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Objective: The English version of the Summary of Diabetes Self-Care Activities (SDSCA) measure is the most frequently used self-reporting instrument assessing diabetes self-management. This study is aimed at translating English SDSCA into the Urdu version and validating and evaluating its psychometric properties. Methods: The Urdu version of SDSCA was developed based on the guidelines provided by the World Health Organization for translation and adaptation of instruments. The panel of experts examined the content validity, reliability, and internal consistency of the instrument. The translation process from the English version to the Urdu version revealed excellent results at all the stages. Results: The instrument showed promising and acceptable results. Of particular mention are the results related to split-half reliability coefficient 0.90, test-retest reliability ($r = 0.918$, $P < .001$), intraclass coefficient (0.912), and Cronbach's alpha (.79). The factor analysis (exploratory and confirmatory) was not performed in this study due to the small sample size ($n = 30$) as the objective was to validate the Urdu version of the SDSCA instrument. Conclusions: This study provided evidence for the reliability and validity of the Urdu Summary of Diabetes Self-Care Activities (U-SDSCA) instrument, which may be used in the future for the patients of diabetes in order to assess type 2 diabetes self-management activities in the rural area of Pakistan and other Urdu-speaking countries.

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Abstract

Objective: The English version of the Summary of Diabetes Self-Care Activities (SDSCA) measure is the most frequently used self-reporting instrument assessing diabetes self-management. This study is aimed at translating English SDSCA into the Urdu version and validating and evaluating its psychometric properties. **Methods:** The Urdu version of SDSCA was developed based on the guidelines provided by the World Health Organization for translation and adaptation of instruments. The panel of experts examined the content validity, reliability, and internal consistency of the instrument. The translation process from the English version to the Urdu version revealed excellent results at all the stages. **Results:** The instrument showed promising and acceptable results. Of particular mention are the results related to split-half reliability coefficient 0.90, test-retest reliability ($r = 0.918$, $P < .001$), intraclass coefficient (0.912), and Cronbach's alpha (.79). The factor analysis (exploratory and confirmatory) was not performed in this study due to the small sample size ($n = 30$) as the objective was to validate the Urdu version of the SDSCA instrument. **Conclusions:** This study provided evidence for the reliability and validity of the Urdu Summary of Diabetes Self-Care Activities (U-SDSCA) instrument, which may be used in the future for the patients of diabetes in order to assess type 2 diabetes self-management activities in the rural area of Pakistan and other Urdu-speaking countries.

Keywords

type 2 diabetes, self-management, Urdu SDSCA, validation, instrument

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Introduction

Diabetes mellitus is one of the leading threats to human health and has become a challenging health problem worldwide.[1] The International Diabetes Federation (IDF) has estimated that there were a total of 463 million people with diabetes in the world in 2019.[2]

The middle-aged population of Pakistan is at high risk of type 2 diabetes as the people are overweight and obese. The lack of physical activity and unhealthy eating habits making the health problem more complicated.[1,2] There is a lack of understanding of establishing the evidence-based guidelines for self-management.[3] The evidence-based quality of care standards set by the American Diabetes Association have not been followed; therefore, the facilities face enormous challenges in providing diabetes care to the patients of diabetes in the country.[4-6]

The health challenges posed by type 2 diabetes in the middle-aged population, in particular, and other population,

in general, required that there must be self-management activities in place to be followed by these populations to manage their daily lifestyle. This would require a valid and reliable instrument that could assess the self-management activities or behaviors in diabetes patients. Toobert et al[7] developed an English version of the Summary of Diabetes Care Activities measure (SDSCA), which is a top-rated tool and is exclusively used in English-speaking countries. This instrument has 11 items, which are used as a questionnaire assessing the levels of self-care activities in patients with diabetes. This English version of SDSCA was used in

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various studies in the literature evaluating the psychometric properties[7] and found that the outcome of the instrument was satisfactory.

However, the English version of SDSCA cannot be used in the Urdu-speaking population of Pakistan due to the language barrier. Also, there is no psychometric validated instrument to date in Pakistan to assess self-management activities of type 2 diabetes in patients. Mumtaz et al[8] used an Urdu version of SDSCA in their study for the self-care inventory previously and found it a useful measure for assessing adherence to diabetes treatment. The SDSCA instrument[7] has been used in diabetes-related studies[9] and has been translated into Chinese by Xu et al,[10] into Spanish by Vincent et al,[11] into Arabic by Al-Johani et al,[12] and into German by Kamradt et al.[13]

The SDSCA questionnaire developed by Toobert et al[7] consists of 2 sections. The first section contains essential questions, and the second section contains additional questions providing detailed knowledge of the patient's self-care activities. The first section with 10 questions of self-care activities has 5 domains or subscales, namely, the diet with 4 questions, physical activity with 2 questions, blood glucose testing with 2 questions, and foot care with 2 questions. Our study considered 1 additional subscale of medication adherence with 2 more questions. So, the SDSCA instrument has a total of 12 questions and there is only 1 question related to smoking.

This study included the subscale of smoking during the translation process, but at the validation process, this subscale was excluded. The first section of the SDSCA instrument was subjected to detailed testing for reliability and validity.[7] The second section contained the various subscales that explored health professionals'/providers' interventions about diet, physical activity, blood sugar testing, and medications.

The main objective of this study was to develop a reliable and valid tool that can be used for the assessment of self-management of type 2 diabetes in the middle-aged population of Pakistan and its use may be extended to other appropriate populations in that subcontinent. Therefore, the process of translating and validating the Urdu version of the instrument was carried out to evaluate its psychometric properties.

Methods

Participants

The recruitment of participants was carried out at the medical clinics of Al-Rehman Hospital. The participants were purposively recruited from these clinics. The invitation was sent to 50 patients to participate, but only 30 patients agreed to take part in this study and were asked to complete the questionnaire, and their informed consent was obtained.

The medical clinic of the facility was used to complete the questionnaire, where most participants preferred to visit

for this activity. The data collection protocol was discussed at an early stage to minimize the bias in data collection. We have followed the 1-week interval between the test-retest protocol, and it was in agreement with Vincent et al[11] who performed the Spanish translation of the original SDSCA. All 30 participants completed the questionnaire twice, and it was in line with Diamond and Jefferies[14] who recommended a sample size of at least 30 for test-retest reliability. However, it has been identified in the literature that even small sample sizes were used for test-retest reliability with great success.[11,15]

Translation and Validation of the SDSCA Instrument

The World Health Organization (WHO) has provided the steps and guidance to translate instruments of measurements.[16] As such, the translation of the English version of SDSCA was carried out using WHO's guidelines. Figure 1 provides steps of "Translation and Adaptation" of the instrument. The translation and validation steps were attained through specific stages such as professional translations in Australia and Pakistan, expert panel reviews, and psychometric evaluation. The flowchart in Figure 1 was used during the process of translation and validation of the instrument.

Forward Translation

The forward translation of the SDSCA instrument (13 items) was delegated to a certified translator in Australia who carried out the translation. The translation process was performed for 5 working days, and the first forward translation "Urdu-SDSCA_1" (U-SDSCA_1) was obtained. The other Urdu translation was obtained from The University of the Punjab, Pakistan, and was named as Urdu-SDSCA_2 (U-SDSCA_2).

Expert Panels (Modification by Expert Panel 1)

The health-related vocabulary issue was discussed with the local supervisor and with the health professionals at the medical clinics. It was agreed to review both the forward translated versions by a panel of diabetes specialists at that medical clinic, and the panel was formed, which included 2 nurses with experience in diabetes management, a general practitioner, and the researcher.

The expert panel agreed that the following questions need to be addressed during the review of the Urdu translation: (1) Does the word translated in Urdu gives the same sense in English? (2) Is there an alternative Urdu word to use in case Urdu word does not provide the same meaning as an English word? (3) Is it likely that the alternative Urdu word will be easily understood by the Urdu-speaking population, particularly those participants completing the questionnaire?
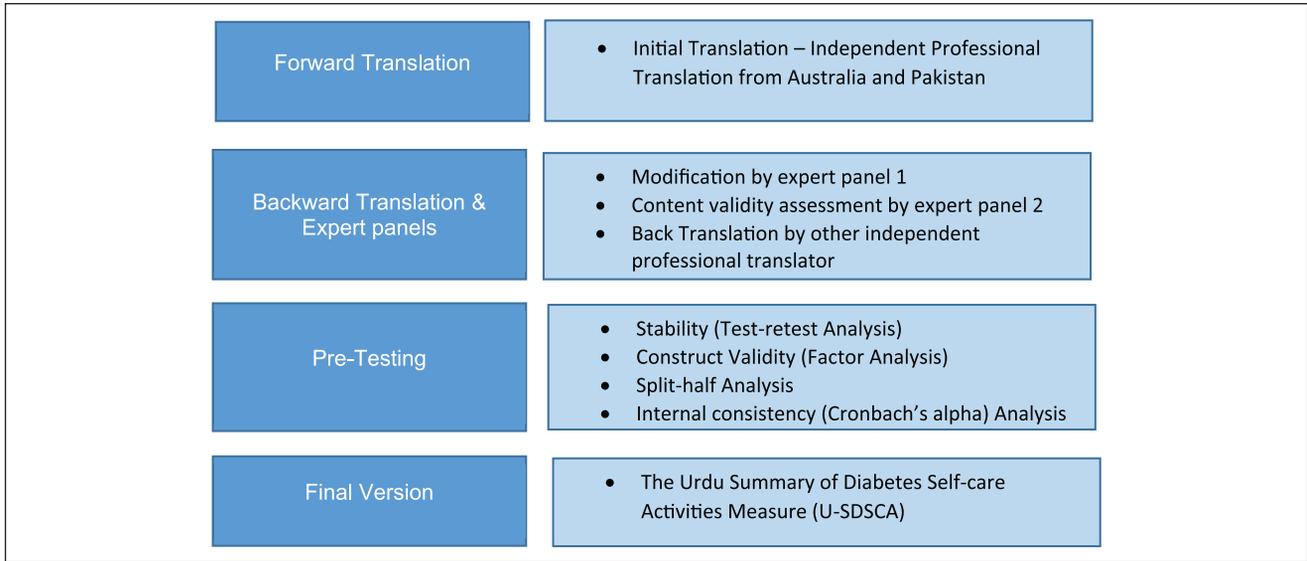
Figure 1. Steps of translation and adaptation of the instrument.

The 2 versions of Urdu translations were reviewed by the expert panel and modified based on the correct and easy-to-understand Urdu language. We found some English words in Urdu translation in the first version from Australia, so these were replaced by the proper Urdu words in the final version with the help of the other translation carried out in Pakistan.

Assessment of Content Validity (Expert Panel 2)

The content validity analysis was carried out to determine if the language content, and structure of the new instrument (Urdu version) was adequate for measuring diabetes self-management activities in the Urdu-speaking population of rural areas of Pakistan. This approach was in agreement with the procedure followed by Polit and Beck.[17] The content validity index (CVI) consists of 2 characters: the item-level content validity index (I-CVI) defining the content validity of individual items and the scale-level content validity index (S-CVI) determining the content validity of an overall scale.[18] The proportion of 0.78 or above for the content validity for individual items is considered an acceptable content validity.[19] The acceptable scores for content validity of an overall scale are between 0.8 and 0.9 or greater.[17,20]

In the assessment of content validity, it is recommended to have a minimum of 3 experts, and a 4-point scale should be employed to rate the items, with 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = highly relevant.[17] The purpose of using the CVI is to determine the cultural appropriateness and effectiveness of the Urdu version of SDSCA in measuring the self-management activities of the rural area of the Urdu-speaking population of Pakistan.

Back Translation

The final URDU version U-SDSCA was back-translated into English as per the recommendations of WHO by another professional translator. There were similarities between the back-translated version and the original instrument in English. The main difference was found that "seven days" in the first Urdu version was replaced with the word "one week" in the back-translated version. Therefore, the original version of the English SDSCA instrument remained as the primary reference.

Pretesting (Reliability and Validity)

Elliott[21] highlighted that assessing the reliability, internal consistency, and construct validity of the instrument is an important task of its overall evaluation. The two important steps of the translation and evaluation process are as follows: The first step is a description of the initial sample for validation purposes and the second step is based on the statistical analysis of the data collected to carry out split-half and test-retest analysis (reliability/stability), performing factor analysis and determining the internal consistency (Cronbach's alpha).

Results

The 30 participants in this study have a mean age of 48 years, with the age group between 35 to 60 years. The male participants were 66%, and females were 34%, and the type 2 diabetes duration was 10 years (range: 5-20 years). The participants have shown great interest in this study and completed the questionnaire 2 times within a 1-week interval, which helped us to determine the test-retest reliability.

Table 1. Content Validity Index (CVI).

Scale Item Description	Expert				Number of agreements	I-CVI
	1	2	3	4		
1	3	4	4	4	4	1
2	3	3	4	4	4	1
3	4	3	3	3	4	1
4	3	3	3	3	3	0.833
5	4	3	4	4	4	1
6	4	4	3	3	4	1
7	4	3	4	3	4	1
8	4	4	4	3	4	1
9	3	4	3	3	4	1
10	3	4	3	4	4	1
11	4	3	4	4	4	1
12	3	3	3	4	4	1
					S-CVI/Ave	0.986
					Total Agreement	11
					S-CVI/UA	0.92

The content validity analysis (I-CVI) for all the instruments scales was between (0.83 and 1) with an average S-CV1/Ave of 0.98 as shown in Table 1, indicating strong agreement between the 2 versions according to Lynn[20] who suggested that the I-CVI should be between 0.78 and 0.80 for the S-CVI to be judged acceptable. In addition, the S-CVI/universal value (UA) was 0.92, which is in line with the recommendations by Polit and Beck.[17] There was some disagreement on item 4 among the panel members as this item asking the use of high-fat products. This concept is not very common and will not be easily understood by the population in the rural area of Pakistan.

The process of calculation is to summing-up I-CVI results as percentages and dividing the result by the total number of items (12 items excluding smoking question). The participation of the 4-panel members in reviewing the final version helped provide a broader perspective about the translation process. The validation process ended up with the final version of the Urdu Summary of Diabetes Self-Care Activities Questionnaire (U-SDSCA).

Statistical Analysis

The statistical analysis was carried out using IBM SPSS 25 software.

Split-Half Analysis (Reliability). The initial sample of 30 participants was used to perform the split-half test. The split-half reliability measure is the correlation between the total scores.[15] The calculated split-half reliability correlation score was 0.9 based on the data of 30 participants with equal lengths coefficient of 0.95.

Test-Retest (Reliability/Stability). This procedure determines the level of agreement between the same participants'

answering on two different occasions.[22,23] Thirty participants completed the questionnaire two times within a 1-week interval. The reliability scores results were found to be statistically significant ($r = 0.918$, $P < .001$).

The outcome of the test is in agreement with other studies. For example, Vincent et al[11] found acceptable to good correlations when they evaluated their Spanish version of the questionnaire. The Arabic version developed by Al-Johani et al[12] showed excellent test-retest reliability for a 1-week interval. Table 2 provides a test-retest reliability of the U-SDSCA (intraclass correlation coefficient and 95% confidence interval).

Cronbach's alpha (internal consistency analysis). The minimum acceptable alpha score for the internal consistency is .70.[24] Cronbach's alpha can be used with continuous and nondichotomous data. In particular, it can be used for testing questionnaires using a Likert scale. The internal consistency analysis of the Urdu instrument for the 10 items questionnaire estimated the value of Cronbach's alpha .79, as shown in Table 3, and the scores for all other subscales have been displayed in Table 4.

The Spearman's rank coefficient was used to measure the interitem correlation for the 5 domains of the instrument scales. General diet and blood glucose testing presented interitem correlation over 0.9, whereas exercise correlation was moderate, and foot care and medication adherence correlation were average. All these results are in agreement with the English version of SDSCA,[7] the Arabic version of SDSCA,[12] Chinese version of SDSCA,[10] Spanish version of SDSCA,[11] and the German version of SDSCA.[13] Table 3 gives the Cronbach's alpha of all the SDSCA versions considered in this current study.

Discussion

The Urdu-version of the SDSCA (U-SDSCA) has shown acceptable psychometric properties in relation to validity and reliability that can be used in the population of rural areas of Pakistan. The properties of the Urdu version are also comparable to the original version of SDSCA.[7] There were no significant challenges in translating and adapting the English version of SDSCA into the Urdu version, and content validity provided promising results. These findings suggest that the Urdu version is suitable for assessing self-management activities in patients with type 2 diabetes in the middle-aged population of rural areas of Pakistan. This sample was not used to carry out a factor analysis of U-SDSCA instrument due to the small sample size of 30 participants, which is too small to be used to undertake factor analysis.

The internal consistency analysis was carried out with the main 10 items of the questionnaire excluding the question related to smoking and omitting the 2 items from the diet (special diet). Toobert et al[7] have also excluded special diet from the analysis indicating that internal

Table 2. Intraclass Correlation Coefficient With 95% Confidence Interval.

	Intraclass correlation coefficient[a]	95% Confidence interval		*F* test with true value 0			
		Lower bound	Upper bound	Value	df1	df2	Significance
Single measures	0.820[b]	0.593	0.930	12.856	29	29	.001
Average measures	0.912[c]	0.789	0.960	12.856	29	29	.001

[a]Intraclass correlation coefficients using a consistency or absolute agreement definition.
[b]The estimator is the same, whether the interaction effect is present or not.
[c]To achieve an estimate, this number is computed, assuming the interaction effect is absent.

Table 3. Internal Consistency (Cronbach's Alpha) of the Summary of Diabetes Self-Care Activities (SDSCA).

	SDSCA version					
	English	Urdu	Arabic	German	Chinese	Spanish
Cronbach's alpha (α)	.80	.79	.76	.63	.61	.68

Table 4. Internal Consistency (Cronbach's Alpha) of the Urdu Version of the Summary of Diabetes Self-Care Activities (U-SDSCA).[a]

Domains	Items	Item to scale correlation[b]	Interitem correlation[b]	Cronbach's alpha
General Diet Scale	1	0.91		
	2	0.93	0.920	.85
Exercise Scale	3	0.81		
	4	0.83	0.830	.80
Blood Glucose	5	0.96		
Testing Scale	6	0.60	0.96	.90
Foot Care Scale	7	0.78		
	8	0.80	0.58	.73
Medication	9	0.84		
Adherence	10	0.75	0.48	.70
All Items (U-SDSCA)				.79

[a]The special diet was not considered as it gave a nonsignificant value.
[b]Spearman's rank correlation: All correlations were significant ($P < .001$).

consistency of the scales, assessed by average interitem correlations for specific diet was consistently unreliable ($r = 0.07\text{-}0.23$, mean = 0.40).

The main reason for the exclusion of a special diet from the analysis is that the concept of a special diet is not understood in the population of the subcontinent. The eating habits such as high fatty food and oily stuff is a daily routine among these people. Therefore, the analysis carried out using that scale for the question related to the special diet provided unreliable outcomes, and the question related to the special diet was excluded to improve the efficiency of the instrument.

It was also observed by Xu et al[10] that the number of items on the subscale and their relationship with each other might influence the outcome of diabetes self-management activities. For example, a patient's high score on a subscale of a healthy diet may not be the same on the foot care subscale. Therefore, the detection of moderate Cronbach's alpha value in these subscales was expected and shows the independence of each area of self-management activity.

However, correlations with other measures of diet and exercise generally supported the validity of SDSCA subscales (mean = 0.23). This was also observed by Kamradt et al[13] during the validity procedure of translating English SDSCA to German that by eliminating the specific diet items, the Cronbach's alpha was increased from .618 to .631 and improvement in the factor structure and model fit was also observed.

Strengths and Limitations

The main strength of our study is the evaluation of the stability of the U-SDSCA, which provided promising results. Statistically significant reliability score ($r = 0.918$, $P < .001$) was obtained. The limitation of the study is the absence of confirmatory factor analysis as it was not possible to carry out that analysis due to smaller sample size (n = 30) as the small sample size would have produced unstable results and might not be replicable.[7]

The factor analysis is proposed to be conducted using a larger sample size (n = 200) to verify clustered items under each sub-scale of an instrument.[25] Completing factor analyses at that stage would require assessing the suitability of the data by inspecting the correlation matrix using the Kaiser-Meyer-Oklin test, and Bartlett's test of sphericity.[25-28] Also, identifying retained factors from the principal components analysis will be based on the indication of the parallel analysis as recommended by Field.[27] The other limitation of this study as well as other studies measuring the self-management is the lack of "gold standard" comparison.[29,30]

Conclusions

The Urdu-version of the SDSCA instrument showed acceptable psychometric properties. Therefore, the current U-SDSCA instrument is suitable to measure self-management practices among the middle-aged population of rural areas of Pakistan. This research work is unique as the data collected and analyzed in this study may eventually affirm or expand on the available literature, and the instrument developed may be used to assess the self-management activities of the underserved middle-aged population of rural areas of Pakistan and other appropriate populations.

Author Contributions

RM did the fieldwork, gathered the data, and analyzed it in relation to the psychometric properties of U-SDSCA. HH, MH, NZ reviewed the manuscript and provided comments to improve the analysis.

Ethical Approval

The study was approved by the ethics committee of the University of New South Wales, Australia on April 6, 2017 with approval number (HC 16882) and by the Ayub Medical Institution, Abbottabad, Pakistan, on October 31, 2016.

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