

Establishing the psychometric properties of the IGBO version of the participation scale

PETER O. IBIKUNLE****, SAMUEL EKUNDAYO
OLADIPO*, JOSEPH NGOZI CHUKWU** &
ADAIGWE IFEOMA OKEKE***

*Northwest University, Mafikeng Campus, Republic of South Africa

**German Leprosy and TB Relief Association, Nigeria

***Department of Medical Rehabilitation, Nnamdi Azikiwe
University, Nigeria

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Summary

Objectives: The Participation Scale (P-Scale) has been shown to be a valid and reliable scale for measuring participation restriction in people affected by leprosy. Until, now there has been no translation of the scale in Igbo. This study set out to produce a valid translation of the P-Scale in Igbo.

Design: The research design was a cross-sectional survey. Forty (40) subjects were chosen by purposive sampling. Data were analysed using Cronbach's Alpha and factor analyses.

Result: Reliability analysis conducted using the Cronbach Alpha reliability test revealed that the overall reliability Alpha of the scale is 0.91. Firstly, most of the scale items showed a correlation coefficient of at least 0.3 with at least one other item on the scale, which suggests reasonable factorability. Secondly, the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.77, and Bartlett's test of sphericity was significant (χ^2 (190) = 473.93, $P < 0.001$). Finally, the communalities were all above 0.5 confirming that each item shared some common variance with other items.

Conclusion: It can be concluded that this Igbo translation of the Participation Scale is reliable and valid for use among the Igbo speaking group in Nigeria.

Keywords: Participation Scale, Psychometric, Leprosy, Igbo

Introduction

Leprosy is a chronic granulomatous infection of the skin and peripheral nerves caused by *Mycobacterium leprae*.¹ When nerves are damaged by leprosy, impairments such as loss of sensation, dryness of skin, muscle weakness or paralysis develop.^{1–5} If treatment is delayed,

Correspondence to: Peter Ibibunle, School of Research and Postgraduate Studies, Faculty of Agriculture, Science and Technology, Northwest University, Mafikeng Campus, Republic of South Africa (e-mail: 25405314@nwu.ac.za, po.ibikunle@unizik.edu.ng)

nerve damage can be irreversible and secondary impairments may develop, including skin cracks, wounds, muscle atrophy, clawing of digits, contractures and absorption of fingers.³⁻⁶

People with disabling conditions such as leprosy are often constrained in their performance of daily activities, and in their social interactions including relationships, education and community involvement.² These restrictions in (social) participation are defined by the World Health Organization (WHO) as 'problems an individual may experience in involvement in life situations'.⁷ The community can have a particularly negative effect on the participation of the person affected, as seen in stereotyping, isolation and other forms of discriminatory practices of community members.⁸ Other causes of participation restriction include the absence of (assistive) equipment, policies or disease-related financial problems.^{2,9} Several instruments have been developed to assess participation restrictions in people with a health condition.¹⁰ However, these have been developed for use with people living in developed countries, have been disease-specific or have covered only certain aspects of 'participation'. The Participation Scale is designed to be suitable for measuring participation restrictions in persons affected by leprosy, disability or other stigmatised conditions, based on the International Classification of Functioning, Disability and Health (ICF) as much as possible, and culture-free.⁸

The Participation Scale allows quantification of participation restrictions experienced by people affected by leprosy, disability or other stigmatised conditions. Various instruments based on the ICF that intend to measure social participation, cover six to eight of the nine domains ICF, as published by the WHO in 2001.¹¹ The nine domains are learning and applying knowledge, general tasks and demands, communication, mobility, self-care, domestic life, interpersonal interactions and relationships, major life areas and community, social and civic life.^{6,8} The P-scale covers eight out of nine domains. No item was included that covered the domain 'general tasks and demands'. The instrument measures perceived participation restriction and intends to be generic in nature.⁶ Specific attention was paid to the cross-cultural validity of the scale by developing the scale with an international team of experts, simultaneously in six languages and three countries.⁶ Another important strength of the P-scale was the emphasis that the instrument should be suitable for use by people who are not professional interviewers, as this skill is scarce in low-income countries.⁶

The Participation scale was originally developed in English by an international team of researchers led by Dr. Wim van Brakel. The purpose of this present study was to validate the Igbo translation of the Participation Scale for screening people affected by leprosy in Southeastern Nigeria. Validation of the Igbo translation is needed to scientifically establish whether it actually measures the construct it is supposed to measure.

Southeastern Nigeria is made up of five out of the 36 States in Nigeria and is one of the six geopolitical zones, with a total population of 16,381,729 million people from the recent 2006 National census. Nigeria is divided into six geopolitical zones, with three major languages being Hausa, Yoruba and Igbo languages. The two largest leprosy centres in Southeastern Nigeria are in Oji river of Enugu state and Uzuakoli of Abia state. Oji River is a Local Government Area of Enugu State, Nigeria to the South bordering Anambra State and Abia State. Its headquarters are in the Town of Oji River. The towns within Oji River L.G.A are: Inyi, Achi, Awlaw, Akpugoeze and Ugwuoba. It has an area of 403 km² and a population of 126,587 at the 2006 census. Oji River town has one of the largest and oldest running leprosy rehabilitation settlements in the south-east. Leprosy was observed in Southeastern Nigeria as early as 1926 in Calabar in the then Old Southeast Nigeria and in Uzuakoli as early as 1937 by a missionary who was a clinical leprologist and epidemiologist.¹²

Construct validity of a scale refers generally to the proposed underlying factors or the theoretical concepts of the scale. In line with the analysis of the original English version of the Participation scale, factor analysis of the construct of the Igbo version was conducted, with an exploration of the interrelationships among questionnaire items in order to be able to ascertain factors measuring the same construct.¹³ The authors of this present study strove to maximise the importance of the first factor, because it is believed to represent the concept of participation restriction.

Theoretically, there could be many types of reliability estimates as there are various sources which could introduce errors in what the instrument or test is measuring.¹³ However, in practice, it is only in a few of these cases that procedures have been developed. These include: Estimate of temporal stability, Estimate of internal consistency, Estimate of equivalence, and Estimate of rater scorer validity.¹³ In this study the Estimate of internal consistency (Cronbach Alpha), which refers to the degree of consistency with which each item of the instrument measures a given trait, was used. It provides a measure of how homogenous or otherwise the items are. This type of estimate is most appropriate for instruments where scores for the various items will be added or aggregated to produce a single or composite score.^{13,14}

Methodology

Design: cross-sectional survey.

Study site: Leprosy settlement in Oji river local government area. Enugu State, Nigeria. Total population of people living with leprosy disability in the settlement = 97.

Sample size: 40 people affected by leprosy

Sample method: Purposive or judgmental sampling technique.

The English Participation Scale was translated into Igbo through a forward and back translation process. The translators were linguistic experts who are involved in the translation of health measuring instruments. Discrepancies between the original and back translated versions were discussed and resolved at an expert committee meeting of all the translators. The Igbo translation was used by trained research assistants to interview the participants. Some pilot interviews were conducted using the translated Igbo scale for clarity and comprehension of all items by participants. The interviewers recruited were all undergraduate and postgraduate students of the Medical Rehabilitation department who were all native Igbo speakers and literate in English; they were trained in the use of the scale before the commencement of the study.

DATA ANALYSIS

For the purpose of this study and in line with the method employed by the original authors of the scale to establish the reliability of the English version, the Cronbach Alpha reliability test was conducted on the Igbo version of the scale. The normal Alpha reliability was considered appropriate for the study because the scale is a summated rating scale that can produce a single score, which could be interpreted as 'high' or 'low'. As in the analysis of the original English version of Participation Scale, factor analysis of the construct of the Igbo version of the scale was conducted, with an exploration of the interrelationships among scale items in order to be able to ascertain factors measuring the same construct.

INCLUSION CRITERIA

Subjects affected by leprosy with some degree of leprosy-related impairment will be recruited for the study.

EXCLUSION CRITERIA

Subjects below 15 years and above 70 years.

ETHICAL CONSIDERATIONS

The study protocol for this cross-sectional survey was approved by the Nnamdi Azikiwe University Teaching Hospital ethical committee. Participant consent was sought and obtained after proper explanation was made to them.

Results and Discussion

Forty people affected by leprosy were interviewed using the Igbo translation of the P-Scale, 17 (42.5%) male and 23 female (57.5%). The majority (70%) were released from treatment. Half the respondents were over the age of 55 years; 35 subjects (87.5%) live in rural areas, 27 (67%) were unemployed and 22 (55%) had no education. Three quarters of the respondents were diagnosed with leprosy over 10 years ago (Table 1).

PSYCHOMETRIC PROPERTIES

Table 2 shows the results of the basic reliability analysis for the Participation Scale. The Cronbach Alpha reliability test revealed that the overall reliability Alpha of the scale is 0.91 which is considered good.¹⁵⁻¹⁷

The values in the column labeled *Corrected Item-Total Correlation* are the correlations between each item and the total score from the questionnaire. In a reliable scale all items should correlate with the total, and any item that has a value less than 0.3 does not correlate well with the scale overall and must therefore be dropped from the scale. For this particular scale, item 17 did not correlate well with the scale overall with a value of 0.08. It could

Table 1. The distribution of subjects by age, sex and EHF score

EHF	Male				Female				Total
	1-3	4-6	7-9	10-12	1-3	4-6	7-9	10-12	
15-24						1			1
25-34	2					1			3
35-44		3					1	1	5
45-54		3	1	1		4	1	1	11
55-64			2	2	1		1	6	12
65+			2	1		1	2	2	8
Total	2	6	5	4	1	7	5	10	40

Table 2. Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Participation 1	25.42	432.763	0.403	0.905
Participation 2	25.62	427.830	0.463	0.904
Participation 3	25.67	430.071	0.427	0.905
Participation 4	26.37	401.984	0.776	0.894
Participation 5	26.70	428.267	0.501	0.902
Participation 6	26.17	411.276	0.645	0.898
Participation 7	26.47	407.487	0.710	0.896
Participation 8	26.95	422.151	0.605	0.899
Participation 9	26.97	419.615	0.597	0.899
Participation 10	27.33	440.328	0.387	0.905
Participation 11	26.65	402.182	0.827	0.892
Participation 12	27.20	418.267	0.702	0.897
Participation 13	26.87	410.061	0.763	0.895
Participation 14	26.40	413.887	0.638	0.898
Participation 15	27.40	429.682	0.580	0.900
Participation 16	26.62	417.369	0.595	0.899
Participation 17	27.60	464.913	0.080	0.911
Participation 18	27.37	449.215	0.318	0.906

therefore be deleted; however, it was retained on the scale because the deletion of item 17 will not cause any significant change in the overall Alpha value of the scale. The values in the column labeled *Alpha if Item is deleted* are the values of the overall Alpha if that item is not included in the calculation. As such, they reflect the change in Cronbach's Alpha that would be seen if a particular item was deleted. The overall Alpha for the present scale is 0.91, so all values in this column should be around that same value. However, if there is any value of Alpha that is greater than the overall Alpha, it means that the deletion of that item will improve the reliability of the entire scale. With respect to the Participation Scale being tested, none of the items would substantially affect reliability if they were deleted, (not even, item 17 that had a low corrected item total correlation) because none of them had a greater reliability value compared to the overall Alpha reliability.

FACTOR ANALYSES REPORT OF PARTICIPATION SCALE

Factor analysis is 'intimately involved with the question of validity and it is at the heart of the measurement of psychological constructs'.¹⁷⁻¹⁹ In other words, factor analysis provides a diagnostic tool to evaluate whether the collected data are in line with the theoretically expected pattern or structure of the target construct and thereby determines if the measures used have indeed measured what they are purported to measure. The choice of principal component analysis was informed by the fact that the scale had already been established on an existing theory by the original authors of the English version and there is no need for the exploratory factor analysis.²⁰⁻²²

For the purpose of this study therefore, a Principal Component Analysis (PCA) was conducted on the scale. Initially, the factorability of the 18 Participation Scale items was examined and to do this, several well-recognised criteria for the factorability of a correlation were used. Firstly, most of the scale items correlated at least 0.3 with at least one other item on the scale, which suggests reasonable factorability.²³ Secondly, the Kaiser-Meyer-Olkin

measure of sampling adequacy was 0.77, which is above the recommended value of 0.6^{21,24} and Bartlett’s test of sphericity was significant ($\chi^2 (190) = 473.93, P < 0.001$). Finally, the communalities were all above 0.5 (see Table 3), thus confirming that each item shared some common variance with other items. Given these overall indicators, factor analysis was conducted with all the 18 items of the Participation Scale.

Table 3 shows the factor loading of each of the 18 items on the questionnaire after extraction. All 18 items had factor loadings that were > 0.5 which indicates that all the items are to be retained for use on the scale.

Principal Component Analysis was used because the primary purpose of the study was to identify and compute composites for the factors underlying the Igbo version of the Participation Scale. The initial eigenvalues showed that the first factor explained 40.73% of the variance, the second factor 12.67% of the variance, third factor 9.40% of the variance, while the fourth factor explained 8.20% of the variance (see Table 4).

Other factors had eigenvalues less than one, therefore, the four factor solution, which explained 70.99% of the variance, was preferred because of the ‘leveling off’ of eigenvalues on the Scree plot after four factors (see Figure 1).

Four factors emerged after extraction as shown in the Scree plot in Figure 1. The extraction is based on Kaiser (1958) criterion i.e. only factors that had eigenvalues greater than 1 are retained.

Our results strongly suggest that the Igbo version of the Participation Scale can be used to measure the restrictions due to leprosy, disability or other health conditions, which it is intended to measure. The reliability and internal consistency (Cronbach’s Alpha) of the Participation Scale were equal to those of other versions with range from 0.89 to 0.91 for the Igbo version; Cronbach’s Alpha for the Indonesia version was >0.70 and criterion validity using Spearman rank correlation was 0.77 $P < 0.0001$; Cronbach’s Alpha for the eastern Nepal version was 0.90 with a range between 0.78 to 0.90 and inter-tester reliability was 0.90.^{25,26}

Table 3. Communalities

	Initial	Extraction
Participation 1	1.000	0.515
Participation 2	1.000	0.701
Participation 3	1.000	0.738
Participation 4	1.000	0.848
Participation 5	1.000	0.667
Participation 6	1.000	0.787
Participation 7	1.000	0.691
Participation 8	1.000	0.810
Participation 9	1.000	0.686
Participation 10	1.000	0.725
Participation 11	1.000	0.909
Participation 12	1.000	0.692
Participation 13	1.000	0.751
Participation 14	1.000	0.571
Participation 15	1.000	0.728
Participation 16	1.000	0.579
Participation 17	1.000	0.537
Participation 18	1.000	0.843

Table 4. Total Variance Explained

Component	Initial Eigenvalues		Extraction Sums of Squared Loadings		Rotation Sums of Squared Loadings	
	Total	% of Variance	Total	% of Variance	Total	% of Variance
1	7.330	40.725	7.330	40.725	4.234	23.525
2	2.281	12.674	2.281	12.674	3.309	18.381
3	1.692	9.397	1.692	9.397	2.828	15.709
4	1.475	8.196	1.475	8.196	2.408	13.378
		40.725		40.725		23.525
		53.399		53.399		41.905
		62.796		62.796		57.615
		70.992		70.992		70.992

Extraction Method: Principal Component Analysis.

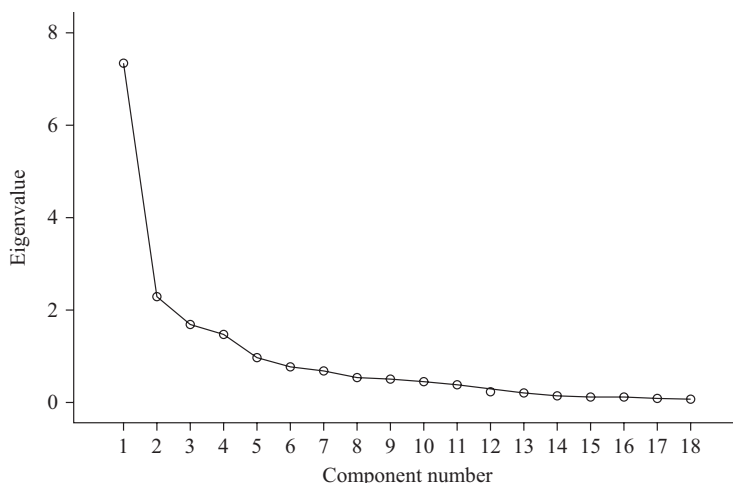


Figure 1. Scree Plot.

Principal component factor analysis was performed for a sample of 40 participants. Indeed no consensus exists on the minimum number of subjects needed to perform principal component analysis. PCA analysis of the P scale was 40.9%, the present study is the first to provide a factor analysis with varimax rotation and shows four independent factors explaining 70.99% of the total variance when only factors having eigenvalues > 1 were retained. This shows that the 18 items can be subdivided into four subscales with four major headings although all 18 items on the scale were retained with each factor having a high loading (> 0.5); the fact that the varimax rotation factors could be easily identified reinforces the robustness of the factorial structure of the scale. When evaluating the result of this study, the inter-rater and intra-rater reliability were not conducted, the authors excluded this procedure and decided to limit the reliability calculation to that of the estimate of internal consistency (Cronbach Alpha) which refers to the degree of consistency with which the items of the instrument measure a given trait. It provides a measure of how homogenous or otherwise the items are, and this type of estimate is most appropriate for instruments where scores for the various items will be added or aggregated to produce a single or composite score.¹⁴

Conclusion

Following psychometric testing of the Igbo translation and having fulfilled all necessary requirements, it can be concluded that it is a valid translation and we recommend it for use among the Igbo speaking group in Nigeria.

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