

A PSYCHOMETRIC EVALUATION OF THE THAI VERSION OF THE CARDIAC SELF-EFFICACY QUESTIONNAIRE FOR PATIENTS WITH CORONARY ARTERY DISEASE

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ABSTRACT: Self-efficacy is an important psychosocial factor that has been reported in many studies to be a mediator between health, behavior, and the environment. However, a valid and reliable measure of self-efficacy in coronary artery disease (CAD) patients has not yet been developed in the Thai language. The aims of this study were to first translate the *Cardiac Self-Efficacy Questionnaire* (CSEQ) into Thai, and then to evaluate its psychometric properties among the Thai CAD population. The original Cardiac Self-Efficacy Questionnaire, developed by Sullivan, LaCroix, Russo, & Katon in 1998 was translated from English into the Thai language. The translation process and content validity of the Thai version were then evaluated by a panel of experts. A measurement model was tested on the construct of a Thai version of the CSEQ among 280 patients with CAD. The study revealed that the Thai version of the CSEQ was found to have a good content validity index (CVI = 1.0). The Cronbach's alpha was 0.92, goodness-of-fit presenting χ^2 was equal to 54.51, degrees of freedom was 42, $\chi^2/df = 1.30$, p-value = 0.09, the model was saturated, and the fit was perfect. In conclusion, the empirical data demonstrated that the Thai version of the CSEQ is both valid and reliable for measuring cardiac self-efficacy among the Thai CAD population.

Keywords: Cardiac self-efficacy, Coronary artery disease, Psychometric properties

INTRODUCTION

Coronary artery disease (CAD) is the leading cause of death in Thailand [1]. CAD is a chronic illness that affects both the physical and psychological functioning of patients. Successful patient outcomes are an important goal in the treatment of CAD patients. Almost all previous measurements of CAD patient outcomes have been focused solely on physiological factors, for example, severity of the disease, left ventricular function, and lipid levels [2]. However, measurements of psychological outcomes are lacking, and further investigation is required regarding the validity and reliability of the instruments, especially for the measurement of self-efficacy in Thai CAD patients.

Self-efficacy is a psychological concept which is based on social cognitive theory [3]. The self-efficacy questionnaire is an instrument designed to assess individual self-efficacy. Albert Bandura [3] defined self-efficacy as "one's capabilities to organize and execute the courses of action required to produce given attainments." Studies have shown

self-efficacy to be an important mediator between health, behavioral, and environmental factors [4-8]. Sullivan and his team developed the *Cardiac Self-Efficacy Questionnaire* for CAD patients in order to study self-efficacy in patients undergoing cardiac catheterization, and found that self-efficacy was able to predict health status in U.S. CAD patients [9]. They reported excellent reliability levels, with 0.98 for control of symptoms, and 0.87 for maintenance of function. A previous prospective cohort study of psychosocial factors and health outcomes in CAD patients, found that low cardiac self-efficacy was associated with poor health status [10, 11]. Therefore, the Cardiac Self-Efficacy Questionnaire could prove to be a useful and important psychological test that is specifically designed for CAD patients. There is currently no instrument that directly evaluates cardiac self-efficacy in Thai CAD patients. Hence, the cardiac self-efficacy instrument has been translated and validated for use among the Thai CAD population in this study. The aim of this study was to first translate the cardiac self-efficacy questionnaire into Thai, and then to evaluate its ability to measure the psychometric properties of a population of Thai CAD patients.

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Table 1 The translation process

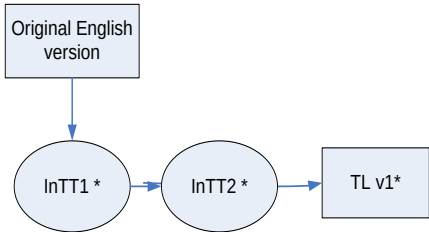
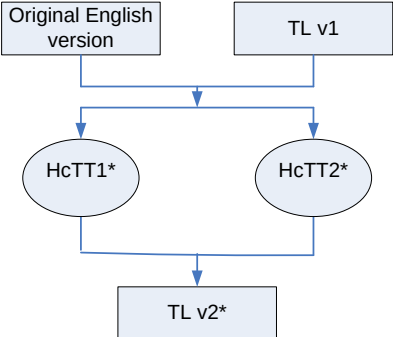
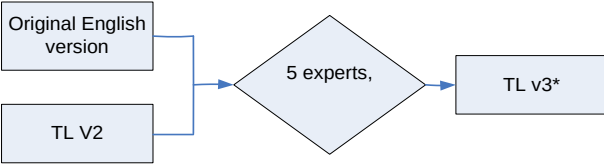
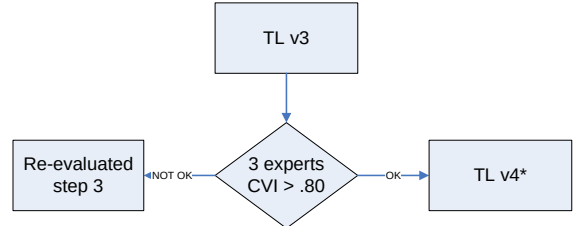
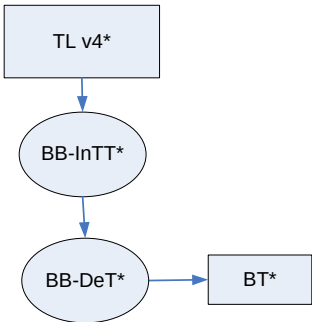
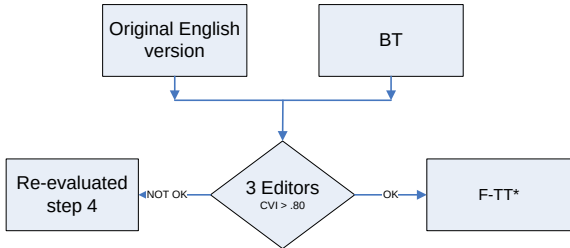
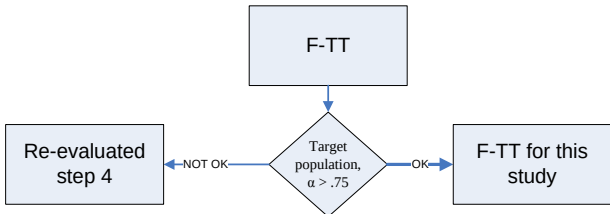
The Process of Translation	Description
Step 1.  InTT1* = Independent Thai Translator 1; InTT2* = Independent Thai Translator 2; TL v1* = Thai Language version 1	The original English version was first translated by Independent Thai Translator 1 (InTT1), and then the translation was verified by Independent Thai Translator 2 (InTT2). This process was the first synthesis of the Thai translation, with the result being Thai Language Version 1 (TL v1).
Step 2.  HcTT1* = Health care Thai Translator 1; HcTT2* = Health care Thai Translator 2; TL v2* = Thai Language version 2	Comparison of the original English version and TL v1 by two nurses that are experts in cardiovascular nursing, and fluent in both Thai and English languages. The result of this second synthesis was Thai Language Version 2 (TL v2).
Step 3.  TL v3* = Thai Language version 3	Comparison of the original English version and TL v2 by five experts in their respective fields: 1) a cardiologist, 2) a cardiovascular nurse, 3) a PhD of nursing, 4) an advanced practice nurse in cardiovascular disease, and 5) a PhD of nursing who is also a specialist in cultural translation. These five experts checked the wording used by the researcher in order to ensure that the Thai version corresponded with the original English version, and also that it used words consistent with Thai culture. The result of this process was Thai Language Version 3 (TL v3).
Step 4.  TL v4* = Thai Language version 4	Comparison of the original English version and TL v3 by three experts in their respective fields: 1) a cardiologist, 2) a PhD of nursing, and 3) an advanced practice nurse in cardiovascular disease. The Scale-level Content Validity Index (S-CVI) was used for synthesis in this step, and was accepted at CVI > 0.80, and CVI < 0.80 was re-evaluated during step 3. This resulted in the Thai Language Version 4 (TL v4).

Table 1 The translation process (cont.)

The Process of Translation	Description
Step 5.  TL v3* = Thai Language version 3; BB-InTT1 = Blind Back-Independent Thai Translator 1; BB-DeT = Blind Back-Dependent Thai Translator; BT= Back-translation.	TL v4 was back-translated by the Chulalongkorn University Language Institute, which used a Blind Back-Independent Thai Translator (BB-InTT), followed by a Blind Back-Dependent Translator (BB-DeT). The result of this process was the Back-Translation (BT).
Step 6.  F-TT*= Final Thai Translated	Comparison of the original English version and BT version by three editors from the Chulalongkorn University Language Institute, using the Scale-level Content Validity Index (S-CVI), which was accepted at CVI > 0.80, and CVI < 0.80 was re-evaluated during step 4. The result of this process was the Final Thai Translation (F-TT).
Step 7. 	Pilot study and Psychometric testing III: Reliability testing; Synthesis VI was the final synthesis in the procedure. We enrolled 30 subjects, who were all coronary artery disease patients that had received PCI for more than one year, for participation in this pilot study. We achieved internal consistency reliability, Cronbach's alpha > 0.75.

MATERIALS AND METHODS

Data from a cross-sectional study of the predicting factors of quality of life among coronary artery disease patients post-percutaneous coronary intervention (PCI), was used in this study. The study is comprised of two phases: 1) translating from English, and examining the content validity index of the Thai version of the Cardiac Self-Efficacy Questionnaire, 2) examining the construct validity of the translated instrument.

Phase 1) Translating from English and examining the content validity index of the Thai version of the Cardiac Self-Efficacy Questionnaire.

The translation process used in this study was

developed from the literature review, and employed the back-translation technique, as shown in Table 1 [12, 13].

Phase 2) Examining construct validity of the translated instrument CAD patients were recruited from the cardiac clinics of five tertiary hospitals in Thailand, and their participation was approved by the Institutional Review Board (IRB). The participants were asked for their consent to participate in the study before receiving information about the questionnaire from the research assistant. During the interview, which lasted 15 minutes, each item and scale response was read out and repeated several times.

The population in this study consisted of post-PCI CAD patients that were following up at the outpatient clinics of five tertiary hospitals in Thailand, and who also met the following inclusion criteria: 1) having been diagnosed with coronary disease in at least one vessel with more than 50% stenosis, 2) having a history of CAD for greater than or equal to one year, 3) being either a male or a female aged over twenty years, 4) being greater than 12 months post-PCI treatment, 5) having stable angina pectoris class I-III, 6) being able to communicate in and understand the Thai language, and 7) having a willingness to participate in this study. The exclusion criterion was as follows: being a post-coronary artery bypass graft (CABG) patient. The sample size was determined according to the recommendation of 20 subjects per item [14], resulting in a sample size of 280 in this study. All participants in the sample were diagnosed CAD patients who were post-PCI, and who had met the above inclusion criteria.

Instrument

The cardiac self-efficacy questionnaire was developed by Sullivan and his team in order to study cardiac self-efficacy in U.S. CAD patients undergoing cardiac catheterization, and so to measure health outcomes in CAD patients from a psychological perspective [9]. The original CSEQ consisted of 13 items. This study reviewed findings that cognitive behavior therapy with a focus on stress management significantly decreased the risk of recurrent cardiovascular disease and acute myocardial infarction [15]. Therefore, one additional item measuring the maintenance of stress management was added to the questionnaire used in this study. As a result, the Thai version of the CSEQ consisted of 14 items rated on a five-point Likert scale. The English version of the CSEQ measures two sets of factors: 'control of symptoms' and 'maintenance of function,' with Cronbach's alphas of 0.90 and 0.87 respectively. The 'control of symptoms' set of factors consisted of eight items, and the 'maintenance of function' set of factors consisted of six items.

Data analysis

Descriptive statistics were used to analyze the demographic characteristics of the participants. A panel of experts evaluated the relevance between the original and Thai versions of the CSEQ by rating the degree of relevancy of each item on a three-point scale: 1 – irrelevant, 2 – questionably relevant, and 3 – relevant. The 'relevant rating score' was calculated based on the number of items rated by the experts as either 2 or 3 on the scale,

and the content validity index (CVI) [16] was computed according to the proportion of experts that rated the items as relevant at either 2 or 3 on the scale [17]. The Cronbach's alpha was used to assess the internal consistency of the cardiac self-efficacy questionnaire. Confirm Factor Analysis (CFA) was tested for the measured variables which represented the constructs. This analysis technique is widely used to test whether the concepts explained in a theory are represented by the measures of constructs in a study, and so determining whether the results fit the hypothesized measurements. Measurement model testing with two components was further evaluated in terms of conceptual meaning, or construct validity, by CFA using the LISREL program. The factor loading for each component, goodness-of-fit indices of the measurement model, and the obtained data, were used to evaluate the construct validity of the Thai version of the cardiac Self-Efficacy Questionnaire.

RESULTS

Participant characteristics

Over three-hundred participants completed the CSEQ questionnaire ($n = 303$), and 280 of the completed questionnaires were used for this analysis. Almost three-quarters of the participants (73.60%) were male, and the age range was from 30 to 89 years, with a mean age of 61.11 years ($SD = 10.94$). Most of the participants were part of a couple (81.20%), and employed (68.70%). Almost all of the participants were not experiencing angina (88.80%).

The degree of relevance and content validity

The average degree of relevance for the questionnaire items used in this study was 90%, which indicates that the Thai version of the CSEQ was an accurate reflection of the English version. The context validity index (CVI) was found to be 1.0, which also indicates a good level of content validity for the Thai version.

Internal consistency and reliability

The Cronbach's alpha of the Thai version of the CSEQ was 0.92, and alpha values for the two factors, control of symptoms and maintenance of function, were 0.91 and 0.87 respectively. The corrected Item-Total Correlations (CITC) for the 14 questionnaire items ranged from 0.47 to 0.74, that was very good discrimination (> 0.30) [18]. Thus, the overall scale satisfied the criteria, as presented in Table 2.

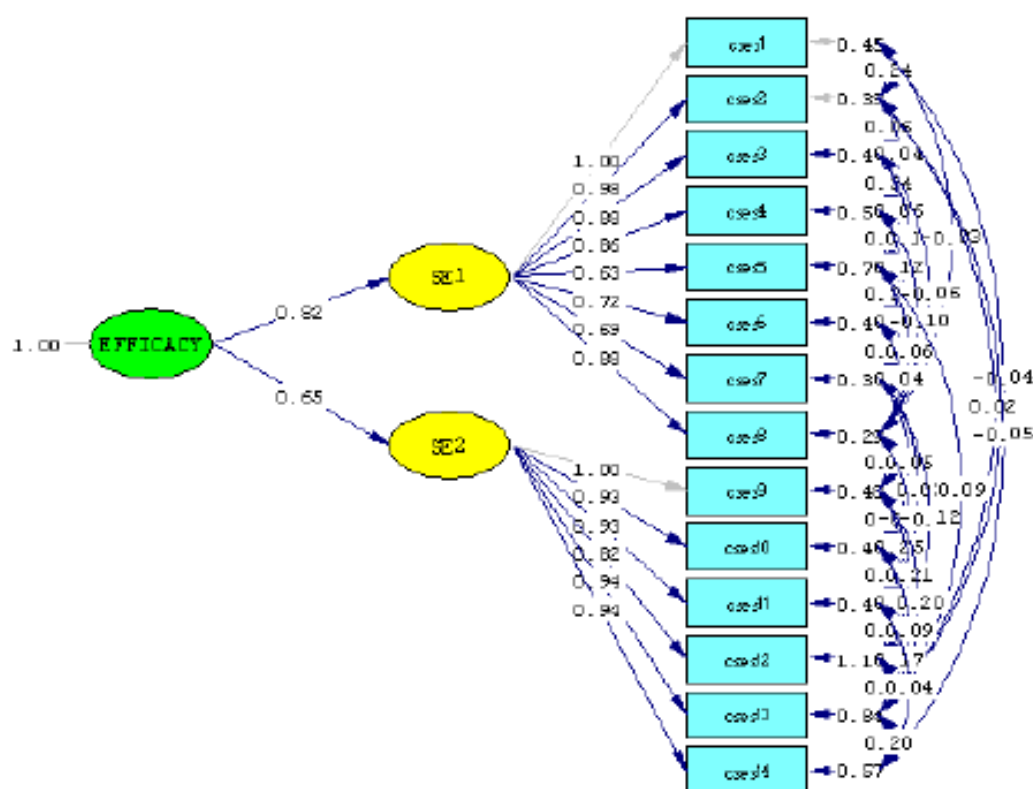
Measurement Model Testing

The data obtained in this study was found to be

Table 2 Corrected Item-Total Correlations (CITC) and Factor Loadings of Cardiac Self-Efficacy Questionnaire, Thai Version (CSEQ-T)

Items	M	SD	CITC	Factor Loading	
				F1 (Control of Symptoms)	F2 (Maintenance of Functioning)
Control your chest pain by changing your activity levels	2.41	1.07	0.72*	0.60	0.49
Control your breathlessness by changing your activity levels	2.39	1.03	0.74*	0.64	0.48
Control your chest pain by taking your medications	2.71	1.00	0.70*	0.79	0.28
Control your breathlessness by taking your medications	2.59	1.00	0.69*	0.79	0.25
When you should call or visit your doctor about your heart disease	2.78	1.00	0.56*	0.73	-
How to make your doctor understand your concerns about your heart	3.01	0.92	0.66*	0.85	-
How to take your cardiac medications	3.13	0.84	0.64*	0.75	0.25
How much physical activity is good for you	2.61	0.90	0.72*	0.55	0.53
Maintain your usual social activities	2.65	0.95	0.73*	0.30	0.81
Maintain your usual activities at home with your family	2.82	0.88	0.72*	0.31	0.79
Maintain your usual activities at work	2.68	0.92	0.71*	0.26	0.82
Maintain your sexual relationship with your spouse	2.03	1.21	0.47*	-	0.71
Get regular aerobic exercise (work up a sweat and increase your heart rate)	2.43	1.11	0.59*	0.23	0.59
Control your stress level	2.54	0.97	0.59*	0.32	0.61

*CITC, > 0.30



Chi-Square=54.46, df=42, P-value=0.09420, RMSEA=0.031

Figure 1 The Cardiac Self-Efficacy Model

appropriate for factor analysis, with a Kaiser-Mayer-Olkin recommend value of 0.70 (KMO = 0.91), and Bartlett's test of sphericity at $\chi^2 = 2665.252$ ($p < 0.001$). Using the principle components extraction method with an eigenvalue greater than 1, two factors were extracted with positive factor loading for all items (0.23 - 0.85), and which were consistent with the original version [9], as presented in Table 2. The Cardiac Self-Efficacy Measurement Model includes two components: 1) control of symptoms (SE1), and 2) maintenance of function (SE2). The results of the CFA for the cardiac self-efficacy model presented that χ^2 was equal to 54.51, degrees of freedom was 42, $\chi^2/df = 1.30$, p -value = 0.09, the model was saturated, and the fit was perfect. All indicator loadings were statistically significant at the level $p < 0.001$. The reliability of the indicators of variance between the two factors (R^2) for all measurement models was 1.0. An R^2 value greater than 0.30 indicates a strong relationship [19], which was interpreted here as the constructs being well-represented, and that the overall measurement models fit the data, as shown in the Cardiac Self-Efficacy Model presented in Figure 1.

DISCUSSION

In the current study, all of the items in the Cardiac Self-Efficacy Questionnaire were accurately translated into Thai with acceptable content validity, as assessed by a panel of five expert judges, indicating good content relevance for the instrument. The Cronbach's alphas for the Thai version of the CSEQ demonstrate acceptable value as of 0.92 for overall scale, .91 and .87 for the two subscales. The two principle components, control of symptoms and maintenance of function, which were extracted from the 14 items of the Thai version, were found to be consistent with the original English version. The goodness of fit showed that the empirical data obtained in this study was saturated and fit the model, indicating that the construct of the Thai version had two components, which is also consistent with the original English version. Thus, for Thai CAD patients, the Thai version of the Cardiac Self-Efficacy Questionnaire was found to be a reliable and valid measure of self-efficacy.

This study provided good evidence for the validity and reliability of the Thai version of the Cardiac Self-Efficacy Questionnaire. Because of the great

differences in culture and language between English and Thai, it is important to researchers that accurate and reliable translations are developed for such instruments. Since contextual meaning is closely associated with language, without careful and thorough translation of the questions, respondents may misunderstand their original meaning. Therefore, a process of translation was developed in this study that would help to avoid this issue. Furthermore, the difference in social etiquette between Western and Thai culture is also a cause for care and concern, which is reflected especially in the items discussing sexual relationships, a topic that is not generally discussed openly in Thailand. Hence, asking this question to members of the Thai population must be taken very seriously, and approached with caution. Although, it should be noted that, since the majority of the Thai people who participated in this study had received education, they may have been more understanding towards this issue.

Regarding the limitations of this study, all of the participants had been diagnosed with CAD and belonged to the percutaneous coronary intervention group, which is a specific group. As a result, the findings cannot be generalized to other groups experiencing such problems as heart failure, myocardial infarction, and cardiac surgery. Further studies are required to assess the use of the Cardiac Self-Efficacy Questionnaire among other groups of patients with CAD.

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