

## Research Article

# Psychometric Properties of Malay Version of Summary of Diabetes Self-Care Activities Measures among the Malay Adults with Type 2 Diabetes Mellitus in Kelantan, Malaysia

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## Abstract

The study aimed to validate a Malay language version of Summary of Diabetes Self-Care Activities (SDSCA) among the Malay adults living in Kelantan, Malaysia. Data collection was conducted in Diabetes Clinic at Hospital Universiti Sains Malaysia. A cross-sectional study design was employed. Participants were 276 Malay adults, who were diagnosed with type 2 diabetes mellitus for at least a year during the data collection. The mean age of participants was 57.10 years, and 53% of participants were female. The SDSCA was first translated into Malay using standard forward and backward translation procedures. Participants then completed the Malay version of SDSCA (SDSCA-M). Exploratory Factor Analysis (EFA) was conducted, and reliability was tested using Cronbach's alpha and inter-item correlation. There were two items measure specific diet self-care was removed in the EFA. Thus, a total of eight items were retained which consisted of five components of diabetes self-care activities: general diet, exercise, blood glucose testing, and foot care. The reliability measured by Cronbach's alpha ranged from 0.70 to 0.95 and were considered satisfactory. The final version of SDSCA-M consisted of eight items. The majority of the items was retained and was considered acceptable for the present Malay adults' sample in Kelantan, Malaysia.

**Keywords:** Diabetes self-management; Self-care, SDSCA; Exploratory factor analysis; Reliability

## Background

Self-management is defined as the knowledge and skills necessary for an individual to take care of oneself, manage crises, and change lifestyle to manage illness successfully [1]. Self-management is an important part of daily life for people with diabetes. It has been reported that approximately 95% of diabetes care is self-treatment or self-management [2]. To control diabetes, individuals must monitor their daily lifestyle behaviour, and often they must change long-held habits. Therefore, although self-management is vital in people with type 2 diabetes mellitus (T2DM), it is not always as effective as health professionals would like. Thus, it is important that individuals adhere to self-management, to prevent further complications associated with diabetes to maintain or achieve a positive quality of life.

In a clinic-based study on diabetes self-management in Malaysia, about 99% of the respondents were practising at least two out of four diabetes regimens, which were regular exercise, healthy diet, monitoring blood glucose and monitoring body weight. However, only about half of the respondents (56%) were practicing all these four regimens [3]. Besides, it is common for people with T2DM to have difficulty practicing all the self-care recommended by their health practitioner. People with T2DM must comply with demanding requirements of their treatment regimens, and this can create the fear of failure [4]. These regimens can involve daily behavioral tasks, such

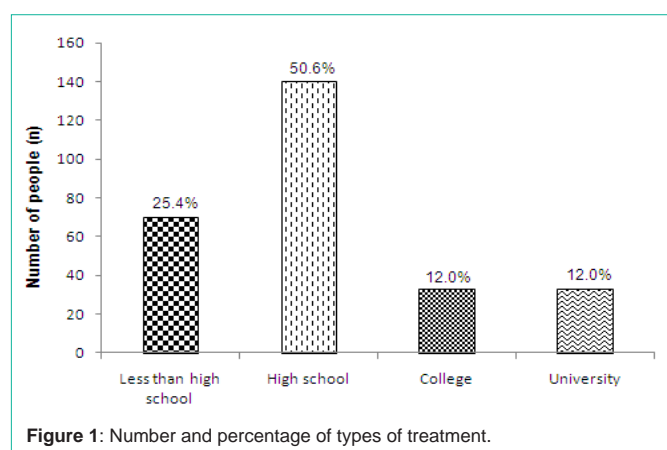
as changes in habits on diet and exercise, which people with diabetes should comply for the rest of their life [5].

Practices such as diet, exercise, smoking cessation, and yearly check-ups will help to prevent the incidence of diabetes and delay the progression of its complications in people who are already known to have diabetes [6]. Handley et al. reported that the majority of the 228 participants (75%) from San Francisco, California, with coronary heart disease risk factors, including those diagnosed with diabetes, were carrying out an action plan that focused on diet or exercise for self-management of their illness condition [7]. Moreover, in a qualitative study, the researchers demonstrated that most people with diabetes had selected diet and or exercise for their behavior change [8]. The study that examined people with diabetes attending a Malaysian clinic showed that 94% of these individuals were following a healthy diet [3]. Besides, Anderson et al., suggested that diabetes self-management, such as diet planning, requires a life-long commitment [9]. This can only be sustained with the genuine internalisation of the purposes and the value of good diabetes self-care.

A valid and reliable questionnaire is essential for evaluating the diabetes self-care activities among people with T2DM. The Summary of Diabetes Self-Care Activities (SDSCA) is a brief self-report measure of the frequency of completing different diabetes regimen activities over the preceding seven days [10]. The original version of

**Table 1:** Mean (M) and Standard Deviation (SD) of Age and Duration of Diabetes since Diagnosis.

Gender	Age			Duration of diabetes since diagnosis		
	M	SD	Range	M	SD	Range
Female	56.65	7.75	36 – 70	9.67	7.47	Jan-38
Male	57.61	9.23	30 – 70	11.32	7.52	31-Jan
Overall	57.1	8.47	30 – 70	10.44	7.53	Jan-38



the SDSCA questionnaire was first used in the 1980s by Schafer et al. [11] and Glasgow et al. [12]. Since then, many researchers have continued to use the SDSCA questionnaire over the past decades to measure the levels of self-management across different components of diabetes practices [13,14]. In 2000, Toobert et al. have created the revised SDSCA, which consisted of 11 core items. Toobert et al. set strict criteria for selecting items, which are: consistency in mean values across studies, sufficient variability and lack of ceiling or floor effects, temporal stability, internal consistency, predictive validity, sensitivity to change, ease of scoring, and ease of interpretation [10]. In this revised questionnaire, some of the items were excluded. For example, medication was not included in the core items because it has strong ceiling effects and has low test-retest reliability. Currently, there is lack of validation study on the Malay version of the revised SDSCA among type 2 diabetes mellitus adult patients specific on Malay population. Therefore, this study aimed to translate the SDSCA into Malay language and to examine the reliability and validity of the translated version of the SDSCA among Malay adult diagnosed with T2DM in Kelantan, Malaysia.

## Method

### Participants

Participants in this study were those diagnosed with T2DM by the clinician for at least a year. The participants' age ranged from 30 to 70 years. Participants visited Diabetes Clinic at Hospital Universiti Sains Malaysia (HUSM), Kelantan, Malaysia during their routine clinical check-up with the physician.

### Translation of questionnaires

The Malay version of The SDSCA were forward-translated from the original English versions into the Malay versions by researcher and were then reviewed by a psychologist, two medical doctors, and a native Malay translator who were bilingual (Malay and English), to ensure they would be readily comprehended by the study population

in Kelantan, Malaysia. Back-translation of the questionnaires was then carried out to uncover any discrepancies of meaning between the original English language versions and the Malay versions of the questionnaires [15]. These versions of measures were back-translated by another bilingual expert without looking at the original English version. The final versions of the questionnaires were again given to a psychologist, a diabetes researcher, and a medical doctor who were of the opinion that the questionnaires had good content validity in measuring diabetes self-management among people with T2DM.

### Data Collection

The study received ethics approval from the Universiti Sains Malaysia Human Research Ethics Committee before data collection was conducted. The study also followed the guidelines outlined by the International Declaration of Helsinki agreed by the World Medical Association and Council for International Organization of Medical Sciences. Participants were recruited via the Diabetes Health Clinic in HUSM. People with T2DM were invited to participate in this study during their routine clinical appointment with their physician. They have sufficient knowledge in Malay and would be able to read and understand the questionnaires provided to them. Participants who agreed to fill in the questionnaires were given a copy of the information statement and consent form. They completed the questionnaire and returned it to the researcher during their clinical appointment with the physician at HUSM.

### Measures

**Demographic/Health Measure:** Several demographic and health treatment questions were administered. These questions assessed personal attributes of the participants (e.g., age, gender), and their health condition (e.g., how long they had been diagnosed with T2DM, and how it was being treated) when the participants complete the measures.

**Summary of Diabetes Self-Care Activities (SDSCA):** The SDSCA measures the frequency of completing different self-care regimen activities over the preceding seven days [10]. The SDSCA-M questionnaire used in this study consisted of 11 items measuring the aspects of diet (four items), exercise (two items), blood glucose testing (two items), foot checks (two items) and smoking status (one item). In the present study, all items were included in the validity and reliability testing except for smoking status which is in dichotomous response (no/yes). Each item asks the participants about their diabetes self-care activities during the past seven days, and they had to score their answers from zero (none of the day) to seven (seven days). The inter-item correlations of the original version of SDSCA were high and exceeded 0.5 [16].

### Data analysis

All statistical analyses were conducted using the computer packages SPSS 20.0. Exploratory Factor Analysis (EFA) was used to

**Table 2:** Results of Exploratory Factor Analyses for SDSCA-M Scale.

Item		Factor loading, $\lambda$			
		1	2	3	4
Diet:					
S1	How many of the last SEVEN DAYS have you followed a healthful eating plan?	0.97			
S2	On average, over the past month, how many DAYS PER WEEK have you followed your eating plan?	0.97			
S3	On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?	a			
S4	On how many of the last SEVEN DAYS did you eat high fat foods such as fried food or full-fat dairy products?	a			
Exercise:					
S5	On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity? (Total minutes of continuous activity, including walking).		0.88		
S6	On how many of the last SEVEN DAYS did you participate in a specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work?		0.78		
Blood sugar testing:					
S7	On how many of the last SEVEN DAYS did you test your blood sugar?			0.91	
S8	On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health care provider?			0.93	
Foot care:					
S9	On how many of the last SEVEN DAYS did you check your feet?				0.76
S10	On how many of the last SEVEN DAYS did you inspect the inside of your shoes?				0.72
Cronbach's alpha, $\alpha$		0.95	0.75	0.93	0.7
Inter-item correlations		0.91	0.6	0.87	0.54
% of variance explained		19.39	17.79	20.04	14.13
% of cumulative variance explained		19.39	37.18	57.22	71.35

**Note:** a= Items with factor loading < 0.30 were deleted from the analysis. Then, the EFA was rerun and the final results are presented in this table.

identify items that belong to a factor in a multifactor structure. The principal axis factoring extraction method was used to extract the factors and their associated items. Then, the factors were rotated with Promaxrotation. Items with factor loadings lower than or equal to 0.3 were excluded from consideration. Reliability of each factor identified in EFA was examined based on Cronbach's alpha value. There are different numbers of items in various SDSCA subscales, for example, the diet subscale has four items and the exercise subscale has two items. Cronbach's alpha coefficient is influenced by both the number of items and the relationships between items [10]. For this reason, the inter-item correlations for SDSCA-M subscales were reported as well as the global correlation.

## Results

### Characteristics of participants

A total of 276 T2DM adult Malay patients (male,  $n = 129$ , 47%; female,  $n = 147$ , 53%) participated in this study. The mean age of participants was 57.10 years and standard deviation of 8.47 years. The time since participants were diagnosed with T2DM ranged from 1 to 38 years, with a mean of 10.44 years and standard deviation of 7.53 years. **Table 1** presents the means and standard deviations of age and duration of diabetes since diagnosis in years for each gender. The mean of age of participants was very similar for males and females, but males had longer mean time since diagnosis with T2DM than female participants.

It was found that 107 (38.7%) participants were being treated

with insulin at the time of data collection. As illustrated in Figure 1, the majority of the participants (59.1%), were being treated with diet and tablets.

The majority (74.6%) of the participants, in this study, had completed at least high school education, of which 12.0% were university graduates, and 12.0% were college graduates. Figure 2 illustrates the education background of the participants.

### Validity and Reliability

Table 2 presents the factor loadings for the ten items in the SDSCA-M scale. The results show that all the items were loaded on the hypothesised factors, which were the four diabetes self-management activities: diet, exercise, blood glucose testing, and foot care, except for items S3 and S4, which measure diet specific issues. All the items show factor loadings above the lower cut-off value, 0.30 and the total variance explained by all four factors was 71.35. However, item S3 and S4 reflected only limited aspects of diet, focusing on fruits and vegetables, which were less suitable for the self-care diet plan for the present sample in Kelantan. Therefore item S3 and S4 were dropped from the subsequent analyses.

For the eight items, which fell within the proposed construct, the Cronbach's alpha coefficients were diet (S1, S2), exercise (S5, S6), blood glucose testing (S7, S8), and foot care (S9, S10), which were varied between 0.70 to 0.95. The internal consistency reliability of these items was considered satisfactory. The inter-item correlations were high for all subscales, ranging from 0.54 to 0.91. From the EFA

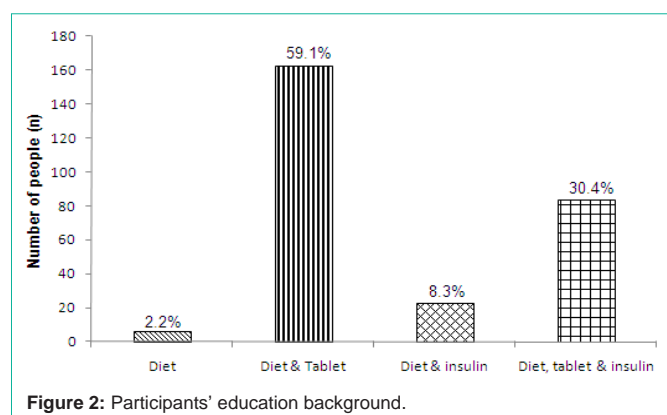


Figure 2: Participants' education background.

analysis, the SDSCA-M scale had four constructs (i.e., diet, exercise, blood glucose testing, and foot care) distinct from each other in factor loading and is theoretically sound.

## Discussion

Diabetes self-management is an essential task in diabetes care, as good self-management will lead to improvement of the glycemic control, metabolic control, blood pressure, and weight control, which will lead to the reduction of future complications. Some studies had reported that there is a lack of information concerning what foods are nutritionally appropriate. For example, managing carbohydrate intake is a key factor in maintaining a healthy diet, and exercise at an appropriate intensity, duration, and frequency could improve the prognosis of diabetes [17,18]. Although the physician can suggest strategies to improve diabetes control, individuals with T2DM should have the responsibility to carry out the treatment regimen on a daily basis, for many years. Because the people with diabetes conduct most of the diabetes care tasks themselves, health professionals have limited control over the management of each illness [19].

The SDSCA scale has been widely used and has been tested in different study population with T2DM [20-23]. The study findings provided evidence that the translated Malay version of SDSCA has adequate levels of psychometric properties based on construct validity and reliability to measure the frequency of self-care activities during the past seven days among the Malay adults with T2DM in Kelantan. There were two items were dropped in the analysis, and these two items measure specific diet component. Xu et al. who employed the SDSCA scale in a Chinese population study, had to exclude items S3 and S4 as well, which measure specific diet, due to the cultural difference in dietary habits between Chinese and Americans [22]. Similarly, both items were also excluded in a study by Shigaki et al. (2010) due to the limited content validity [23].

In this study, the Malay version of SDSCA tested in the Malay adult sample consists of two items for each main five components of diabetes self-care activities, includes general diet, exercise, blood sugar testing, and foot care. The majority of the items were retained, and items were considered a sound fit to the sample in this study. Future research should consider applying the Malay version of SDSCA with eight items for specific Malay Kelantan population. However, the Malay version of SDSCA with full items (11 items) including the component of diet specific and smoking status should be included if researchers and clinicians would like to know their diabetes self-care

regimen in those specific components.

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