HOSTED BY

ELSEVIER

Original Article

Psychometric properties and characteristics of the Diabetes Self Management Scale

CrossMark

Besher Gharaibeh, RN, PhD [a, *], Ahmed Mohammad Al-Smadi, RN, PhD [b], Diane Boyle, PhD, RN, FAAN [c]

[a] Jordan University of Science and Technology, P.O.Box 3030, Irbid 22110, Jordan
[b] American University at Madaba, Jordan
[c] Fay W. Whitney School of Nursing, University of Wyoming, United States

ARTICLE INFO

ABSTRACT

Objective: Assessing diabetes self care management is essential for nursing care for diabetes. There is a need to have valid and reliable scales that assess the actual performance of diabetes self management. The purpose of this study was to revise and conduct psychometric testing and analysis of the Diabetes Self Management Scale (DSMS).
Methods: A cross-sectional methodological design was used. A convenience sample was used and 78 adults with diabetes and taking insulin from five sites in the Midwest area of the U.S participated in the study. Reliability analysis was done using Ferketich techniques to make decisions about whether any given item should be retained or deleted.
Results: A descriptive analysis for the 60 items of the scale was conducted; several items had low variability compared to the other items on the scale. The correlation matrices showed that a total of 20 items had poor item characteristics. These 20 items were deleted resulting in developing 40- item version of the scale. The 40 - item scale had high level of internal consistency (Cronbach's $\alpha = 0.947$). The validity testing of the 40 - item scale was guided by the Research Model for Diabetes Self Care Management; results were congruent with the model and showed strong correlation with self efficacy, moderate correlation with self care agency, and weak correlation with diabetes knowledge.
Conclusion: The items and the scale (DSMS) have undergone careful psychometric testing. The 40-item DSMS is a reliable and valid instrument to measure diabetes self care management among people with diabetes.

1. Introduction

Diabetes is a chronic condition that affects a very large population in the United States and the whole world. Not only prevalent but also each year there is an increment in the morbidity rate [1]. So, diabetes self care management is considered essential in managing diabetes to help people with diabetes achieve glycemic control and prevent complications [2].

Diabetes Self care Management (DSCM) was defined as exercising of the actual performance of self care activities by those who

have diabetes to manage their condition. The goal of diabetes self care management is to maintain near-normal glucose levels by means of self care actions by following diet, performing physical activities, monitoring blood glucose level, using of medications, and other self care actions [3,4].

Reliable and valid instruments are important for the advancement of research and translation of research findings into practice [5]. Also, developing valid and reliable instruments to assess the actual performance of diabetes self management activities is important for providing appropriate interventions that can be effective in achieving the goals of diabetes management [6,7]. So, a scale to measure diabetes self care management was developed [6], this scale is the Diabetes Self Management Scale (DSMS). However, factor validity of the scale was not conducted. So, the authors recommended conducting further psychometric analysis and

* Corresponding author.
E-mail addresses: beshergh76@gmail.com (B. Gharaibeh), aum.nh@aum.edu.jo (A.M. Al-Smadi), dboyle@uwyo.edu (D. Boyle).
Peer review under responsibility of Chinese Nursing Association.

evaluation of its reliability, and further testing and revisions for the DSMS. Therefore, the aim of the study was to examine the reliability and item characteristics of the Diabetes Self Management Scale (DSMS) using the Research Model for Diabetes Self Care Management as theoretical framework to guide the analysis.

1.1. Background and conceptual framework for hypotheses testing

The research model for Diabetes Self Care Management was developed [3] through synthesizing knowledge about self care and identified a framework and described the relationships between diabetes self care management, self efficacy, self care agency, and diabetes knowledge (See Fig. 1). This model proposed that direct relationships exist between self efficacy and self care management; and self care agency and self care management. The model also proposed indirect relationship between diabetes knowledge and DSCM.

1.2. The Diabetes Self Management Scale (60- item DSMS)

In Sousa et al.'s [6] study to develop new measures of DSCM and other concepts, the authors indicated that various tools to measure DSCM are available in the literature but all have limitations such as low reliability, lack of content and construct validity. So, Sousa and colleagues developed the DSMS using American Diabetes Association (ADA) and American Association of Diabetes Educators (AADE) current standards of care, empirical works, and Orem's self care theory. The scale included aspects of healthy eating, being active, monitoring blood glucose, taking medication, problem solving, and reducing risks.

The DSMS scale is a 60 item scale with Likert-type response options that ranged from 0 (strongly disagree) to 5 (strongly agree). The DSMS total score can range from 0 to 300 with higher score indicating higher level of self care. The reliability and validity of the scale was assessed [6] using a sample of the 10 clinicians and 10 insulin-treated persons with type 2 diabetes (T2DM). Thirteen items of the DSMS had interrater reliability less than the recommended level of 80%. The expert panel also reported that two of the DSMS items had low level of consistency with the current standards of diabetes care. However, item analysis, reliability analysis, and the factor validity of the scale and the scale dimensions were not tested. Further psychometric testing is needed [6]. Therefore, the aim of this study was to evaluate the item characteristics and reliability of the Diabetes Self Management Scale (DSMS). Permission to use and edit the DSMS scale was obtained from the original author [6] prior to conducting this study.

2. Methods

2.1. Design

A cross-sectional methodological design was used to conduct the study. Methodological design is preferred in developing, validating, evaluating and refining research instruments. Scale and item analysis were used to evaluate and refine the scale.

2.2. Sample

The sample size was determined based on recommendations of [8]. Based on their rules to calculate the minimum sample size for a correlational study, a minimum sample size of (75) participants were needed for this study.

A convenience sample of 78 participants with complete data was recruited for the study. The inclusion criteria for the sample were:

1) 18 years or older,
2) Medical diagnosis of either T1DM or T2DM,
3) Minimum diabetes duration of 6 months,
4) Taking insulin, and
5) Ability to understand, speak, and write in English.

The reason for limiting the sample to those taking insulin was to obtain participants who required more complex capabilities to perform specific self care activities to appropriately manage diabetes. Individuals who were pregnant, not managed by insulin, or had cognitive impairments were excluded from the study. The sample was collected form 5 sites located in a Midwest metropolitan area.

2.3. Ethical considerations

Human Subject Committee approval was obtained from the University of Kansas Medical Center (KUMC) Institutional Review Board prior to data collection. Five sites in the Midwest area of the U.S agreed to participate in the study. A staff member at each site agreed to screen their patients or clients for study inclusion criteria listed in the sample section above. All had completed the KUMC human subjects tutorials and were trained in screening for study criteria.

2.4. Data collection and research procedure

Patients and clients who fit the criteria were informed about the study and invited to participate in the study. If they agreed to participate, they were given a questionnaire packet. The packet included the 60 —item Diabetes Self Management Scale (DSMS), the Diabetes Self Efficacy Scale (DSES), the Diabetes Knowledge Test (DKT), and The Appraisal of Self care Agency Scale Revised (ASAS-R). A cover letter containing a summary of the study, the participant's rights, and the researcher's contact information was included with the questionnaire packet. The cover letter also encouraged the potential participants to complete the questionnaire and return it as soon as possible to the investigator. No
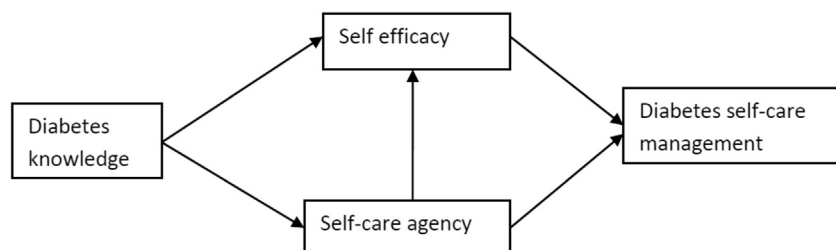

Fig. 1. The relationships between the concepts of the Research Model for Diabetes Self care Management as proposed by Sousa et al. (2004).