

HOSTED BY



ELSEVIER

Contents lists available at ScienceDirect

## International Journal of Nursing Sciences

journal homepage: <http://www.elsevier.com/journals/international-journal-of-nursing-sciences/2352-0132>

## Original Article

## Psychometric evaluation of the Thai translation of the Diabetes Self-management Questionnaire in type 2 diabetes

Somsak Thojsampan<sup>a,\*</sup>, Barbara Mawn<sup>b</sup><sup>a</sup> Faculty of Nursing, Naresuan University, 99 Moo 9, Thapho, Muang, Phitsanulok, 65000, Thailand<sup>b</sup> School of Nursing, University of Massachusetts Lowell, 113 Wilder St., Suite 200, Lowell, MA, 01854-3058, USA

## ARTICLE INFO

## Article history:

Received 9 January 2017

Received in revised form

26 April 2017

Accepted 21 June 2017

Available online 23 June 2017

## Keywords:

Diabetes  
Self-management  
Questionnaire  
T2DM

## ABSTRACT

**Objectives:** To explore the content validity and the internal consistency of the diabetes Self-management Questionnaire (DSMQ) for persons with T2DM in Thailand.**Methods:** Diabetes Self-management Questionnaire (DSMQ) was developed in English. The translation of DSMQ into Thai language was performed by native Thai translators. A panel of five experts in Thailand evaluated the translation. Content validity was quantified by the content validity index (CVI). A cross-sectional design was used to test internal consistency by calculating Cronbach's alpha.**Results:** The DSMQ contains 16 items. There are eleven items (69%) which showed excellent CVI; two items (12.5%) showed good CVI and three items showed acceptable CVI. The average scale of CVI was 0.90. The internal consistency of the DSMQ was 0.73.**Conclusion:** The Thai version of DSMQ showed excellent content validity; good internal consistency. The instruments can be used among Thai adults with DM in future research studies.© 2017 Chinese Nursing Association. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## 1. Introduction

In 2014, the International Diabetes Federation (IDF) estimated that 382 million people worldwide had diabetes mellitus (DM), with more than 90% of them diagnosed with type 2 diabetes (T2DM) [1]. In Thailand, there were over 4 million cases of DM in 2014 [2]. According to the Thai National Health Examination Survey IV conducted in 2009, the prevalence of impaired fasting glucose (IFG) and diabetes was 10.6% and 7.5% for all Thai adults age 20 or older [3].

The cross-cultural adaptation of a tool is an important process when an instrument is used in a foreign country using a different language, in a different setting and culture to reduce the risk of introducing bias into a study [4]. Chaavez and Canino [5] suggested that the researchers should be aware that there are conceptual and methodological challenges when translating and adapting original instruments to another language and culture. They have provided guidelines for the adaptation process. Moreover, Gjersing et al. [6] mentioned that during a research study where a certain

phenomenon is measured indirectly with questionnaires, comparison of results between samples with different cultures could be a challenge. In particular, a comparison will be difficult if the adaptation process of the original instrument has flaws during development or implementation. It is important to make sure that each item of the instrument is adapted appropriately.

Since the Diabetes Self-management Questionnaire (DSMQ) was developed and published in English, it is not available in Thai so it was necessary to translate it to the Thai language and conduct a psychometric evaluation. To use this questionnaire in Thailand, it was translated and back translated to the Thai language. The purpose of this paper is to explore the content validity and the internal consistency of this original English language questionnaire translated into Thai for the first time in a sample of Thai adults with T2DM. The instruments for investigation called the Diabetes Self-Management Questionnaire (DSMQ). The main research instrument of the study is the DSMQ, which was developed by Schmitt et al. [7] to assess DM patients' self-care activities associated with blood sugar level control. The DSMQ contains 16 items in four subscales: glucose management (GM), dietary control (DC), physical activity (PA), and health care use (HU). Based on the literature review, the DSMQ has not been used in Thailand or other Asian countries before this study and has never been translated to the Thai language. The researcher contacted the original developers of

\* Corresponding author.

E-mail addresses: [somsakth@outlook.com](mailto:somsakth@outlook.com) (S. Thojsampan), [Barbara\\_Mawn@uml.edu](mailto:Barbara_Mawn@uml.edu) (B. Mawn).

Peer review under responsibility of Chinese Nursing Association.

the DSMQ and received their permission to translate it and use it in Thailand.

## 2. Method

### 2.1. Translation and adaptation of the instruments

The questionnaire utilized in this study was developed and published in English. Since the target population of this study included Thai adults with T2DM, the instrument was translated to the Thai language. The original instrument was examined also for cross-cultural relevance and understanding in the Thai culture. This research utilized the cross-cultural instrument translation method of Chaavez and Canino [5].

The detailed process of translation and adaptation of the instrument includes: (1) Forward translation: the original instrument was translated from English into the Thai language by two translators who did the initial translations independently. The translators are native Thai persons who are proficient and fluent in English. A third independent translator with the same qualifications synthesized the translated Thai versions into one version. (2) Back translation: a professional translator in Thailand back-translated the synthesized version independently. The back-translator is fluent both in English and in the Thai language. (3) Committee review: an expert review committee reviewed the synthesized translated version and the back-translated version. The purpose of having this committee was to review and resolve any dispute, discrepancy and/or inadequate translation of the instrument. The expert review committee was comprised of health professionals, language professionals, and the forward and back translators [5]. The expert review committee assessed if a word or several words reflected the same ideas or subjects in both the original version (English) and in the Thai (adapted) versions of the questionnaire. This assessment ensured that items were translated accurately conceptually, and that the content of the instrument was culturally adapted correctly in the Thai language. (4) Pilot test study: The translated instrument was pilot tested. Thirty qualified persons with T2DM in Thailand were recruited for the pilot test study. (5) A final semantic adjustment was made for the questionnaire by the researcher based on the results of the pilot test study. (6) Based on the data collected from this pilot study, the psychometric properties of the instrument were tested using statistical methods including content validity and reliability analysis. (7) The translated instrument was tested and analyzed for their reliability before administered to persons with DM in a formal study in Thailand.

### 2.2. Pilot study: participants and setting

Thirty persons with T2DM were recruited for the pilot study and four hundred one persons with T2DM in Thailand were recruited for the final study. It was calculated by using definite population method developed by Yamane. Sample inclusion criteria included Thai adult males and females, age 20 or older, who had been diagnosed with T2DM by physicians for at least one year. Study participants also needed to have the ability to read and understand the Thai language and be willing to participate in the study. Persons were excluded from the study if they had any major complication such as blindness or any life-threatening illnesses, an inability to understand the study. After reviewing the purpose of the study with the researcher, an informed consent was signed in Thai. To start the process, the researcher first interviewed each of the participants as he or she reviewed the questionnaires to assess the understanding of each item. This allowed the researcher to identify if any items were confusing or misleading.

The researcher asked each study participant to rephrase each item, with the purpose of identifying whether he/she understood the item. Reichenheim [8] suggested that interviews be conducted until a pre-established percentage of understanding is achieved for all items ( $\geq 90\%$ ). The researcher proceeded with the pilot testing once he had reached greater or equal to 90% understanding of the questions with the pilot study participants individually. The researcher recruited the pilot sample and from a diabetic clinic in a community hospital in northern Thailand.

## 3. Results

Content validity is one of the most important aspects in the adaptation and validation process of instruments, especially if the instruments are used in a foreign country and a foreign language [9]. For this study, the questionnaire has been validated for content validity by a panel of Thai experts consisting of two nurses, one nursing professor, one medical school faculty member, and one public health faculty member.

Five experts evaluated the translated Thai version of the Diabetes Self-management Questionnaire for content validity. All of them agreed on all of the proposed translated items as acceptable. The DSMQ contains 16 items in four categories: glucose management (GM), dietary control (DC), physical activity (PA), and health care use (HU). Eleven of the 16 items (69%) showed excellent content validity ( $I-CVI = 1$  and  $k^* > 0.80$ ), two items (12.5%) showed good content validity ( $I-CVI = 0.80$  and  $k^* > 0.60$ ), and three items (18.75%) showed acceptable content validity ( $I-CVI = 0.60$  and  $k^* > 0.50$ ). The average scale content validity ( $S-CVI_{ave}$ ) was 0.90, which is above the cut-off of 0.80. No changes were made to the items as result of the content validity review. Another important psychometric evaluation of a translated instrument is the internal consistency or Cronbach's  $\alpha$ . The Cronbach's  $\alpha$  should be equal or greater than 0.7 [10].

### 3.1. Pilot study

The Cronbach's  $\alpha$  coefficient for the questionnaire was high. The item-total correlations of DSMQ ranged from 0.04 to 0.64. Some items (items 2,5,7,8,11,14) correlated weakly with the sum of the other items ( $r < 0.3$ ) while other items correlated modestly ( $0.3 < r < 0.7$ ). For the DSMQ, the alpha coefficient was 0.73. The item-total correlations were modest and ranged from 0.30 to 0.64.

### 3.2. Final study

The Diabetes Self-management Questionnaire had excellent content validity as evaluated by a panel of experts and good internal consistency from the pilot study. No changes were made based on the pilot study results. The instrument was justified for the main research project, which focused on studying the moderating effect of social cognitive factors on self-management activities and HbA1c in Thai adults with type 2 diabetes. Four hundred persons with T2DM in Thailand were recruited for the main study. The study participants were Thai adults who were diagnosed as having T2DM. The researcher recruited the study sample from four clinical sites in four different regions of Thailand using a convenience sampling method. Inclusion and exclusion criteria were the same as those in the pilot study.

#### *Final study psychometric results*

The instruments were tested on the main sample of the final study by using reliability analysis. The Cronbach's  $\alpha$  coefficients for the Diabetes Self-management Questionnaire was high. The item-total correlations of DSMQ ranged from 0.35 to 0.90. All items

correlated modestly ( $0.3 < r < 0.7$ ). For the DSMQ, the alpha coefficient was 0.94.

#### 4. Discussion

The purpose of this study was to assess the validity and reliability of the Thai version of the instrument used in this study. In line with evidence from other cross-cultural studies [11,12], the findings of this study supported the validity of the translated instrument and the original Thai instrument on Buddhist values. This study used experts to evaluate content validity and conducted reliability analysis in a pre-test and final study sample. Experts concluded that the majority of the translated items were culturally relevant. The results of both measurements, I-CVI and  $k^*$ , was in line with each other, with items meeting the I-CVI criterion of 0.90 along with excellent  $k^*$  values, indicating that both methods resulted in the same conclusion and strengthened the evidence for adequate content validity.

The S-CVI results of the instrument is 0.90; this study met the limits of agreement as recommended by Polit et al. [13]. The S-CVUIA of the instruments of 0.69 might be explained by the large number of experts. Three items of the DSMQ had an acceptable item content validity index. The internal consistency of the instrument in both the pilot and final study was found to be relatively high; the alpha coefficients for DSMQ were 0.73 and 0.94. The alpha coefficient of the pilot study was slightly lower but the final study result was higher than the alpha coefficient found by Schmitt et al. [7] (0.84) and is still considered acceptable. Furthermore, the relatively high alpha values on the scale confirmed the good internal consistency of the instruments [14].

The forward and back translation process was conducted by native Thai translators who are proficient and fluent in English. Because they are native Thai, they understand the Thai culture and the proper language to use in a survey designed for Thai people. In other words, the translators knew how to use the words that are understandable and have the same meaning as in the original instrument. The translated instruments were easily understood by Thai persons. More importantly, content validation is one of the most important aspects in the adaptation and validation process of the translated instruments [9] since the instrument used was originally developed in a foreign country. This study used the psychometric evaluation process which was approved by the Thai expert committee. It is very helpful to confirm that the translated instrument is appropriate for Thai person with type 2 DM. Chavez and Canino [5] indicated that researchers should not underestimate the conceptual and methodological challenges during the process of translation and culture adaptation of original instruments from one country to another country.

The results of this study proved that the Thai versions of the instrument is reliable and a valid tool for research among Thai persons with T2DM. However, its application in the clinical setting remains to be tested. While the Thai sample in this study generally found no problem in understanding the questions, using this instrument for quick screening tools in the clinical setting was not evaluated.

#### 5. Conclusions

The questionnaires reviewed for this study were developed in English and the proposed research for this study was conducted among Thai adults with T2DM. In addition to translation, the

original English instrument needed to be cross-culturally adapted to Thai culture. When an instrument is translated to another language, the translation has to be conceptually accurate in a culturally acceptable manner, rather than simply being correct linguistically using one-to-one word correspondence [15]. In summary, The DSMQ had excellent content validity as evaluated by a panel of experts and good internal consistency from the pilot study. The results of the reliability analysis in the final study also revealed high internal consistency. Thus, the use of this instrument was justified for the main research project, which focused on studying the moderating effect of social cognitive factors on self-management activities and HbA1c in Thai adults with type 2 diabetes.

Based on the findings in this study, the researcher recommends that this instrument be used among Thai adults with DM in future research studies. According to Streiner & Norman [10], testing the psychometric properties of an instrument improves the overall study quality and validity, and will increase the study quality and impact. Moreover, Squires et al. [9] reported that content validity is one of the most important aspects in the adaptation and validation process of the instruments, especially when the instruments will be tested in a foreign country using a foreign language. The measurement of social and cognitive factors is an essential first step in the analysis of behaviors that impact diabetes management. This is a problem of significance across the globe. The results from this psychometric evaluation can be utilized to further enhance the understanding of this problem from the Thai perspective.

#### References

- [1] International Diabetes Federation (IDF). Diabetes in Thailand. 2014. Retrieved from: <http://www.idf.org/membership/wp/thailand>.
- [2] World Health Organization (WHO). Diabetes mellitus. 2014. Retrieved from: <http://www.who.int/mediacentre/factsheets/fs138/en/>.
- [3] Aekplakorn W, Charialertsak S, Kessomboon P, Sangthong R, Inthawong R, Putwatana P, Taneepanichskul S. Prevalence and management of diabetes and metabolic risk factors in Thai adults: the Thai national health examination survey IV, 2009. *Diabetes Care* 2011;34(9): 1980-1985.
- [4] Beauford JE, Nagashima Y, Wu M. Using translated instruments in research. *J Coll Teach Learn* 2009;6(5):77–82.
- [5] Chavez LM, Canino G. Toolkit on translating and adapting instruments. 2005. Retrieved from: [http://www.hsri.org/files/uploads/publications/PN54\\_Translating\\_and\\_Adapting.pdf](http://www.hsri.org/files/uploads/publications/PN54_Translating_and_Adapting.pdf).
- [6] Gjersing L, Caplehorn JRM, Clausen T. Cross-cultural adaptation of research instruments: language, setting, time and statistical considerations. *BMC Med Res Methodol* 2010;10:13.
- [7] Schmitt A, Gahr A, Hermanns N, Kulzer B, Huber Jö, Haak T. The diabetes self-management questionnaire (DSMQ): development and evaluation of an instrument to assess diabetes self-care activities associated with glycemic control. *Health & Qual Life Outcomes* 2013;11(1):1–14.
- [8] Reichenheim ME, Moraes CL. Operationalizing the cross-cultural adaptation of epidemiological measurement instruments. *Rev De Saúde Pública* 2007;41(4): 665–73.
- [9] Squires A, Aiken LH, Van DH, Sermeus W, Bruyneel L, Lindqvist R, et al. A systematic survey instrument translation process for multi-country, comparative health workforce studies. *Int J Nurs Stud* 2013;50(2):264–73.
- [10] Streiner D, Norman G. Health measurement scales: a practical guide to their development and use. fourth ed. Oxford, UK: Oxford University Press; 2008.
- [11] Deilakas ET, Hofoss D. Psychometric properties of the Norwegian version of the safety attitudes questionnaire (SAQ), generic version (short form 2006). *BMC Health Serv Res* 2008;8:191.
- [12] Kaya S, Barsbay S, Karabulut E. The Turkish version of the safety attitudes questionnaire: psychometric properties and baseline data. *Qual Saf Healthc* 2010;19(6):572–7.
- [13] Polit DF, Beck C, Owen SV. Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Res Nurs Health* 2007;30(4):459–67.
- [14] Streiner DL. Starting at the beginning: an introduction to coefficient alpha and internal consistency. *J Pers. Assess* 2003;80(1):99–103.
- [15] World Health Organization (WHO). Process of translation and adaptation of Instruments. Retrieved from: 2015. [http://www.who.int/substance\\_abuse/research\\_tools/translation/en/](http://www.who.int/substance_abuse/research_tools/translation/en/).