DEVELOPING A MOTIVATION –TO–QUIT SCALE AMONG THAI ADOLESCENT SMOKERS

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ABSTRACT: Motivation has been consistently a powerful predictor of smoking cessation among adolescents. Health care professionals need to assess adolescents' motivation to quit. However, there is currently no valid and reliable measure to assess this. The purpose of this study was to develop motivation to quit scale (MTQS) for Thai adolescent smokers. This study was guided by the scale development procedures, which consist of two phases: I) scale construction and II) psychometric testing. Different sample groups were used in the phases. Firstly, the items generated were drawn from a comprehensive literature review, self-determination theory, and existing measures. The content validity of the first draft was established by seven experts. Results of item-analysis and item-review from a convenience sample of 230 adolescent smokers in Bangkok were used for constructing the second draft of the scale. Finally, 319 adolescent smokers in Bangkok were selected to validate the structure of the final scale by confirmatory factor analysis. The MTQS is a self-reported questionnaire that consists of 36 items with 5-Likert scale. It contains two dimensions: intrinsic and extrinsic motivation. Psychometric testing demonstrated satisfactory internal consistency and validity of the instrument for Thai adolescent smokers with α coefficient of 0.96. Construct validity was supported by confirmatory factor analysis. In conclusion, the MTQS is a reliable and valid instrument. The scale could be used as a tool for determining adolescent smokers' motivation to engage in smoking cessation behavior.

Keywords: Scale development, Motivation to quit, Thai adolescent smokers

INTRODUCTION

Motivation has been consistently a powerful predictor of smoking cessation among adolescents [1, 2]. In order to encourage adolescents to quit smoking, health care professionals need to assess their motivation to quit [3]. If smokers decided to change their behavior and attempted to quit, their main concern would be motivation, particularly self-motivation. Thus, assessing motivation to quit would be helpful in promoting smoking cessation among adolescents [4, 5]. A reliable and valid measure is necessary for precise evaluation of smokers' motivation to quit smoking.

The concept of motivation is typically described through the tenets of self-determination theory [6]. Motivation refers to an individual's desire or need that inspires a certain behavior and is influenced by stimulating forces. These forces occur both inside and outside the individual. The individual will engage in, or be attracted toward activities perceived as having the potential to meet his/her need or desire [6]. Motivation is increasingly recognized as a critical success factor for smoking cessation, particularly in adolescents [7]. With regard to smoking, motivation is defined as a smoker's desire to stop smoking as influenced by stimulating forces. The forces that stimulate a desire that originate from within an individual (e.g., health, self-image) are called intrinsic motivation; an extrinsic motivation refers to sources outside of the individual (e.g., friends, family, social pressures) [3, 5, 6, 8].

Literature has supported the notion that, among adolescents, motivation to quit consists of

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intrinsic and extrinsic motivation. For instance, motivation to quit among Thai adolescents is stimulated by intrinsic motivation, including fear of addiction or being ill, and concern for one's self-image (e.g., a bad smell, being a good model). Extrinsic motivation includes wastefulness, anti-smoking policies, and suggestions by one's family, teachers or peers [9, 10]. Similarly, Western studies have indicated that health concerns and social disapproval were more likely to be reported as motivators by adolescents who successfully quit smoking [2, 3, 5, 11].

In order to facilitate successful cessation efforts, health professions need to assess and understand smokers' motivation to quit. Instruments for assessing motivation have been developed and are currently in use; however, these are limited. Some measures lack the dimension of motivation, such as the Sixteen Motivation to Quit Index [2], the Motivation for Smoking Cessation in Teenagers (MSCT) measure [5], and the Adolescent Reasons for Quitting Smoking (ARFQ) measure [12]. Typically either intrinsic or extrinsic dimensions are applied; this does not reflect the construct of motivation. Another measure, the Motivation for Quitting Questionnaire [13], no psychometric properties were established [14]. One measure was developed based on adult lifestyle, the Reasons for Quitting (RFQ measure) [15], since adults have characteristics and pursue lifestyles that differ from those of adolescents; therefore, such measure would not be appropriate for use with an adolescent population.

Unfortunately, there is no valid and reliable measure to assess motivation to quit among Thai adolescents. Therefore, the purpose of this study was to develop an appropriate measure for the assessment of this.

MATERIALS AND METHODS

This study was guided by the scale development procedures proposed by DeVellis [16] and Nunnally and Bernstein [17], which consist of two phases: I) scale construction and II) psychometric testing.

Sampling

The study samples consisted of adolescent smokers in grades 7–12, enrolled at 12 schools belong to the Teacher's Network against Tobacco (TNT) in Bangkok. The adolescents had attempted to quit smoking within the past three months. The adolescents were identified as smokers by the teachers that were quit-smoking counselors in each school. Two groups of convenience samples were recruited at different phases: 1) a total of 230 adolescents were selected for scale construction, and 2) a total of 319 were selected for psychometric testing. Normally, the purpose of scale development was to develop an appropriate instrument and then test its psychometric properties in specialty sample, it does not for generalized the finding, and therefore a non-representative sample could be used in a scale development study [17, 18]. Data were collected from September to October 2013.

The characteristics of the two sample groups were most likely similar. All subjects were aged between 12 and 18 years. Most of them were male (94.8–97.8%), Buddhist (91.2–98.3%), and living with parents (88.3–89.7%). The average age for the first cigarette smoking experience was 15 years (*SD*=1.45) for subjects included in phase I, and 15.36 years (*SD*=1.63) for those in phase II. Daily cigarette consumption differed for two sample groups, with a mean of 6.40 (*SD*=6.01) for phase I subjects and 4.46 (*SD*=3.63) for phase II subjects.

Following the approval of this study by the Ethical Review Committee of Health Sciences Group, Chulalongkorn University, Thailand, the directors of each participating school were contacted for permission to conduct the study. Verbal permission for collecting the data was obtained from the participants. Informed consent from the parents was not obtained, as most are generally not aware of their children's smoking status; thus, a request for informed consent from parent may have had a negative effect on the participants. An information sheet explaining aspects of the study was given to each participant.

The development of the Motivation to Quit Scale (MTQS) comprised two phases, as mentioned earlier:

Phase I: Scale construction

The processes of constructing the MTQS started with a broad review of literature on the motivation to quit, the development of operational definitions, review of existing instruments, and determination of the dimensions of motivation using self-determination theory [6]. The MTQS consists of two dimensions, namely, intrinsic and extrinsic motivation. Intrinsic motivation involves health concerns and self-image; while extrinsic motivation consists of social concerns, financial considerations, and anti-smoking policies. Initial pools of 25 items were generated based on the two dimensions of motivation to quit and a comprehensive review of the relevant literature on the motivation to quit among Thai adolescent

Table 1 The results of exploratory factor analysis of the MTQS (n=230)

Dimensions	Number of items	Factor loading	Eigen value	% of variance	Cumulative %	Cronbanch's Alpha
Intrinsic motivation						
Health concerns	4	0.46-0.74	14.26	39.61	56.81	0.70
Self-image	10	0.54-0.76	2.20	6.10		0.88
Extrinsic motivation						
Social concerns	14	0.43-0.69	1.58	4.39		0.91
Financial considerations	4	0.58-0.72	1.35	3.76		0.79
Anti-smoking policies	4	0.56-0.73	1.06	2.96		0.80

smokers, while 13 items that were relevant to the motivation to quit among the Thai adolescent smokers were translated from the existing instruments through Brislin's back-translation model [19] (e.g., "I get sick more often because of smoking," "I don't want my parents to find out," "I don't enjoy smoking as much as I thought I would," etc.). The 38 items of the MTQS were placed on a 5-point Likert-scale, reflecting the logical and semantic content of the concept of motivation. Whether or not positively- and negatively-worded items should both include in the pool, they were found to be confusing or problematic to respondents, especially children or adolescents that often pay little attention to the wording and formatting of items, resulting in inconsistent and invalid answers. The instrument development for that group required positively-worded items to avoid forming a confusing [20]. Therefore, all items of the MTQS were worded positively, with 1 *(strongly disagree)* and 5 *(strongly agree).* The subjects were asked to report on motivation to quit within the past three months. Thereafter, content validity was established by seven experts with experience in smoking cessation research and service. These experts evaluated each item by considering its relevance to the objective of the measure using a four-point rating scale from 1 *(not relevant)*, 2 *(somewhat relevant)*, 3 *(quite relevant)*, to 4 *(very relevant)* [21]. The content validity index (CVI) of the scale was calculated based on the number of experts giving a rating of either 3 or 4, divided by the number of experts. Additionally, the experts were asked to clarify their reasons if they did not agree with any of the items in the MTQS.

Following the experts' review, the scale's content validity index (S-CVI) was found to be 0.76. In order to achieve the minimum criterion of S-CVI, set at ≥ 0.80 [21], two items were deleted. The S-CVI for 36 items subsequently increased to 0.81. Thus, the MTQS contains 36 items representing the content domain.

In the next step, item-analysis from the first sample group, consisting of a convenience sample of 230 adolescent smokers, was used to identify the best items for the construction of the MTQS (36 items); item-total correlation was used. According to Nunnally and Bernstein, corrected item-total correlation should be 0.30–0.70, and internal consistency, using Cronbach's alpha coefficient, should be above the 0.70 standard required for a newly developed instrument [17]. Therefore, 36 items of the MTQS were retained. While the subjects completed the MTQS, their behaviors, such as pausing, skipping items, or asking for answers from friends, were observed and recorded as misunderstandings, denoting items that were difficult to understand or that they were reluctant to answer. To determine the appropriateness and clarity of the wording of each item, 10 adolescent smokers that displayed those behaviors were selected through convenience sampling. They were interviewed regarding the problems that had occurred while responding to the questionnaire. Based on this review, five items were modified to further clarify the meaning.

Then, exploratory factor analysis (EFA) using the principal component method was conducted so as to identify complex interrelationships among items and group items that formed part of unified concepts [16]. The purpose for using the EFA in this study was to determine if items fell under the component they were generated from. Items that were loaded on a wrong factor would be excluded. The assumptions of the EFA were tested: Bartlett's test of sphericity was significant (χ^2 = 4582.98, p<0.01) and the Kaiser-Meyer-Olkin (KMO) value was 0.93, which is adequate for the relationships between the items, also indicating the appropriateness of a factor analysis [22]. The results of the EFA produced five components (health concerns, self-image, social concerns, financial considerations, and anti-smoking policies) with Eigen values above 1.0, accounting for 56.8% of the variance (Table 1). After application of the EFA, factor loadings greater than 0.30 were chosen [16]. In this study, the factor loadings ranged from

Table 2 Examples of the MTQS items

Dimension	Items
Intrinsic motivation	1. adolescents desired to quit smoking because they often getting sick from smoking 2. adolescents desired to quit smoking because smoking made they smelly
Extrinsic motivation	1. adolescents desired to quit smoking because they didn't want their parents to find out about their smoking 2. adolescents desired to quit smoking because cigarette was costly

Table 3 Fit indices of the factors structure of the MTQS (n=319)

Goodness-of-fit statistics	Threshold values	Studied value
Chi-square (χ^2)	p>0.05	p=0.00
Normed chi-square (χ^2/df)	<3.00	1.89
Goodness-of-fit index (GFI)	>0.90	0.92
Root-mean-square error of approximation (RMSEA)	<0.05	0.05
Comparative Fit index (CFI)	>0.90	0.98
Parsimony Normed Fit Index (PNFI)	>0.60	0.84

The level of significant was set at the 0.01 level (2-tailed)

0.43 to 0.76. Those with high loadings on each component were grouped together. It was found that items generated from the same component were grouped together; therefore all 36 items of the MTQS were retained. A Cronbach's alpha coefficient of 0.95 was obtained for the total scale. Examples of the MTQS items are presented in Table 2.

Phase II: Psychometric testing

A second draft of the MTQS, comprising 36 items, was tested in this phase. The psychometric testing phase comprised the validity and reliability test on the scale. This section consisted of two steps. First, the field test study was conducted to test the scale's construct validity using confirmatory factor analysis (CFA) in LISREL (version 8.53). Second, reliability testing involved the determination of the scale's internal consistency. However, criterion-related validity was not established in this study due to the lack of an existing acceptable instrument assessing adolescents' motivation to quit. The expected outcome of this phase was a valid and reliable research instrument measuring the desire of Thai adolescent smokers to quit as influenced by intrinsic and extrinsic motivation. Convenience samples of 319 adolescent smokers were used in this phase.

RESULTS

Construct validity

Confirmatory factor analysis was conducted to examine whether a particular factor model provided a good fit to the data. The results showed regression weights of two dimensions ranging from 0.78 to 1.00 (p <0.01). Most of the model's fit indices were acceptable (e.g., the goodness-of-fit index (GFI) = 0.92, comparative fit index (CFI) = 0.98, parsimony normed fit index (PNFI) = 0.84, root-mean-square error of approximation (RMSEA) = 0.05), except for chi-square significance (P-value = 0.00) as shown in Table 3. The structural domain of Motivation to Quit among Thai adolescents is summarized in Figure 1.

Reliability

The internal consistency analysis for the scale was calculated. A Cronbach's alpha coefficient of 0.96 was obtained for the overall scale.

DISCUSSION

The final version of MTQS is a self-reported questionnaire that consists of 36 items with 5-Likert scale. It contains two broad dimensions: intrinsic and extrinsic motivation. Psychometric testing demonstrated satisfactory content and construct validities, and internal consistency of the instrument for Thai adolescent smokers with alpha coefficient of 0.96.

The construct validity of MTQS was tested by CFA. The results indicated that most fit indices were in acceptable ranges. However, a non-significant result was obtained for the chi-square (χ^2) test. The χ^2 statistical test or resulting p-value is less meaningful in instances of considerably large sample sizes or the number of observed variables [20]. The MTQS contains 36 items and indicated large observed variables [23]. Therefore, the normed fit chi-square (χ^2 value divided by the degrees of freedom (χ^2/ *df*)) was considered instead the significance of χ^2. A normed fit chi-square less than 3 is an acceptable recommended threshold [24]. In this study, it was 1.86 and other goodness-

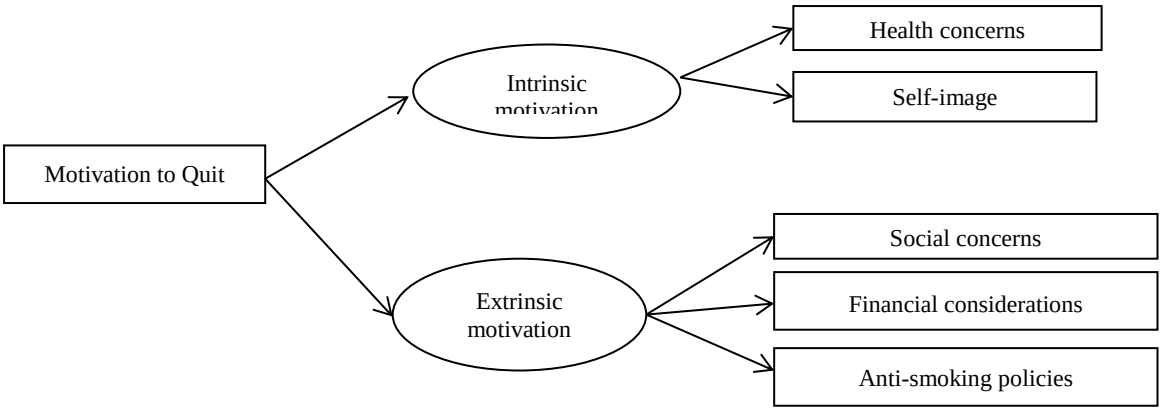


Figure 1 The structural domain of the MTQS

of-fit indices, such as the GFI >0.90, CFI >0.90, and PNFI >0.60 indicated a good fit. All factor loadings were significant (p<0.05), demonstrating the construct validity of the MTQS and that proposed model was accepted as a good fit.

The structural domain of MTQS consists of intrinsic and extrinsic motivation. There were five components underlying these two domains: health concerns, self-image, social concerns, financial considerations, and anti-smoking policies. The literature indicated that health concerns and self-image that generally occur within an individual were identified as intrinsic motivation [2, 15]. The other three components (social concerns, financial considerations, and anti-smoking policies) occur outside of the individual and were identified as extrinsic motivation [3, 6, 25]. The domains of MTQS are quite similar to other measures which have been used to assess motivation to quit in western countries. For instance, the ARFQ scale [12] contains three components: short-term consequences, social disapproval, and long-term concerns that seem to be equivalent to two components of health concerns, and social considerations in MTQS. One measure, the Motivation for Quitting Questionnaire [13] contains four components: long-term health consequences, immediate health consequences, financial costs, and social environments, which congruent with the three components of MTQS (e.g., health concerns, financial considerations, and social consideration). Another measure is the MSCT scale [5] that consists of autonomous regulation and controlled regulation subscales. The self-determination theory indicates that intrinsically motivated and autonomous behaviors are inherently fulfilling and rewarding for a person. In contrast, controlled regulation refers to the extent that people perform the behavior because they felt pressured or coerced [26, 27]. Therefore, the autonomous regulation and controlled regulation subscale in MSCT are equivalent to intrinsic and extrinsic motivation in MTQS. The content domains between the MTQS and these existing measures are similar due to the measures were developed underpinning the self-determination theory. Not only are the structural domains of MTQS similar to existing measures, but also the scale format as a self-report with Likert-scale.

The MTQS was mainly difference noticeable component specific for Thai adolescent smoker that is anti-smoking policies. One plausible explanation is that the Nation Plan and Policies for Tobacco Control in Thailand was established to implement strategies to protect youth from tobacco use, such as the prohibition of tobacco sales to minors aged under 18 years, zoning for tobacco selling, prohibition of smoking in schools, and banning the advertising of cigarettes [28]. The content domain of MTQS could response to these policies that pertains to motivation to quit among Thai adolescent smokers.

The present study shows that the MTQS is a reliable and valid measure for assessing Thai adolescent smokers' motivation to quit. However, the MTQS was first developed and used in the Thai context in this study. The classification of adolescent smokers' level of motivation to quit was limited. To be more practical in the use of the MTQS, further study to test norm-referenced is needed. Additionally, the samples of this study were enrolled from schools that belong to the Teacher's Network against Tobacco (TNT) in Bangkok. Future studies should be conducted in diverse settings, such as vocational schools, and with different adolescents' characteristics.

The MTQS will be useful in practice and future research. Thai nurses and other professionals

will have an accurate measure that can be used to assess the motivation of Thai adolescent smokers age between 12-18 years to quit, instead of using the nurses' or other experts' judgments. The MTQS is easy to use, requires no special training for users, and can be administered to a large number of smokers at the same time.

In conclusion, the MTQS was developed for use among the Thai adolescent population. The MTQS could be used as a tool for determining adolescent smokers' motivation to engage in smoking cessation behavior. The tool could be useful for smoking prevention research and the development of smoking cessation interventions. The authors hope that this new scale will improve the depth and validity of smoking-related research in Thailand.

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