PUBLIC HEALTH RESEARCH

Construct Validity and Reliability of Malay Language-Perception towards Smoking Questionnaire (BM-PTSQ) Among Secondary School Adolescents

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ABSTRACT

Introduction	Multitude studies have demonstrated that perception is an integral factor associated with smoking. However, no such tool was available in the Malay language. In this study, we established a Bahasa Malaysia version of PTSQ (BM-PTSQ) and tested the validity and reliability among secondary school adolescents.
Methods	The English version of PTSQ originally consists of 12 items. It was translated into Bahasa Malaysia and back-translated again into English to check for consistency. After face validity (face-to-face query) was determined among 20 secondary school adolescents, only 10 items were included in the survey. Construct validity was established from 407 school adolescents through random selection in the same locality. More than 60% of the respondents were female, while the majority of them (67.3%) were schooling in rural areas. Then, the reliability of the questionnaire was determined with Cronbach's alpha.
Results	The Exploratory Factor Analysis (EFA) has grouped PTSQ into two components associated with either knowledge or attitude towards smoking. The variance and Cronbach's alpha for the first and second components were 38.24% and 0.861 (7 items), 21.62% and 0.661 (3 items), respectively.
Conclusions	The PTSQ showed good validity and reliability for measuring perception of smoking among secondary school-going adolescents in Malaysia. Hence, this is a viable measurement tool. But, more importantly, this study showed an urgent need to improve smoking education among adolescents in Malaysia.
Keywords	Perception towards smoking - Construct Validity - Reliability - PTSQ - School going adolescents.

INTRODUCTION

Ample research studies have demonstrated that smoking is a significant contributor to morbidity and mortality globally.[1] Smoking-related diseases, such as cancer and ischaemic heart diseases, are the leading causative factors for mortality in Malaysia since the 1980s.[2-4] National burden of diseases studies revealed that approximately one-third of disabilities in Malaysia is due to smoking-related diseases.[5] Therefore, the Ministry of Health Malaysia has introduced various measures to address the problem of disabilities due to smoking.[6]

Multitude studies have shown that smoking is a learned behaviour that starts as early as during the adolescent years.[7-9] The earlier an individual initiates smoking, the higher the likelihood he/she will become a smoker during adulthood and less likely able to cease smoking.[10-11] Subsequently, the risk of cardiovascular diseases would also increase.[12]Therefore, reducing smoking initiation among non-smoking adolescents is a long-term health measure to address the morbidity and mortality related to smoking.

Intrapersonal and interpersonal factors have been identified to contribute to smoking initiation among adolescents.[13-14] Amongst the intrapersonal factors are knowledge and attitude towards smoking.[15-18] Those with poor knowledge and a positive attitude towards smoking have a higher likelihood to start smoking. These findings are well aligned with Human Behavioral Theories such as Health Belief Model (HBM)[19] and Theory of Planned Behaviour (TPB),[20] which posits that individual who perceives severe outcomes and negative attitude towards any behaviour are less likely to practice it. Furthermore, attitude towards certain behaviour has shown a significant association with behaviour intend and actual behaviour.[18] Therefore, these two variables are of paramount importance to be measured among adolescents.

Although studies regarding smoking among adolescents have been carried out by researchers in Malaysia since 2000,[9,21-23] the main focus of these studies is on the prevalence and factors associated with adolescents smoking. Moreover, the knowledge component measured in those studies is only on diseases related to smoking.[17] Therefore, a valid and reliable tool to measure knowledge and attitude among adolescents is essential. This study aims to establish the construct validity and reliability of the Malay language version of PTSQ (BM-PTSQ) among secondary school adolescents.

METHODS

Perception towards smoking questionnaire (PTSQ) was adopted from Ma et al.[24], and the 12 items in PTSQ were forward translated by content and language experts into the Malay Language. The Malay Language-perception towards smoking questionnaire (BM-PTSQ) was then back-translated into English by another group of content and language experts. BM-PTSQ was finalised after an in-depth discussion between 2 groups of experts. Then, BM-PTSQ was sent to 2 content experts to obtain their opinions regarding the questionnaire. They were asked to evaluate the items in the questionnaire with a Likert like scale. All the items were approved and maintained in the questionnaire.

The face validity of BM-PTSQ was established by distributing it to 20 secondary school adolescents to determine their understanding of each item in the questionnaire. We found that majority of the respondents were unsure about 2 items in the questionnaire. After consulting the content experts, the remaining 10 items were maintained in the questionnaire as contents experts have concluded that it is sufficient to measure the knowledge and attitude toward smoking.

The construct validity was established through the distribution of the questionnaire to 428 students. The required sample size was calculated using the Bonnett formula.[25] The number of items in the questionnaire was 10 (k), the value of Cronbach's alpha at null hypothesis (CA0) was estimated at 0.55, and the expected value of Cronbach's alpha (CA1) was estimated by 0.65, power of study at 90%, and the alpha value of 0.05. The required sample size was 372. Based on a non-response rate of 15%, the total sample size of the study was set to be 428.

The questionnaire was distributed to the ten secondary schools in the district of Kota Tinggi, Johor, Malaysia. The number of respondents from each school was selected through a proportionate to size approach, and random selection of students was made by simple random sampling method. Only selected respondents who were consented in writing by their parents were allowed to participate in the study. The letter was issued to selected respondents through school administration to inform the parents/guardian of their son/daughter. They were selected to participate in the study if they understand the objectives of the study and the participation was based on a voluntary basis. Therefore, the anonymity of the respondents and responses was guaranteed.

The data was obtained through a self-administered approach, and the respondents were briefed on the content of the questionnaire. They were assisted by the research team member(s) when they have any doubt on any item(s) in the questionnaire. No school teacher/staff was around during the data collection session to avoid the occurrence of the "Hawthorne effect". The study had been approved by the Medical and Research Committee, Ministry of Health Malaysia, Ministry of Education and Johor Education Department.

Data Management and Analysis

Data were cleaned prior to analysis. Descriptive statistics were used to describe the characteristics of the respondents. The Exploratory Factor Analysis (EFA) utilised the principal component analysis for the construct validity of the instruments. The ideal number of factors was determined by eigenvalue criteria above 1 and based on the scree plot. Factor loading of 0.3 was selected as a criterion for item inclusion in each item. Kaiser Mayer-Olkin test and Barlett's test of sphericity were used to assessing the adequacy of data. The reliability of each domain in BM-PTSQ was determined by internal consistency reliability analysis using Cronbach's alpha. All analyses were performed using the Statistical Package of Service Solutions (SPSS) statistical software version 16.

RESULTS

A total of 407 Form Four students have participated in this study and responded to the survey. They consisted of 32.7% (n=133) male and 67.3% (n=274) female students. The majority of these respondents were Malay (90%; n=366), followed by Chinese (9%; n=37), and Indian (1%; n=4). Approximately 67% (n=273) of them came from FELDA, while 33% (n=134) of them inhabited urban or rural areas in Kota Tinggi, Johor, Malaysia. (Table 1)

Table 1 Demographic characteristic of the respondent

Variable	Frequency	Percentage
Gender		
Male	133	32.7%
Female	374	67.3%
Ethnicity		
Malay	366	90.0%
Chinese	37	9.0%
Indian	4	1.0%
Residential Area		
Urban/Rural	134	33.0%
Felda Settlement	273	67.0%

A Kaiser-Mayer-Olkin measure of 0.867 has indicated good sampling adequacy for EFA, while a significant value from Bartlett's test of sphericity indicated that the data were adequate for reduction. The varimax rotated factor matrix in Table 2 has identified two domains that accounted for 59.87% of the variance. The first domain comprised of 7 items that accounted for 38.25% of the variance. On the other hand, the second domain consisted of three items that accounted for 21.62% of the variance.

Table 2 BM-PTSQ and Varimax rotated factor matrix

Item		Varimax rotation (variance 59.867%) Domain	
		1	2
1	Program mencegah amalan merokok di dalam kalangan remaja adalah penting *(Preventing teens from cigarette smoking is very important)*	0.880	
2	Sekiranya saya merokok dan tidak bersenam, kesihatan saya akan terjejas di masa depan *(My lifestyle and heath behaviors, such as eating and smoking habits, will determine whether I get sick or not)*	0.825	
3	Amalan merokok akan menjejas kesihatan saya *(Cigarette smoking is harmful to my health)*	0.757	
4	Sekiranya saya merokok, saya akan menghadapi gejala kesukaran bernafas *(I would develop breathing problems)*	0.702	

5	Sekiranya saya merokok, saya akan menghadapi gejala penyakit selsema dan jangkitan saluran pernafasan *(I would easily get colds or upper respiratory infections)*	0.658	
6	Sekiranya saya merokok, saya mungkin akan menghadapi kanser paru-paru *(I might develop lung cancer)*	0.633	
7	Wanita mengandung yang merokok akan menjejaskan kesihatan janinnya *(If a woman smokes when pregnant it will harm the health of her baby)*	0.569	
8	Hasil tembakau, sama ada dikunyah atau dihisap tidak akan menyebabkan kanser *(Tobacco, whether chewed or smoked, can cause cancer)*		0.822
9	Kesan ketagihan hasil tembakau (rokok) tidak sekuat dadah *(Tobacco is not as addictive as other drugs such as heroin or cocaine)*		0.658
10	Kebanyakan jenis kanser tidak boleh dicegah dan kejadinya adalah di luar kawalan kita *(Most cancers are not preventable and are beyond my control)*		0.677

Kaiser Meyer Olken - Barlett test of sphericity <0.001

Table 3 shows the mean score of the items ranged from 1.04 (Item 3) to 1.36 (Item 9). All the items showed a good item-total correlation in the first and second factor. In addition, there was a moderate correlation between domain 1 and 2 (r=0.50). Meanwhile, sufficient internal consistency was shown for items in domain 1 (Cronbach alpha of 0.861) and domain 2 (Cronbach alpha of 0.661).

Table 3 Response to items and internal reliability of BM-PTSQ among Form Four students in Kota Tinggi District, Johor, Malaysia.

		n	Mean	SD	Item-total correlation	Cronbach Alpha (if the respective item was deleted)
Domain 1						
1	Program mencegah amalan merokok dalam kalangan remaja adalah penting *(Preventing teens from cigarette smoking is very important)*	399	1.04	0.20	0.72	0.836
2	Sekiranya saya merokok dan tidak bersenam, kesihatan saya akan terjejas di masa depan *(My lifestyle and heath behaviors, such as eating and smoking habits, will determine whether I get sick or not)*	399	1.11	0.32	0.53	0.857
3	Amalan merokok akan menjejas kesihatan saya *(Cigarette smoking is harmful to my health)*	399	1.04	0.19	0.66	0.844
4	Sekiranya saya merokok, saya akan menghadapi gejala kesukaran bernafas *(I would develop breathing problems)*	399	1.12	0.32	0.63	0.843

5	Sekiranya saya merokok, saya akan menghadapi gejala penyakit selsema dan jangkitan saluran pernafasan *(I would easily get colds or upper respiratory infections)*	399	1.16	0.36	0.64	0.845
6	Sekiranya saya merokok, saya mungkin akan menghadapi kanser paru-paru *(I might develop lung cancer)*	399	1.09	0.29	0.72	0.827
7	Wanita mengandung yang merokok akan menjejaskan kesihatan janinnya *(If a woman smokes when pregnant it will harm the health of her baby)*	399	1.06	0.23	0.68	0.837
Domain 2						
8	Hasil tembakau, sama ada dikunyah atau dihisap tidak akan menyebabkan kanser *(Tobacco, whether chewed or smoked, can cause cancer)*	403	1.22	0.41	0.44	0.601
9	Kesan ketagihan hasil tembakau (rokok) tidak sekuat dadah *(Tobacco is not as addictive as other drugs such as heroin or cocaine)*	403	1.36	0.48	0.51	0.515
10	Kebanyakan jenis kanser tidak boleh dicegah dan kejadinya adalah di luar kawalan kita *(Most cancers are not preventable and are beyond my control)*	403	1.23	0.42	0.47	0.568

DISCUSSION

The study revealed that the Malay language version of PTSQ (BM-PTSQ), which was adapted from Ma et al[24] and originally used among English native speaking adults in America, can be used among upper secondary school-going adolescents in Malaysia with some modifications. Two items, namely "I might develop heart disease/stroke if I smoked" and "My lifestyle such as eating and smoking habit will determine whether I get sick or not", respectively, were removed from BM-PTSQ in view of lower comprehension among the 16 years old school adolescents. This might be because they could not comprehend the meanings of the items, probably due to maturity or lack of knowledge on the items. However, the instrument can still be used to measure knowledge and attitude toward smoking based on several factors. Namely, the instrument has gone through the comprehensive validation process, namely backward and forward translation by different groups of content and language experts, to preserve the psychometric properties of the instrument. Furthermore, the comprehensive face validity of the instrument had been carried out among the school-going adolescents in addition to the adequacy of the sample size to test the construct validity of the instrument. In terms of reliability, both the item-total correlation and Cronbach's alpha values were found to be satisfactory for both domains in BM-PTSQ (i.e. knowledge and attitude). The Cronbach's alpha values were 0.861 and 0.661 for knowledge and attitude, respectively. Notwithstanding a lower value of reliability for the attitude factor in the present study, it was nevertheless higher than the minimum value of 0.60 and thus ensured the reliability of BM-PTSQ.[26-27] Finally, the instrument with 10 items was referred to content experts after the face validity process prior to the establishment of construct validity for the instrument.

There are several limitations to the study. Firstly, the generalisation of the present findings is only applicable to school adolescents in Kota Tinggi, Johor, Malaysia. Therefore, more studies would be necessary for other localities among school adolescents to test the reliability and validity of BM-PTSQ. Secondly, the construct validity of BM-PTSQ was investigated by using explanatory factor analysis (EFA). Still, other methods such as confirmatory factor analysis could be useful in future studies to further enhance and validate the instruments.

CONCLUSION

The BM-PTSQ showed good validity and reliability for the measurement of perception of smoking among school adolescents in Malaysia. Hence, this is a viable measurement tool to measure knowledge and attitude toward smoking among school going adolescents in Malaysia.

ACKNOWLEDGEMENTS

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