RESEARCH COMMUNICATION

Reliability and Construct Validity of the Bahasa Malaysia Version of Transtheoretical Model (TTM) Questionnaire for Smoking Cessation and Relapse among Malaysian Adult

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Abstract

The transtheoretical model (TTM) has been used as one of the major constructs in developing effective cognitive behavioural interventions for smoking cessation and relapse prevention, in Western societies. This study aimed to examine the reliability and construct validity of the translated Bahasa Malaysia version of TTM questionnaire among adult smokers in Klang Valley, Malaysia. The sample consisted of 40 smokers from four different worksites in Klang Valley. A 26-item TTM questionnaire was administered, and a similar set one week later. The questionnaire consisted of three measures; decisional balance, temptations and impact of smoking. Construct validity was measured by factor analysis and the reliability by Cronbach's alpha (internal consistency) and test-retest correlation. Results revealed that Cronbach's alpha coefficients for the items were: decisional balance (0.84; 0.74) and temptations (0.89; 0.54; 0.85). The values for test retest correlation were all above 0.4. In addition, factor analysis suggested two meaningful common factors for decisional balance and three for temptations. This is consistent with the original construct of the TTM questionnaire. Overall results demonstrated that construct validity and reliability were acceptable for all items. In conclusion, the Bahasa Malaysia version of TTM questionnaire is a reliable and valid tool in ass

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Introduction

Smoking cessation is a complex process, which usually involves a range of unsuccessful attempts before achieving long term abstinence. It was cited that roughly 75% to 80% of smokers who attempted to quit, relapsed within the first six months ((USDHHS), 1990). As such, interventions and programme involving smoking cessation usually ranged from 5- 35% success rates (Sun et al., 2007). Various factors were identified, which included physiological, biological and cognitive factors that determine whether a smoker can maintain quit status or not (Piasecki, 2006).

A model that has been utilized in smoking cessation (Lawrence et al., 2003 ; Haug et al., 2008) and increasingly being used for effective relapse prevention (Segan et al., 2006; Zundert et al., 2009) in Western societies is the transtheoretical model (TTM). The TTM is a behavioral change process that has been validated and popularized by Prochaska and colleagues since over 20 years (Prochaska & DiClemente, 1983; Fava et al., 1995; Norman et al., 1998; Velicer et al., 1999). This model includes five stages of change, which a smoker progresses through in a quit process (precontemplation, contemplation, preparation, action and maintenance). In addition, 10 processes of change are used to describe activities that lead to the progression across the stages. These 10 processes are further divided into two categories: experiential (dramatic relief, consciousness raising, social liberation, environmental reevaluation and self reevaluation) and behavioural (stimulus control, helping relationships, counterconditioning, self liberation and reinforcement management) (Prochaska et al., 1988). Another measurement which adds as an explanatory power to the model is decisional balance. Decisional balance contains two independent factors (pros and cons) which estimated the importance of making a behaviour change as perceived by individuals (Velicer et al., 1985). Lastly, self efficacy is also incorporated into the model. It measures smoking temptation in three different situations, being; Positive/ Social, Habit/ Addictive and Negative/ Affective (Velicer et al., 1990).

A measured instrument in any study must first be subjected to test of both validity and reliability. Given the fact that the English version of TTM Questionnaire has been validated previously in various literatures from western countries, it remains to be seen if it may also be

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of value to populations of different sociodemographic backgrounds and culture. It is therefore, necessary to re-examine the validity and reliability of the measures in Bahasa Malaysia version, before it can be adapted to Malay speaking community in countries like Malaysia, Singapore, Indonesia and Brunei. Hence, the aim of this study is to test the validity and reliability of the translated version of the TTM Questionnaire which will be useful for future smoking related studies in Malaysia and its neighbouring countries.

Materials and Methods

Participants and procedures

The investigator conducted a one month cross-sectional validation study in four different workplaces. It was conducted between September 2009- October 2009. The reason for such diversity was to cover the various occupational groups and education status that existed in worksite settings and adult smokers. The participants were recruited from: 1) University Technology Mara (UiTM), Puncak Perdana Campus, Shah Alam, Selangor; 2) University Malaya (UM), Kuala Lumpur; 3) University Malaya Medical Centre (UMMC); 4) Bukit Aman Police Station. Smokers from each worksite were individually invited and approached to participate in this validation study. All participants were explained on the requirement to fill up the questionnaire twice, with one week apart.

Inclusion criteria were smokers who smoked at least five cigarettes per day, not involved in any quit attempt, planning on quitting in the next six months but not within two weeks and is fluent and able to read and write in Bahasa Malaysia. Smokers who were not willing to fill two sets of the questionnaire in two consecutive weeks were excluded.

Self administered Malay versions of the Questionnaires were distributed to 48 smokers at the respective worksite over a period of two weeks. An average of 30 minutes was utilized to complete the questionnaires. The response rate for the first set of questionnaires was 100%. However, after one week, two of the smokers did not return the questionnaire. Six other failed to fill up the second set due to shift hours, or kept the questionnaire longer than eight days. Smokers whom returned the second questionnaire after seven days were excluded from analysis. In total 83% (N=40) returned both questionnaires and were included in the analysis. These smokers were given a token of appreciation after they have returned two sets of the questionnaire.

Measures

The TTM questionnaires were translated into the Bahasa Malaysia version by two lecturers in Information Management Faculty, University of Technology MARA. They were not involved in this study and were fluent in both Bahasa Malaysia and English. The later was then back translated into English language by another colleague lecturer in UiTM, to ensure high face validity. Any differences that existed among the three parties were discussed, and common consensus was achieved.

The translated version was then pre-tested to a group of five smokers, with different educational background and age. Any questions which were difficult to understand were rephrased and discussed again with the translators in identifying the best possible wordings.

TTM Questionnaire Measures

It was popularized and validated by Velicer and associates to involve both smoking cessation and relapse situations (Velicer et al., 1990). This questionnaire consisted of three parts, which were: a) smoking decisional balance; b) temptations to smoke; c) impacts of smoking. The entire questionnaires were based on a five point Likert-scale. Results were averaged for each variable.

The decisional balance scale used three item subscales. Participants were asked on their opinion regarding quitting or otherwise. The scales were rated from 1 (not important) to 5 (extremely important). Measurements of situational temptations were computed from a three items subscale indicating their temptations to smoke, ranging from 1 (not tempted at all) to 5 (extremely tempted). These were measured in three separate high risk circumstances, which were positive/social, habit/addictive, and negative/affective. Aggregate measures of decisional balance and temptations were the average of all the subscales within the items.

Impacts of smoking, which measured the change process, consisted of two major items. i) Behavioral change processes: counterconditioning, e.g. instead of smoking I shift to do smothing else to relax; reinforcement management, others reward me if I don't smoke; self-liberation, I confide in myself that I can quit if I want to; helping relationships, there is someone who listens when I have something to talk about my smoking problem; and stimulus control, I tend to remove things at my workplace that reminds me of smoking). ii) Experiential change processes: dramatic relief, when I see warnings of health hazards, it touched me emotionally; consciousness raising, I seek for information on smoking; environmental reevaluation, I stop to think that smoking cause pollution to the environment; self-reevaluation, I felt dissappointed in myself for depending on cigarettes; and social liberation, I realized that there are sections for non-smokers in public places). Each item was rated in a Likert scale of 1-5. (1 = never do 5= repeatedly).

In exploratory factor analysis, the general rule of thumb is that the ratio of the number of respondents to items (subject to variable ratio) should be more than five (Arindell & Ande, 1985). In this study, the ratio fell within the recommended level for questionnaire with eight items. One questionnaire contained nine items, and was slightly underpowered. However, another study in the literature had a ratio of less than 4:1 was deemed acceptable (MacCallum et al., 2001), the authors also concluded that the general rule of thumb for sample size may not be valid.

Statistical Analysis

Double data entry was carried out with a subsequent validation to guarantee the quality and consistency of the data. The statistical program SPSS for Windows version 15.0 was used to carry out the analysis. The P value was set at 0.05.

Descriptive statistics were computed for demographic

Table 1. Smoking Decisional Balance Questionnaire and Temptations to Quit Smoking

Items	Cronbach's α	Test retest reliabilities
Decisional		
Pros of smoking (D1, D3, D5, D7)	0.92	0.70; 0.62; 0.69; 0.81
Total score correlation: 0.84		
Cons of smoking (D2, D4, D8)	0.69	0.57; 0.51; 0.68
Total score correlation: 0.76		
Temptation		
Positive/ Social (T1, T4, T7)	0.89	0.43; 0.58; 0.58
Average score correlation: 0.66		
Habit/ Addictive (T2, T5, T8)	0.54	0.58; 0.35; 0.44
Average score correlation: 0.41		
Negative/ Affective (T3, T6, T9)	0.85	0.45; 0.70; 0.56
Average score correlation: 0.66		

features. Means and standard deviations were calculated for continuous variables and frequency and percentages for categorical variables. The internal consistency of each part of the questionnaire was tested using Chronbach's alpha reliability coefficients (Garson, 2008). For test-retest reliability, Spearman's Correlation Coefficient was used to assess the reliability of Likert scale scores(Garson, 2008).

Factor analysis was conducted to assess the construct validity of each instrument. The present study used exploratory factor analysis to ascertain that all the items correctly capture the decisional balance and temptations to smoking respectively among Malaysian population, using the translated questionnaire. The impact of smoking questionnaire was not being tested with factor analysis. This was because each item was a separate item within the category. Principal Component Analysis was employed with varimax rotation. Varimax rotation was the most appropriate extraction for these variables because the factors were not correlated (Costello & Osborne, 2005).

Results

Socio-demographic characteristics

The average age was 31 years old, one third being single. The majority was in lower education achievers, primary and secondary school (77.5%). Most respondents were married (65.0%) and all were male (100%). The mean number of cigarettes smoked per day was 10.2. The job categories ranged from librarians (25.0%), lecturers (25.0%), security guards (22.5%), policemen (15.0%), clerks (7.5%), technicians (2.5 %) and administration staff (2.5%).

Reliability test

The item correlations and Cronbach's alphas of each item in Smoking Decisional Balance and Temptations to Quit are given in Table 1. Values for all item correlations were significant. Overall, items showed fair to good correlation (range: 0.40-0.77). In general, the Cronbach's alpha coefficients were acceptable for decisional balance (0.92; 0.69), and temptations to quit smoking (0.89; 0.54; 0.85). Impacts of Smoking ranged from 0.38 for Helping Relationship to 0.77 for Self Liberation.

Validity Test

All of the eight items of the two scales for pros and cons were included in the exploratory factor analysis which showed that the first factor was associated with the scales for pros of smoking. All the items were loaded with the greatest loading factor, ranging from 0.85 to 0.91. The second factor was associated with all items of cons of smoking scale, with the greatest load ranging from 0.51 to 0.89. The factor analysis result for temptations to smoking. revealed three dimensions for temptations, which highly correlated to the original English version questionnaire. These factors were positive/social temptations for factor 1, habit/addictive temptations for factor 3 and negative/ affective temptations for factor 2. Only two items did not accurately reflect the factors under study. T2 for habit/ addictive temptations (factor 3) has shown to reflect factor 1 and an item in factor 2 was also shown to reflect both of factor 1 and factor 2.

Discussion

The present reliability and validity study was used to validate the translated Malay version of TTM questionnaire. In order to measure reliability, we used Cronbach's alpha, which ranged from 0 to 1; the greater the alpha level the more reliable is the scale (Santos, 1999 ; Garson, 2008). An alpha value of 0.70 and above is reported as acceptable and some explorative research took 0.60 as the cut-off values (Santos, 1999). All items in the present study had good internal consistencies, except for one item of habit/addictive temptations. Nevertheless, the Cronbach's alphas of the other two temptations were high (above 0.8), indicating that the whole constructs of temptations is reliable. The authors can thus exclude the whole habit/addictive temptations item, as was done by another study among adolescent (Plummer et al., 2001). Overall, our results were in consistent with the Australian validation of the questionnaire in smoking relapse study of 0.65 to 0.88 (Segan et al., 2006). These results were also similar in Bulgarian adolescent smokers of between 0.63 to 0.89 (Anatchkova et al., 2006). Furthermore, the test retest reliability results were revealed to be significant across all items under study, as shown be the correlation of >0.35. The item correlations of >0.3 conveyed the stability of the instrument over time (Garson, 2008).

The results of exploratory factor analysis showed that the two sets of translated questionnaire, decisional balance and temptations to smoking were shown to be associated with the dimensions under study. Although two items from temptations were found to be loaded into another factor, both were of different factors, and the remaining factors in the item were between 0.74-0.92. This might also suggest that the two items may need to be rephrased. Nevertheless, other studies had demonstrated that factor analysis differs across different population groups and were moderate, and not as strong of the decisional balance items (Plummer et al., 2001; Anatchkova et al., 2006).

The TTM instrument utilized in this study was a short standardized form taken from the full version of TTM. i.e. the three subscales of situational temptations, 8 from 10 of the change processes, pros and cons of smoking, and

stage of change (Java et al., 1995). To accommodate for current smoking status, a modification of the questionnaire was made. The questionnaire was changed, instead of asking the respondent's opinion "during the past month" it was changed to "currently", as was conducted by Segan and colleagues (Segan et al., 2006). In addition, we felt this was appropriate for our future studies in assessing current attitudes during smoking cessation and relapse. Moreover, two of the experiential change processes were not measured; dramatic relief and social liberation, as these two measures were not found to hypothesize or predict smoking relapse (Prochaska et al., 1985).

Some limitations were identified. A major limitation of this validation test was the number of sample size was rather small. The reasons were; 1) Due to the nature of the questionnaires used in this study, which involved behaviour process of smoking and quitting, the investigator felt that it was impossible to test it on non-smokers and ex-smokers; 2) To recruit smokers for this reliability study was a difficult task. Many smokers turned down the invitation to participate, due to the amount of questions that need to be filled and subsequent questionnaire a week later. Secondly, the construct Stage of Change was not being measured in this study, as it requires a greater sample size because each participant will need to be assessed and subdivided according to their current stage of motivation. Nevertheless, in the present study, to counter this loss, we have only invited participants who were in the preparation stage (preparing to make a quit attempt), to ensure homogeneity of the sample. It would be of greater advantage of future TTM validation to include smokers from other stages of motivation. This may enable the researcher to conduct a principal component analysis and exploratory model testing of the entire construct. Lastly, our sample was rather homogenous in terms of eithinicity. Smokers were obtained only among Malay group of population. It was not tested among other ethnic groups (e.g. Chinese, Indians).

Assessing the reliability and validation of the translated version is important for development of tailored interventions based on individual needs. This measure may be utilized for smoking intention, smoking cessation and smoking relapse studies. The items should be able to convey the breath of the construct, at the same time its psychometric properties. The translated version accomplishes both goals. Results of coefficient alphas were good, showing between 0.65- 0.9, and test-retest reliability were all above 0.4.

In conclusion, the present study demonstrated that the Bahasa Malaysia version of the TTM questionnaires is a reliable and valid tool to assess smoking behaviours among Bahasa Malaysia speaking adult smokers. Nevertheless, the current study only offers preliminary findings. Perhaps, more research is required to validate the TTM questionnaire in larger and more diverse population groups. In addition, it would be more meaningful if the psychometric properties across the stages of change differences can be measured in future studies. Moreover, translation and validation of other TTM related behaviour questionnaire is warranted in this region, and will be deemed useful.

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