA of Katz ADL, single items with factor loadings ≥0.5: bathing, dressing, toileting, transferring, and feeding; loadings <0.3: Continence; Cronbach's alpha reliability value was 0.95. LSNS, SPS, Katz ADL, and LSI were valid and reliable instruments measuring elderly well-being, social support, and independence. Confirmatory factor analyses will revalidate it in different populations.

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1. INTRODUCTION

Population ageing is a worldwide phenomenon with profound implications for many facets of human existence [1]. As the world's population is projected to reach between 8 and 9.6 billion by 2050, the elderly will represent a significant proportion of the overall population on every continent [2]. Population ageing might be a significant demographic issue in many European nations [3]. It is anticipated to substantially affect socioeconomic systems such as public pension schemes, healthcare, and family structures [3]. Indeed, the ageing population has rapidly become one of the world's most significant issues [4].

Asian countries are home to 57% of the estimated 900 million individuals who are 60 years old or older. Hence, governments and researchers are devoting an increasing amount of attention to the well-being and happiness of older people on this continent [5]. In Malaysia, the number of senior residents reached 28.3 million in 2010 and given the overall trend toward greater health, it is expected that this number will climb to 38.6 million during the next 30 years [3]. This significant demographic milestone has redirected and

refocused attention on the challenges faced by population growth [3]. In 2005, 7% of Malaysia's aged population was 60 years or older; by the year 2028, it is expected that this number will have increased to 14% [3].

Older generations are more prone to social isolation and loneliness than younger generations; this is especially true for those who will spend the remaining years of their lives alone or severely ill [6]. According to Peplau [7], loneliness is a subjectively painful or unpleasant sensation resulting from the dissonance between an individual's social networks and society's social expectations. Older individuals have a greater risk of and are more likely to experience feelings of isolation, considering the influence of the interrelationship between sociodemographic, social, and health variables [8]. Hence, one of the most critical steps in determining the vulnerable elderly is establishing reliable methods for recognising seniors, particularly those who live alone [8]. In truth, the lubben social network scale (LSNS) is internationally recognised as one of the most often used and useful instruments for evaluating an individual's perceived social support from family members, friends, and community members [8], [9].

It is well acknowledged that social support is one of the most important factors in one's health and happiness [10]. According to the definition by the Public Health Agency of Canada (PHAC), social support is the sense or experience of feeling loved, appreciated and attended to, as well as having a close relationship or contacts with family members, acquaintances, colleagues, and other members of the community who are there for someone in times of need [11]. The social provisions scale (SPS) is one of the most frequently utilised instruments beneficial in assessing the level of social support [10]. While developing and validating the SPS, Cutrona et al. extensively used Weiss's concept of social provisions [10], [12]. This model addresses the following six social needs that stem from one's interactions with other people: i) guidance (advice or information), ii) reliable alliance (tangible assistance), iii) the reassurance of worth (other people's recognition and appreciation of the competence, abilities, and value possessed by an individual), iv) opportunity for nurturance (the individual as a source of support for others for the possibility for growth and development), v) attachment (an emotional connection that provides a person with a feeling of security), and vi) social integration (a feeling of connection and affiliation in a community that shares mutual goals and interests) [10], [13].

The individual's ability to conduct the social and physical tasks essential for self-care and quality day-to-day living is considered when determining an individual's functional status [14]–[16], which serves as a tool for determining an individual's overall health [14]. Basic activities of daily living (BADLs), instrumental activities of daily living (IADLs), and advanced activities of daily living (AADLs) include the three levels of activities that contribute to a person's functional status [17], [18]. In addition, several scales have been established to evaluate functional status. The Katz activities of daily living (ADL) is one of the several instruments that assess BADLs, and it is by far the most well-known and widely used tool in clinical practice and research. Historically, Katz et al. are individuals who played a significant role in the establishment of the Katz ADL in the 1960s [19]. The Katz ADL has amassed a considerable reputation and emerged as a noteworthy research instrument, particularly in locations with large populations of elderly individuals [16], [19]. The six-item Katz ADL is brief and interview-administrable [16], assessing self-care activities such as bathing, dressing, toileting, transferring to a chair, maintaining continence, and feeding [16].

The evaluation of a person's level of contentment with their life has emerged as a central focus and attention-grabbing topic in several research projects involving elderly populations. The degree to which a person is satisfied and content with their life serves as a general indicator of how they feel emotionally, expressed as the degree to which they are happy with their life [20], [21]. As a direct consequence, the life satisfaction index (LSI) has been recognised as one of the most widely utilised indicators of an individual's level of happiness and well-being [22]. Based on this index, researchers can verify whether there are correlations between life contentment and various life scenario characteristics. Some variables include physical well-being, socioeconomic status, age, employment, marital status, and social interaction [23]. It is critical to have a solid understanding of the LSI's psychometric properties in light of the extensive use of the LSI in the past [23], [24] besides the possibility of its ongoing implementation in gerontology as a result of demographic shifts and a rising interest in staying healthy as people age [23]. Eventually, Wood, Wylie, and Sheafor proposed the life satisfaction index Z (LSIZ), which was a revision of the life satisfaction index A (LSIA). LSIZ incorporates 13 of the original 20 items [25].

Development and validation of the LSNS, SPS, Katz ADL, and LSI assessments in Malaysia have received insufficient attention. The evidence-based information regarding strategies for improving the quality of life of older adults and modifying the factors that influence their life satisfaction and contribute to unhealthy lifestyles is severely limited in the absence of a reliable and valid Malaysian version of the LSNS, SPS, Katz ADL, and LSI. This emphasises the need for a uniform and accurate assessment instrument to determine the LSNS, SPS, Katz ADL, and LSI levels in the elderly population. Thus, this study aimed to develop LSNS, SPS, Katz ADL, and LSI and evaluate their reliability and validity among the elderly in Malaysia.

2. RESEARCH METHOD

2.1. The setting, population, and sampling

This cross-sectional study adopted the purposive sampling method. It was conducted in two divisions in Kuching and Bintulu over three months (June to August 2022). The sample size was determined based on Tabachnick and Fidell's recommendation of 10 participants per questionnaire item for factor analysis: LSNS, SPS, Katz Index ADL, and LSI [26]. A total of 201 participants were recruited after considering incomplete forms. The total number of samples surpassed the minimum sample size of 130 participants required for statistical analysis. The following are the inclusion criteria: (i) age 60 or older, (ii) male and female, (iii) residing in the residential areas for more than a year, (iv) capable of answering questions and not suffering from cognitive problems or depression, according to the abbreviated mental test score (AMTS), and (v) showing no evidence or sign of severe mental disease, cognitive disorders, or no hearing or speech impairments.

2.2. Data collection instruments

The English versions of the LSNS, SPS, Katz ADL, and LSI were consistent with previous studies [9], [10], [19], [20], [27]. Two bilingual experts in Malay and English translated the original English versions of the LSNS, SPS, Katz ADL, and LSI into Malay. A back translation was conducted without affecting the instrument's structure and evaluated for its face and content validity among elderly Malaysians. It was then modified correspondingly to make it more accessible to the Malaysian population.

2.3. Data entry and analysis

The Statistical Package for the Social Sciences (SPSS) Version 27 [28] was unquestionably a useful instrument for inputting and analysing data for this research; it codified, verified, and replicated quantitative data. The data's completeness was evaluated, and the Kolmogorov-Smirnov test was used to evaluate the data's normalcy. For the descriptive statistics study of categorical variables, numbers and percentages were used, while means and standard deviations were utilised to analyse normally distributed data (medians for non-normally distributed variables). Principal axis factoring (PAF) was used for factor extraction, while orthogonal varimax (Kaiser Normalisation) rotation was used for exploratory factor analysis (EFA). Before further analysis, the Kaiser-Meyer-Olkin (KMO) test for sample adequacy and the Bartlett test for sphericity were conducted. Internal consistency reliability levels were determined using Cronbach's alpha values, which were then applied to the overall dimensions and each dimension.

2.4. Ethical issues

The study proposal was approved by the faculty ethics committee. Prior to the beginning of this study, participants were given background information and advised that their participation was entirely optional. Participants, together with their parents or legal guardians, completed the informed consent forms, which included a comprehensive description of the study's details. District offices and local councils were responsible for authorising data collection in their areas.

3. RESULTS AND DISCUSSION

3.1. Demographic characteristics

The participants' mean (SD) age is 65.28 (5.30). Most participants are males (n=109, 54.23%), while the rest are females (n=92, 45.77%). Malay participants dominated this study (n=88, 43.78%), followed by Others (n=70, 34.83%), Iban (n=20, 9.95%), Chinese (n=12, 5.97%), and Bidayuh (n=11, 5.47%). Most participants completed secondary school (n=71, 35.32%), followed by primary school (n=67, 33.33%), tertiary school (n=36, 17.91%), and none (n=27, 13.43%). The vast majority of participants resided in their own house (n=187, 93.03%), followed by their child's house (n=7, 3.48%), a rental house (n=4, 1.99%) and others (n=3, 1.49%), as listed in Table 1.

3.2. EFA and reliability analysis

3.2.1. SPS

The SPS-10 comprises ten items, all of which reflect five of Weiss' social support dimensions: social integration, reassurance of worth, attachment, sense of reliable alliance, and guidance. The factor loadings for the EFA analysis vary from 0.73 to 0.95. Five factors in the SPS-10 EFA have eigenvalues higher than 1 (1.79, 1.67, 1.64, 1.33, and 1.20). Furthermore, Cronbach's alpha values for reliability for this version's internal consistency were good [29]. Additionally, Cronbach's alpha values are 0.94 (social integration), 0.91 (reassurance of worth), 0.90 (attachment), 0.78 (sense of reliable alliance), and 0.74 (guidance; as shown in Table 2).

Table 1. Participants' demographic characteristics (n=201)

Characteristics	N	%	Statistic
Age			
60	48	23.88	
61	11	5.47	
62	10	4.98	
63	19	9.45	
64	6	2.99	
65	38	18.91	
66	13	6.47	
67	4	1.99	
68	12	5.97	
69	7	3.48	Median=65.00
70	5	2.49	Mean (SD)=65.28 (5.30) Min, 60.00; Max, 87.00
71	5	2.49	
73	2	1.00	
74	2	1.00	
75	1	0.50	
76	11	5.47	
77	2	1.00	
78	1	0.50	
79	2	1.00	
87	2	1.00	
Gender			
Male	109	54.23	
Female	92	45.77	
Ethnicity			
Malay	88	43.78	
Chinese	12	5.97	
Iban	20	9.95	
Bidayuh	11	5.47	
Others	70	34.83	
Education			
None	27	13.43	
Primary	67	33.33	
Secondary	71	35.32	
Tertiary	36	17.91	
Residence			
Own house	187	93.03	
Child's house	7	3.48	
Rental house	4	1.99	
Others	3	1.49	

Table 2. EFA with cronbach alpha of social provisions scale

Constructs, indicators, variables	Exploratory factor analysis – EFA varimax rotation			Reliability		
	Eigenvalues	% of variance explained	Cumulative variance explained	Cronbach alpha	Factor loading	Mean construct
Attachment:	1.79	17.85	17.85	94		2.53
1. I have close relationships that provide me with a sense of emotional security and well-being.					0.95	
2. I feel a strong emotional bond with at least one other person					.91	
Guidance:	1.67	16.70	35.54	0.91		2.82
1. There is someone I could talk to about important decisions in my life.					.88	
2. There is a trustworthy person I could turn to for advice if I were having problems.					.90	
Social integration:	1.64	16.38	50.92	0.90		2.87
1. There are people who enjoy the same social activities I do.					.85	
2. I feel part of a group of people who share my attitudes and beliefs.					.90	
Reassurance of worth:	1.33	13.34	64.27	0.78		3.11
1. I have relationships where my competence and skill are recognised.					.84	
2. There are people who admire my talents and abilities.					.73	
Sense of reliable alliance:	1.20	12.02	76.29	0.74		2.75
1. There are people I can depend on to help me if I really need it.					.79	
2. There are people I can count on in an emergency.					.74	

*Kaiser-Meyer-Olkin (KMO): .60 and Bartlett's Test of Sphericity: p <0.005

3.2.2. LSNS

The six-item LSNS-6 assesses perceived social support from family members and friends. The factor loadings for the EFA analysis vary from 0.43 to 0.92. Two factors in the LSNS-6 EFA have more than 1 eigenvalue (1.77 and 1.63). Furthermore, as far as reliability was concerned, Cronbach's alpha values for this version's internal consistency are good [29], as indicated by 0.77 (family) and 0.73 (friend; as presented in Table 3).

Table 3. Exploratory factor analysis (EFA) with cronbach alpha of LSNS

Constructs, indicators, variables	Exploratory factor analysis – EFA varimax rotation			Reliability		
	Eigenvalues	% of variance explained	Cumulative variance explained	Cronbach alpha	Factor loading	Mean construct
Friends:	1.77	29.57	29.57	0.77		2.04
1. How many of your friends do you see or hear from at least once a month?					0.60	
2. How many friends do you feel at ease with that you can talk about private matters?					0.64	
3. How many friends do you feel close to such that you could call on them for help?					0.83	
Family:	1.63	27.19	56.76	0.73		2.72
1. How many relatives do you see or hear from at least once a month?					0.43	
2. How many relatives do you feel at ease with that you can talk about private matters?					0.59	
3. How many relatives do you feel close to such that you could call on them for help?					0.92	

*Kaiser-Meyer-Olkin (KMO): .78 and Bartlett's Test of Sphericity: p<0.005

3.2.3. LSIZ

LSIZ is a 13-item subjective measure with two dimensions (acceptance-contentment and achievement-fulfilment) to assess the elderly's well-being. The factor loadings for the EFA analysis vary from 0.36 to 0.74. Two factors in the EFA of the Z LSI have eigenvalues more than 1 (4.05 and 2.42). In addition, Cronbach's alpha reliability values for this version's internal consistency were good [29]. The Cronbach's alpha values are 0.87 (acceptance-contentment) and 0.72 (achievement-fulfilment; as shown in Table 4).

Table 4. EFA with cronbach alpha of LSI Z

Constructs, indicators, variables	Exploratory factor analysis–EFA varimax rotation			Reliability		
	Eigenvalues	% of variance explained	Cumulative variance explained	Cronbach alpha	Factor loading	Mean construct
Acceptance-Contentment:	4.05	31.13	31.13	0.87		1.23
1. As I grow older, things seem better than I thought they would be					0.56	
2. I have had more chances in life than most of the people I know					0.67	
3. This is the dreariest time of my life					0.71	
4. I am just as happy as when I was younger					0.66	
5. These are the best years of my life					0.74	
6. Most of the things I do are boring or monotonous					0.63	
7. The things I do are as interesting to me as they ever were					0.48	
8. I have made plans for things I'll be doing a month or a year from now					0.64	
9. In spite of what people say, the lot of the average man is getting worse, not better					0.36	
Achievement-Fulfilment:	2.42	18.63	49.76	0.72		1.32
1. As I look back on my life, I am fairly well satisfied					0.63	
2. When I think back over my life, I didn't get most of the important things I wanted.					0.62	
3. Compared to other people, I get down in the dumps too often					0.42	
4. I've gotten pretty much what I expected out of life					0.55	

*Kaiser-Meyer-Olkin (KMO): .87 and Bartlett's Test of Sphericity: p<0.005

3.2.4. Katz index ADL

The Katz ADL is a six-item subjective measure to assess the level of independence in the elderly. The factor loadings for the EFA analysis vary from 0.36 to 0.74. In the EFA, the bathing, dressing, toileting, transferring, and feeding items have a single factor with a high factor loading (factor loadings ≥0.5). The only item with factor loadings <0.3 is continence. This version's internal consistency revealed excellent Cronbach's alpha values, indicating its reliability [29]. The Cronbach's alpha value is 0.95 as presented in Table 5.

3.2.6. Reliability analysis

All items in each variable of the SPS, LSNS, LSIZ, and Katz Index ADL were analysed for internal consistency, or the measure to which a set of items is related. For variables of SPS-10, LSNS-6 and KATZ ADL Index has a range score of 0.81 to 0.89, while the LSIZ Index has the lowest reliability value of 0.63. The range of 0.63 to 0.89 for Cronbach's alpha might be considered acceptable to good [29] as shown in Table 6.

Table 5. EFA with cronbach alpha of Katz ADL

| Constructs, indicators, variables | Exploratory factor analysis – EFA varimax rotation | | | Reliability | | |
	Eigenvalues	% of variance explained	Cumulative variance explained	Cronbach alpha	Factor loading	Mean construct
Activities of daily living:	4.05	67.41	67.41	0.95		0.94
1. Bathing					0.95	
2. Dressing					0.92	
3. Toileting					0.91	
4. Transferring					0.77	
5. Feeding					0.94	

*Kaiser-Meyer-Olkin (KMO): .89 and Bartlett's Test of Sphericity: p<0.005

Table 6. Cronbach alpha

Variable	Number of items	Reliability Cronbach's alpha	Comment
1. Social provisions scale	10	0.89	Good
2. Lubben social network scale	6	0.81	Good
3. LSIZ	13	0.63	Acceptable
4. Katz index of independence in activities of daily living	6	0.85	Good

Developing and validating measurements of the LSNS, SPS, Katz ADL, and LSI in the Malaysian context is essential for elderly Malaysians. All scales are valid and reliable for studies among the elderly worldwide [16], [30]–[32]. This research investigated the psychometric qualities of the LSNS, SPS, Katz ADL, and LSI. In Malaysia, awareness of the elderly is relatively low, and an instrument for evaluating their well-being, social support, and level of independence is insufficiently established. In light of the unique culture of Malaysia, it is crucial to investigate the psychometric features of the LSNS, SPS, Katz ADL, and LSI [33]. The results may be useful in the construction of a research instrument for studies among the elderly in Malaysia, therefore increasing understanding of the health, social support, and degree of independence of the elderly in the setting of Malaysia.

The EFA for the SPS discovered that five of Weiss' dimensions of social support, with each dimension comprising two items, are comparable to the research by Steigen and Bergh. The dimensions are social integration, reassurance of worth, attachment, a sense of reliable alliance, and guidance [34]. These five dimensions have been identified as significant in gauging the social support of the elderly. Social integration is vital to the health of the elderly and is associated with longer and more fulfilling lives [35]. The reassurance of one's self-worth that comes from being of assistance to other people is beneficial to an individual's psychological health [35]. Attachment is also crucial as it arises as a result of social interactions. These interactions, e.g., proximity and affection, in addition to love, cultivate a sense of safety and comfort [36]. Moreover, the sense of reliable alliance and guidance dimensions are equally crucial for the elderly as they may anticipate their mental health [36].

The EFA for the LSNS indicated that two aspects of social support derived from family members and friends are equivalent to the study by Chang et al. [30]. It appears that the support of family members becomes more critical to the quality of life and well-being of individuals as they age [37]. As a consequence of the lack of care from family members, the elderly experienced psychological disappointment, which put their life

satisfaction at stake [37]. Research has shown that seniors who spend more time engaging in social interactions with their families and friends have much better mental health [38].

The EFA for the LSIZ that examined the well-being of the elderly population revealed that two dimensions (Acceptance-Contentment and Achievement-Fulfilment) are comparable to the research by Baiyewu and Jegede [20]. These two dimensions have been identified as crucial for gauging the well-being of the elderly. The notions of contentment and acceptance derive from being content with the current state of one's life, being at peace as a person, and feeling at ease in one's life [39]. Through acceptance and contentment, the elderly can acquire inner peace and tranquillity [39]. Feeling a sense of accomplishment is also essential for developing positive well-being in the elderly [40]. In reality, living a profoundly meaningful and purposeful life is vital for achieving fulfilment. Nevertheless, happiness is not a necessary component of fulfilment. Instead, vision, aspirations, and living in complete alignment and harmony with one's values are crucial for the elderly [41], [42].

Following an EFA of the Katz Index ADL, one factor was extracted and identified as significant. A person's functional state may be gleaned from their ability to perform ADL [43]. When individuals cannot perform ADLs, they may need assistance from other people or devices [43]. Moreover, it is possible for life-threatening situations and a decrease in quality of life to result from an incapacity to perform fundamental day-to-day activities [43]. ADLs are predictors of nursing home admission, the need for alternative living arrangements, hospitalisation, and placement in paid home care, making their measurement crucial [43].

The LSNS, SPS, Katz ADL, and LSI validity levels among elderly Malaysians are acceptable [29]. Inconsistent measurement has been one of the most significant challenges to the internal validity of investigations [44]. Estimates of internal consistency provide crucial information on one soundness aspect of measuring variables, items, and attributes. Thus, the internal consistency reliability appropriate for establishing the scale's reliability is vital [45].

Nonetheless, this study has several limitations that might limit its generalisability. First, it recruited a relatively small sample size of 201 elderly individuals in Sarawak, which might not provide a comprehensive overview of the state's elderly (estimated population of 3.54 million as of 2020) [46]. Secondly, this study could not verify the questionnaire's stability over time as test-retest procedures were not conducted.

4. CONCLUSION

LSNS, SPS, Katz ADL, and LSI are highly valid and reliable instruments for evaluating elderly well-being, social support, and level of independence in Sarawak. Further research utilising confirmatory factor analysis is necessary to revalidate the LSNS, SPS, Katz ADL, and LSI component structures across diverse populations. However, the limitation of the study needs to be addressed for more accurate results.

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