

# CROSS-VALIDATION OF THE AUSTRALIAN-DEVELOPED SMOKING INVENTORY: AN INVESTIGATION OF MOTIVES UNDERLYING THE DECISION-MAKING PROCESSES LEADING TO THE UPTAKE, MAINTENANCE, AND POSSIBLE CESSATION OF SMOKING AMONG STUDENTS IN ASSUMPTION UNIVERSITY

**Hathairat Sae-Jong<sup>1</sup>**

**Robert Ho<sup>2</sup>**

**Abstract:** The present study was designed to cross-validate the Australian developed Australian Smoking Inventory as applied to the Thai context. Exploratory factor analysis identified the three factors of ‘perceived utility of smoking’, ‘pleasure/addiction needs’, and ‘need for social acceptance’ as three major motives for smoking behavior among Thai young adults. These findings are similar to those obtained from Ho’s (1989) Australian study and suggest that Thais and Australian hold similar beliefs about the decision-making processes underlying smoking behaviors. The implications of the study’s findings, which include the development of intervention programs and strategies to lower the motivation and perception of the perceived utility of smoking, are discussed.

**Keywords:** Smoking Behavior, Motives, Scale Development.

## **Introduction**

The number of smokers worldwide is increasing, especially among adolescents. The estimated number of smokers by the year 2025 will increase to 1.7 billion from 1.3 billion if global tobacco prevalence remains unchanged (WHO World Health Report, 2013). Arguably, about 15 billion cigarettes per day are currently being sold worldwide. Two-thirds of adults smokers revealed that they started during adolescence before they reached 18 years of age and more than 80% tried smoking before the age of 20 (Robinson & Bugler, 2010). The general lifestyle survey for adult smokers from the Office for National Statistics (2013) showed that two fifths (40%) of regular smokers started smoking before the age of 16. More male smokers were found in both developing and developed countries (WHO, 2004). In developing countries the male-female smoking ratio is 48% to 7%, while in developed countries the ratio is 42% to 24%. Smoking is recognized as a major health risk that leads to

---

<sup>1</sup> Ph.D. Candidate in Counseling Psychology, Graduate School of Education and Psychology, Assumption University, Thailand.  
jeablerz@gmail.com

<sup>2</sup> Ph.D. Associate Professor, Graduate School of Education and Psychology, Assumption University, Thailand.  
tack.kwei@gmail.com

significant negative physical and psychological consequences. According to the World Health Organization (WHO, 2005) smoking is the second major cause of death worldwide and the leading preventable cause of death. The prevalence of smoking is indicated by the billion or more people worldwide who smoke on a routine basis. The health consequences associated with smoking often show a 30 year delayed effect before adverse health conditions are manifested (Cummings, Morley, & Hyland, 2002). The world prevalence of smoking consumption forecasted that by the year 2030, over 10 million will die from smoking-related diseases (Texas Department of State Health Services, 2007).

#### *Smoking Prevalence and Behavior in Thailand*

Takashi, Toshitaka, and Eun (2010) reported that, overall, Thais smoke an average of 87.6 packs/per person/per year which had increased considerably from 71 packs/per person/per year during the period 2001-2002. Males smoked, on average, 9.0-10.6 cigarettes per day. The projection is that there will be an increase in the number of both Thai male and female smokers in the future.

The National Statistical Office (2003a) revealed that smoking among Thais aged 10 years and older increased from 8.6 million in 1976 to 11.4 million in 1991. Nevertheless, annual assessment of the number of smokers revealed a decline in the prevalence of smoking in the past two decades, although the rates fluctuated from year to year. For example, in 1986, out of 33 million Thais aged 15 years and above, 10.4 million were smokers whereas in 2004, out of a total of 49.4 million, only 9.6 million were reported to be smokers. The World Health Organization predicted that 2.2 million Thai people will die from cigarette-related diseases (WHO, 2006). The National Statistical Office (2003b) showed that the ratio of male to adolescent smokers is 18:1 among regular smokers, and that 65.6% will be addicted to tobacco before the age of 19 years.

Tobacco smoking rates vary among rural and urban populations. Past research has demonstrated that youths who live in rural areas have more opportunities to smoke than those in urban areas. Supawongse and Buasai (1996) conducted a national survey on the smoking behavior of Thai youths and found that 16% of urban youth and 27% of rural youth aged 20-40 smoked cigarettes. Across five regions, the northern region of Thailand had the highest prevalence of smoking among the youth. A smoking prevalence rate of 28.6% was observed in Bangkok, 14% in Central Thailand, and 24% in Southern Thailand.

The motivation to smoke includes a diversity of reasons, and a clear and deep comprehension of the motivation for the uptake of smoking can assist in predicting a variety of smoking relevant behaviors and smoking consequences. The early uptake of smoking is a significant contributor to later heavy smoking and leads to a higher degree of smoking dependence, lower probability of smoking cessation and an increase in mortality rate (Royal College of Physicians, 2010).

#### *Australian Smoking Inventory (Ho, 1989)*

Ho (1989) conducted a study to identify some of the motives/factors that influence Australians to smoke, as well as the efficacy of these factors in predicting their smoking behavior and their possible cessation. The development of the Australian

Smoking Inventory employed both qualitative and quantitative methodologies. The qualitative part of the study involved the use of interviews in which a total of 80 regular smokers (21 males and 59 females) from the Darwin metropolitan area (Australia) were requested to consider their own smoking behavior, to think of some of the reasons why they smoke, and to list down as many of these reasons as possible. The procedure yielded 172 reasons for smoking. Inspection of these reasons showed extensive overlapping in meaning, and these were grouped. Grouping according to identicalness of meaning reduced the total number of reasons to 63. These reasons were then content-analyzed and those reasons which were listed at least four times were retained. This procedure resulted in a final total of 25 reasons for smoking. Twenty five statements were then written by the author to be included in the Smoking Inventory.

The quantitative part of the study involved the use of exploratory factor analysis to identify the factor structure of the Australian Smoking Inventory. A total of 128 regular smokers filled in the inventory. Factor analysis of the respondents' endorsement of the 25 reasons for smoking yielded four distinct motives for smoking, namely: social acceptance, addiction/habitual needs, pleasure, and boredom. Convergent validity was demonstrated via multiple regression analysis in which the four smoking motives were treated as 'independent/predictor' variables in predicting the criterion variables of cigarette consumption, the perceived likelihood, difficulty, and confidence in giving up smoking, and the perceived associated health risks. The results yielded significant standardized regression weights for all four smoking motives in predicting the criterion variables.

The development of the Australian Smoking Inventory points to its utility in identifying smoking motives that can assist in the development of effective treatment strategies. However, it must be noted that the Smoking Inventory was developed in Australia based on samples of Australian smokers. As such, its cross-cultural validity when applied to Thai adolescent smokers is unknown. The present study was conducted to test the cross-cultural validity of the Australian Smoking Inventory as applied within the Thai context.

## **Methodology**

### *Participants*

A total of 936 participants (male:  $n=740$ , 79.1%; female:  $n=196$ , 20.9%) from Assumption University, Thailand volunteered to fill in the study's questionnaire. Their ages range from under 18 years to 42 years or older, with a median age within the range 18 to 21 years. The majority of the participants were enrolled in the Bachelor degree program ( $n=894$ , 96.4%), with 28 (3%) participants enrolled in the Master's degree program, and 5 (.5%) enrolled in the PhD degree program.

### *Material*

Participants responded to a questionnaire consisting of five sections. Section 1 consisted of items written to elicit the participants' demographic information relating to their gender, age, nationality, and educational level.

Section 2 consisted of the 25 item-Australian Smoking Inventory (Ho, 1989) developed to tap the motives/reasons underlying the uptake and maintenance of smoking behavior. Each item was to be rated on a 6-point scale ranging from 1=strongly disagree, 2=moderately disagree, 3=barely disagree, 4=barely agree, 5=moderately agree, and 6=strongly agree, with high scores indicating strong motive for the uptake and maintenance of smoking behavior.

Section 3 consisted of 36 items adapted from Ho et al.'s (2005) study and written to measure the protection motivation theory variables of maladaptive coping (6 items), the perceived severity of the health consequences associated with smoking (6 items), the perceived risk of the health threat associated with smoking (6 items), self-efficacy (6 items), response-efficacy (6 items), and the emotion of fear (6 items). All 36 'protection motivation' items were to be rated on 6-point Likert scales ranging from 1 (strongly disagree) to 6 (strongly agree), with high scores indicating high evaluations of maladaptive coping, perceived severity, risk, self-efficacy, response-efficacy, and fear.

Section 4 consisted of 8 items written to measure both the incidence of smoking behavior (number of cigarettes smoked per day) and the intention of giving up smoking (likelihood of giving up, difficulty in giving up, confidence in giving up, intention to give up, willingness to give up, certainty of giving up). Of the 8 items, those written to measure the intention of giving up were to be rated on 5-point scales, with high scores reflecting high likelihood, high difficulty, high intention, high willingness, and high certainty of giving up.

Section 5 consisted of 18 items written to measure the three Theory of Planned Behavior factors of attitude (6 items), subjective norm (6 items), and perceived behavior control (6 items). The 6 items measuring attitude were to be rated on 6-point scales ranging from 1 (very bad/very unpleasant/very unimportant) to 6 (very good/very pleasant/very important), with high scores indicating positive attitude toward the targeted behavior. The other 12 items measuring subjective norm and perceived behavior control were also to be rated on 6-point scales ranging from 1 (strongly disagree) to 6 (strongly agree), with high scores indicating strong perception of subjective norms and strong perceived behavior control respectively.

### *Pre-test*

A pretest of the questionnaire was conducted prior to the actual study to check for errors and for readability. Data were collected from a total of 30 students (none of these students participated in the main study). Upon verifying that the questionnaire was free from errors and comprehension problems, the researcher proceeded to conduct the actual study in the designated study locations.

### *Procedure*

Convenience sampling method was used to recruit participants. To increase the probability of obtaining a larger sample, completion of the questionnaire was conducted in person and online. Assumption university students are likely to be found congregating in public places such as restaurants in and around the Hua Mak and Bang Na campuses, student lounges, library, and dormitories. Potential participants were approached and were informed of the general nature of the study, i.e., to

investigate people's attitudes toward the initiation, maintenance, and cessation of smoking behavior. Participants were then invited to fill in the study's questionnaire. They were also informed that (1) they could withdraw from filling in the questionnaire at any time, (2) no names would be recorded to guarantee the participant's anonymity, and (3) the data collected would only be used for the purpose of this study and only by the researcher and her advisor.

For online questionnaire completion, the website link of the online questionnaire was sent to Assumption University students. These students were also asked to forward the questionnaire website link to their classmates. It was hoped that this 'snowball' effect would help increase the number of participants. These online participants were also informed that (1) they could withdraw from filling in the questionnaire at any time, (2) no names would be recorded to guarantee the participant's anonymity, and (3) the data collected would only be used for the purpose of this study and only by the researcher and her advisor.

## Results

### *Exploratory factor analysis*

The participants' responses to the 25 items from the Smoking Inventory were subjected to a principal components analysis followed by oblique rotation. Inspection of the main exploratory factor analysis (EFA) results revealed that five factors had eigen-values greater than 1.00. These five factors accounted for a combined total variance of 59.68%. Inspection of these five factors, however, showed that only the first three factors are conceptually meaningful. Factor 1 contained items that reflected the *perceived utility of smoking*. Factor 2 contained items that reflected *pleasure/addiction needs* associated with smoking. Factor 3 contained items that reflected the *need for social acceptance*. Given the meaningfulness of these three groupings on the basis of the five extracted factors, oblique rotation limited to three factors was then conducted.

From the obtained pattern matrix, a total of 22 items were retained, using the criteria of selecting items with factor structure coefficients greater than or equal to 0.40 and no significant cross-correlations. The use of the 0.40 value as a criterion for selecting items is based on the logic that squaring the correlation coefficient ( $0.40^2$ ) yields approximately 16% of the variance explained. Of the 22 items, 9 correlated with Factor 1, 10 correlated with Factor 2, and 3 correlated with Factor 3. Examination of the items that correlated with these three factors indicated that Factor 1 consisted of items that reflected the perceived utility of smoking (e.g., '*Smoking makes me feel sophisticated and glamorous*,' '*I smoke as an act of defiance*'); Factor 2 consisted of items that reflected pleasure/addiction needs associated with smoking (e.g., '*I enjoy lighting up after pleasurable experiences, e.g., after a good meal*,' '*I smoke because I am addicted to cigarettes*'); and Factor 3 consisted of items that reflected a need for social acceptance (e.g., '*I smoke because most of my friends smoke*', '*Smoking allows me to be part of a crowd*').

### *Reliability analysis*

In order to maximize the internal consistency of the derived factor solution, the items representing each of the three factors were item analyzed. Two criteria were used to eliminate items from these factors. First, an item was eliminated if the inclusion of that item resulted in a substantial lowering of Cronbach's alpha (Walsh & Betz, 1985). Second, an item was considered to have an acceptable level of internal consistency if its corrected item-total (I-T) correlation was equal to or greater than 0.33 (Hair, Anderson, Tatham, & Black, 1997). Table 1 presents the items for the three factors together with their I-T coefficients and Cronbach's alphas.

**Table 1: Smoking Inventory Factor Items Together with Their Corrected Item-Total Correlations and Cronbach's Alphas**

<u>Utility of smoking</u>	<u>Corrected Item-Total Correlation</u>
• I am willing to live with my health problems that my smoking may cause me. (m25)*	.61
• The health statistics regarding smoking cigarettes and health problems don't bother me, as they are highly exaggerated anyway. (m24)	.58
• I smoke to annoy non-smokers. (m23)	.58
• Smoking makes me feel sophisticated and glamorous. (m18)	.69
• I smoke as an act of defiance. (m19)	.65
• I smoke because it makes me feel confident. (m17)	.65
• Smoking lowers my appetite and, therefore, keeps my weight down. (m3)	.47
• I smoke because members of my family smoke. (m13)	.52
• I feel secure when I am smoking. (m7)	.61
Cronbach's alpha = .86	
<u>Pleasure/Addiction Needs</u>	<u>Corrected Item-Total Correlation</u>
• I enjoy lighting up after pleasurable experiences, e.g., after a good meal. (m8)	.68
• Smoking relaxes me. (m9)	.68
• When I feel stressed, tense, or nervous, I light up a cigarette. (m2)	.62
• I find smoking enjoyable. (m1)	.68
• I smoke cigarettes to relieve boredom. (m5)	.65
• Lighting up a cigarette is a habit to me. (m4)	.60
• I find smoking pleasurable. (m22)	.64
• I smoke because I am addicted to cigarettes. (m12)	.54
• Smoking gives me a lift. (m10)	.55
• I enjoy the taste of cigarettes. (m21)	.54
Cronbach's alpha = .89	

**Table 1: Smoking Inventory Factor Items Together with Their Corrected Item-Total Correlations and Cronbach's Alphas**

<u>Social Acceptance</u>	<u>Corrected Item-Total Correlation</u>
• I smoke because most of my friends smoke. (m16)	.53
• Smoking is a means of socializing. (m14)	.59
• Smoking allows me to be 'part of a crowd'. (m11)	.49
Cronbach's alpha = .72	

\*Items as numbered in questionnaire

Examination of the Cronbach's alphas for the three factors and their items' I-T correlations showed that all items have corrected item-correlations greater than .33 and that the deletion of any of these items would have lowered their respective Cronbach's alphas. As such, all 22 items were retained. Thus, the factor of 'perceived utility of smoking' is represented by 9 items, the factor of 'pleasure/addiction needs' is represented by 10 items, and the factor of 'social acceptance' is represented by 3 items. The computed Cronbach's alpha coefficients for the three scales were adequate and ranged from .72 to .89. Each of the three factors of 'perceived utility of smoking', 'pleasure/addiction needs', and 'social acceptance' was then computed by summing across the items that make up that factor and their means calculated. Table 2 presents the means and standard deviations for these three computed variables.

**Table 2: Means and Standard Deviations for the Computed Factors of Perceived Utility of Smoking, Pleasure/Addiction Needs, and Social Acceptance**

	<u>Mean</u>	<u>S.D.</u>	<u>Mid-point</u>
• Perceived utility of smoking	3.09	.97	3.5
• Pleasure/addiction needs	3.94	.92	3.5
• Social acceptance	3.43	1.18	3.5

As can be seen from Table 2, the smoking motives of 'perceived utility of smoking' and 'social acceptance' were rated below the mid-point, while the motive of 'pleasure/addiction needs' was rated above the mid-point (3.5) on their respective scales by the participants. Thus, for the Thai participants in the present study, smoking for pleasure/addiction needs appears to be the strongest motive for their smoking behavior, followed by their need for social acceptance. Smoking for utility purposes appears to be the weakest motive for the participants' smoking behavior.

#### *Confirmatory factor analysis (CFA)*

Confirmatory factor analysis was carried out to evaluate the adequacy of the factor structure identified in the exploratory factor analysis. CFA, unlike exploratory factor analysis, allows the researcher to explicitly posit an *a priori* model (e.g., on the basis of the factors identified through exploratory factor analysis) and to assess the fit of this model to the observed data. Based on the factor structure identified through exploratory factor analysis, a three-factor model representing the smoking motives of

‘perceived utility of smoking’, ‘pleasure/addiction needs’, and ‘social acceptance’ was posited.

For this measurement model, the three latent constructs were represented by 9 indicator items (perceived utility of smoking), 10 indicator items (pleasure/addiction needs), and 3 indicator items (social acceptance). While it can be argued that a greater number of indicators per latent construct will represent that latent construct to a higher degree than fewer indicators, in practice however, too many indicators make it difficult if not impossible to fit a model to data (Bentler, 1980). Based on Hair et al.’s (1997) suggestion that three is the preferred minimum number of indicators to represent a construct, it was decided to limit the number of indicators to three for each of the model’s latent construct. This was achieved by using item parcels to represent the original number of items for each latent construct.

#### *Item parcels.*

This technique involves summing responses to individual items and then using scores on these summed parcels in the latent variable analysis. For example, on the basis of a reliability analysis of the 9 items representing the latent smoking motive factor of ‘perceived utility of smoking’, the items were divided into three parcels, and the items in each parcel were then summed to form three measured variables to operationalize the latent construct. Adapting the procedure described by Russell, Kahn, Spoth, and Altmaier (1998), the development of these item parcels involved the following steps:

1. A reliability analysis on the 9 items assessing ‘perceived utility of smoking’ was conducted.
2. The items were rank-ordered on the basis of their corrected item-total (I-T) correlation coefficients.
3. Items were assigned to parcels in a way that equated the average I-T coefficient of each parcel of items with the factor.

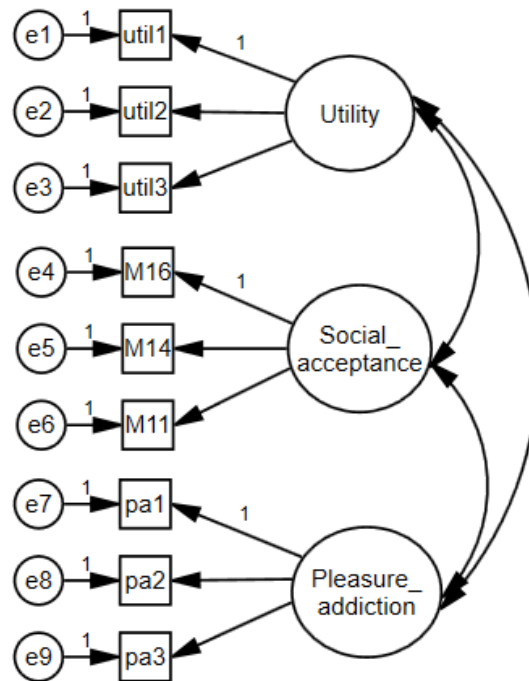
Specifically, items ranked 1, 2 and 9 were assigned to parcel 1; items ranked 7, 8 and 3 were assigned to parcel 2; and items ranked 4, 5 and 6 were assigned to parcel 3. This procedure ensured that the resulting item parcels reflected the underlying latent protection motivation factor of ‘perceived utility of smoking’ to an equal degree.

Figure 1 presents the three-factor measurement model representing the three latent constructs of ‘perceived utility of smoking’, ‘pleasure/addiction needs’, and ‘social acceptance.’ For this model, all factor loadings were freed, indicators were allowed to correlate with only one factor, and the three factors were allowed to correlate (equivalent to oblique rotation).

(See Figure 1 on the next page)

A  $\chi^2$  goodness-of-fit test (via structural equation modeling) was employed to test the null hypothesis that the sample covariance matrix was obtained from a population that has the proposed model structure. Table 3 presents the goodness-of-fit indices for this model.





**Figure 1: Three-Factor Measurement Model (with Item Parcels) Representing the Latent Constructs of ‘Perceived Utility of Smoking’, ‘Pleasure/Addiction Needs’, and ‘Social Acceptance’**

**Table 3:  $\chi^2$  Goodness-of-Fit Value, Normed Fit Index (NFI), Incremental Fit Index (IFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA)**

Model	$\chi^2$ (N=468)	df	p	NFI	IFI	TLI	CFI
Null Model	2596.94	36	<.001	0.00	0.00	0.00	0.00
Three-factor Model	137.54	24	<.001	0.95	0.96	0.93	0.96

(‘perceived utility of smoking’, ‘pleasure/addiction needs’, and ‘social acceptance’)

Although the overall chi-square value is significant,  $\chi^2$  ( $df = 24$ ,  $N = 468$ ) = 137.54,  $p < .001$ , the incremental fit indices (Normed Fit Index – NFI, Incremental Fit Index – IFI, Tucker-Lewis Index – TLI, Comparative Fit Index – CFI) are all above 0.90 (range: 0.93 – 0.96). These fit indices indicated that the model provided a very good fit relative to a null or independence model (i.e., the posited model represented between 93% to 96% improvement in fit over the null or independence model), and support the hypothesized structure of the posited Smoking Inventory three-factor model.

While the above fit indices can be used to evaluate the adequacy of fit in CFA, it must be noted that this is only one aspect of model evaluation. As pointed out by Marsh and his colleagues (e.g. Marsh, 1996; Marsh & Balla, 1994; Marsh, Hau, & Wen, 2004), model evaluation should be based on a subjective combination of

substantive or theoretical issues, inspection of parameter estimates, goodness-of-fit, and interpretability. Table 4 presents the standardized regression weights, residuals, and explained variances for the three-factor model.

**Table 4: Standardized Regression Weights, Explained Variances, and Residual Variances for the ‘Perceived Utility of Smoking’, ‘Pleasure/Addiction Needs’, and ‘Social Acceptance’ Indicator Variables**

Parameter	Standardised Regression Weights	Explained Variances	Residual Variances
Utility of smoking → util1	.84	.71	.29
Utility of smoking → util2	.84	.70	.30
Utility of smoking → util3	.83	.69	.31
Pleasure/addiction → pa1	.87	.75	.25
Pleasure/addiction → pa2	.84	.71	.29
Pleasure/addiction → pa3	.91	.82	.18
Social acceptance → m16	.65	.42	.58
Social acceptance → m14	.75	.56	.44
Social acceptance → m11	.74	.55	.45

The standardized regression coefficients (factor loadings) for the measurement indicators are all positive and significant by the critical ratio test,  $p < .001$ . Standardized loadings ranged from 0.65 to 0.91 ( $M = 0.81$ ). These values indicated that the indicator variables hypothesized to represent their respective latent constructs of ‘*perceived utility of smoking*’, ‘*pleasure/addiction needs*’, and ‘*social acceptance*’ did so in a reliable manner. The percentage of residual (unexplained) variances for the 9 indicator variables ranged from 25% (i.e. 75% of the variance explained) (pa1) to 58% (i.e. 42% of the variance explained) (m16). (See Appendix 4)

#### *Test of convergent validity*

Convergent validity of the Smoking Inventory can be assessed from the confirmatory factor analysis model by determining whether each indicator variable’s estimated standardized loading/coefficient with its underlying latent construct is significant (greater than twice its standard error) (Anderson & Gerbing, 1988). In other words, a standardized coefficient is significant ( $p < .05$ ) if its associated critical ratio (C.R.) value is  $\geq \pm 1.96$ . Examination of the standardized loadings for all 9 indicator variables showed that they are all statistically significant by the C.R. test, indicating convergent validity for the Smoking Inventory.

#### *Test of criterion-related validity*

Criterion-related validity is denoted by the degree of effectiveness with which the performance on the Smoking Inventory predicts performance in real life. Test of criterion-related validity for the Smoking Inventory was demonstrated by correlating the summated scales for the three identified smoking motives of ‘perceived utility of smoking’, ‘pleasure/addiction needs’, and ‘social acceptance’ with the participants’ reported number of cigarettes smoked per day. It is hypothesized that the three identified smoking motives will be positively correlated with the participants’

reported frequency of smoking behavior. Pearson's product-moment correlation analysis was conducted to investigate the direction and strength of the relationships between the three smoking motives and the participants' reported number of cigarettes smoked per day. The results of this analysis are presented in Table 5. (See Appendix 5)

**Table 5: Correlations between the Smoking Motives of 'Perceived Utility of Smoking', 'Pleasure/Addiction Needs', and 'Social Acceptance' with Reported Number of Cigarettes Smoked Per Day**

	<u>Number of Cigarettes Per Day</u>
• Perceived utility of smoking	.13***
• Pleasure/addiction needs	.22***
• Social acceptance	.07*

\*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$

The results indicated that all three identified smoking motives are significantly and positively correlated with the participants' reported number of cigarettes smoked per day. These findings are in line with the study's hypotheses and offer support for the Smoking Inventory's criterion-related validity within the Thai context.

## Discussion

The primary purpose of this study was to cross-validate a psychometrically-sound Australia-developed smoking motive scale that can reliably and validly tap the motives (and their strength) underlying the uptake and maintenance of smoking behavior among Thai male and female smokers. Initial exploratory factor analysis (EFA) of responses derived from the 25-item scale identified a five-factor structure representing motives for smoking. Further analysis based on the meaningfulness of the extracted factors and similarity in their meaning content reduced the number of factors to three: (1) perceived utility of smoking, (2) pleasure/addiction needs, and (3) social acceptance. Reliability analysis indicated good internal consistency for the three factors. Confirmatory factor analysis (CFA) confirmed and further clarified the adequacy of this three-factor structure in representing the motives/reasons for the uptake and maintenance of smoking behavior among the targeted smokers. Tests of both convergent and criterion-related validity showed that the resultant Thai Smoking Inventory is valid by these two criteria. Together, these findings support the cross-cultural validity of the Australian-developed Smoking inventory when applied to the Thai context.

Keeping in mind that the original Australian-based Smoking Inventory yields a four-factor structure representing the four smoking motives of *social acceptance*, *addiction/habitual needs*, *pleasure*, and *boredom*, findings from the resultant Thai Smoking Inventory show both similarities and differences in smoking motives among Thai smokers. Thai and Australian smokers are highly similar in terms of their smoking motives based on their pleasure/addiction and social acceptance needs. This is not surprising as people generally smoke for both pleasure and addiction reasons. For example, Fidler and West (2009) found that a strong motive for smoking was for

enjoyment (50.7%) and also to cope with stress (47.2%). Another study reported that cigarette smoking reduces tension, relaxes one's mood, and encourages pleasure (Souza et al., 2010). Maisto et al. (2004) found that nicotine can enhance mood by decreasing anger, depression, and tension. The same study reported that cigarette intake has a calming effect and also increases pleasure. Similarly, Bonilha et al. (2013) reported that adolescents smoke for pleasure and that depressed adults tend to smoke more often than non-depressed adults (Khaled et al., 2012). In effect, many smokers have the perception that smoking helps them cope with stress and gives them a sense of relief from psychological strain.

The important role that 'pleasure/addiction needs' play in the uptake and maintenance of smoking behavior can be gleaned from a number of empirical findings from past research. For example, it was found that active smokers hand-rolled their cigarettes to better inhale the smoke (Surgeon General, Atlanta, 2014). Another study reported that smoking behavior resulted from psychological distress such as stress, depression, and anxiety (Sarawanan & Wilks, 2014). Similarly, Boden et al. (2010) posited that smoking behavior and psychological problems (stress, depression, and anxiety) are significantly related. It was also reported that smoking cigarettes helps relieve symptoms of psychological distress although these smokers do not acknowledge the fact that smoking will lead to nicotine dependence and will affect their long-term health condition adversely (Mental Health Foundation, 2007). The findings from the present study, in conjunction with those obtained from past research, point to the conclusion that smokers believe that smoking helps reduce their stress, enhances pleasure, and relaxes their mind (Ozturk et al., 2011).

Another major motive for smoking behavior that appears to be common among Australian and Thai youths is smoking for 'social acceptance.' Regardless of the country of residence, adolescent non-smokers have greater chances of taking up the habit if they are surrounded by familiar smokers such as family members and peers. The predilection to be socially accepted and be part of the group makes adolescents comply with the favored group's expectations. It is not unusual to see adolescents being influenced by their friends to engage in smoking and, consequently, becoming addicted (Erb & Bohner, 2002). According to Fidler and West (2009), many non-smokers have taken up the habit for social acceptance, through socializing, following a friend's example, or simply being part of the 'smoking' crowd. In addition, marketing media and tobacco advertising are major influences that impact on youths and in particular, women (Royal College of Physicians, 2007). This is a major concern for women, and in particular young females, as they initiate smoking similar to their male counterparts, in order to gain greater equality in both economic and sociocultural status (WHO, 2006). Not unexpectedly, there are many individuals who take pride in showing others that they smoke to give the impression of being sociable (Fidler & West, 2009).

The finding that the resultant Thai Smoking Inventory yielded the smoking motive of *perceived utility of smoking* suggests that for Thai smokers, unlike their Australian counterparts, smoking has certain utility functions. These functions are clearly personal and serve to promote one's sense of well-being and self-satisfaction. Common utility functions include smoking in order to feel glamorous and sophisticated, to feel confident and secure, to annoy non-smokers, and as an act of

defiance. For many Thai smokers, a common utility function of their smoking is to lose weight, especially among female smokers. According to Goldstein (2003), smoking appeals to women because they believe it reduces their appetite, giving them greater control over their weight. There is in fact evidence of metabolic effect on the weight gain of ex-smokers of about 4 kilograms after they quit smoking, and that metabolic rate increased during smoking (Benowitz, 1998). According to the World Health Organization, it is the fear of weight increase that many women turn to smoking as a method of weight control (WHO, 2003).

### **Limitations of the Study**

Before discussing the implications of the current study's findings, some limitations of this study should be noted. First, the cross-validation of the Australian Smoking Inventory in the present study did not include the conduct of test-retest reliability across time due to time constraints and the difficulty of gathering the same participants to fill in the study's survey questionnaire again. In scale development, test-retest reliability is usually conducted to check the consistency of test scores across time to test the assumption that there will be no temporal changes in results or in the quality of the construct being measured that might affect the interpretation of the results. As such, test-retest reliability is a requisite for demonstrating the stability of a measure over time. Failure to demonstrate this type of reliability diminishes the claim of external consistency for the cross-validated Thai Smoking Inventory.

A second limitation concerns the correlational design of the study design of the study in which the posited path models were tested via the technique of structural equation modeling. SEM is essentially a regression technique and as such, the models' path coefficients were computed on the basis of the covariances/correlations between the models' measurement variables. Given the correlational nature of the results, no definitive conclusions can be drawn about the 'causal sequential effects' (both direct and indirect) between the models' exogenous, mediator, and criterion variables.

A third limitation relates to the fact that the study employed a restrictive sample that included only Assumption University students. It can be said that university students may differ from the general population in terms of education, experience, worldviews, and perspectives on life in general. Moreover, given the young age of the student sample, they may not readily acknowledge the health threats associated with their smoking when compared to older smokers. There may be significant differences between young smokers and older smokers in terms of their smoking motives, which may differentially affect their decision-making processes underlying their intention towards as well as engagement in smoking behavior.

### **Implications**

Notwithstanding the above limitations, the findings from the present study carry a number of important implications for understanding the motives/reasons underlying male and female adolescents' intention towards as well as their engagement in smoking behavior. First, the cross-validated Thai Smoking Inventory has the ability to identify, measure, and clarify the motives underlying Thai adolescents' intention for as well as their engagement in smoking behavior. Through the identification of

these motives, health educators can develop and tailor intervention programs that can more effectively aid adolescents from taking up smoking as well as to aid smokers who want to quit. Given the fact that smoking has remained a serious health problem worldwide, it is imperative that such health education programs are effective at tapping into what motivates people to engage in smoking. For example, Al-Naggar et al. (2013) suggested that anti-smoking interventions should target modifying irrational beliefs about the benefits of smoking cigarettes as this reinforces smoking behavior among adolescents. Researchers and program planners can focus on specific motives that increase the likelihood of smoking behavior and develop effective health education programs aimed at countering these harmful beliefs. That is, given the ability of the Thai Smoking Inventory to discriminate between smoking motives, the inventory may be used as a screening tool to identify at-risk individuals, and ultimately leading to the development of intervention health education programs tailored specifically to these at-risk individuals.

Second, the Thai Smoking Inventory may also be useful in the evaluation of intervention programs, such as smoking-reduction programs, particularly where at-risk young adults have been admitted for treatment. The effectiveness of such programs can be evaluated by applying the Thai Smoking Inventory prior to and at the completion of these programs and examining any changes in the 'sub-scales' scores. Similarly, the Thai Smoking Inventory may also be utilized in the evaluation of health campaigns such as those that focus on alerting young adults of the health risks associated with the up-take of smoking, as well as raising smokers' awareness of the health benefits that can be accrued by quitting.

## Conclusions

The present study cross-validated the psychometrically-sound Australian Smoking Inventory, with the resultant Thai Smoking Inventory found to be equally valid and reliable when applied to the identification of motives (and their strength) underlying the uptake and maintenance of smoking behavior among young Thai male and female smokers. The cross-validation of the Thai Smoking Inventory as a valid and reliable measurement instrument provides researchers with an important research tool that can be employed to (1) predict at-risk young adults as well as to evaluate and guide responses to them, (2) assist researchers and program planners to focus on specific motives that may increase the likelihood of both intention for as well as engagement in smoking behavior, (3) act as a screening tool for identifying sub-groups of high-risk individuals so that interventions or health education programs may be tailored specifically for them, and (4) evaluate the effectiveness of intervention programs and health campaigns (via a *repeated-measures procedure*) designed to alert young adults of the health risks associated with smoking. The overall findings from the present study point to the importance of psychological motives as key predictors of the decision of whether or not to engage in smoking. More specifically, the evidence from the present study points to the role of intrinsic motivation that involves the three primary motives of 'perceived utility of smoking', 'pleasure/addiction needs', and 'social acceptance.' Clearly, a thorough understanding of the motives that contribute to a smoker's continued use of cigarettes, despite knowledge of its long-term harmful

effects, can go a long way toward aiding health organizations in developing effective treatment procedures.

## References

- Anderson, J. C. & Gerbing, D. W. (1988). Structural equation modeling in practice: A review approach. *Journal of Counseling Psychology*, 45 (1), 18-29.
- Benowitz, N. L. (1998). Gender differences in the pharmacology of nicotine addiction. *Addiction Biology*, 3:383-404.
- Boden, J., Fergusson, D., & Horwood, L. (2010). Cigarette smoking and depression: Tests of causal linkages using a longitudinal birth cohort. *Br J Psychiatry*, 196, 440-46.
- Bonilha, A. G., De Souza, E. S., Sicchieri, M.P., (2013). A motivational profile for smoking among adolescents. *J Addict Med*, 7, 439-46.
- Cummings, K. M., Morley, C. P., & Hyland, A. (2002). Failed promises of the cigarette industry and its effect on consumer misperceptions about the health risks of smoking. *Tobacco Control (Supplement I)*, 1110-1117.
- Erb, H-P., & Bohner, G. (2002). "Theorien zum sozialen Einfluss durch Mehrheiten und Minderheiten" [Theories on Social Impact due to Majorities and Minorities]. In D. Frey & M. Irle (Eds.). *Theorien der Sozial psychologie: Gruppen-, Interaktions- und Lerntheorien* [Theories of social psychology: Theories of groups, interaction and learning], (2<sup>nd</sup> ed., Vol. 2, pp. 47-61). Bern: Verlag Hans Huber.
- Fidler, J. & West, R. (2009). Self-perceived smoking motives and their correlates in a general population sample. *Nicotine Tob Res*, 10, 1182-8.
- Goldstein, M. (2003). Pharmacotherapy for smoking cessation. In: Abrams DB et al., Eds. The tobacco dependence treatment handbook: a guide to best practice. New York, NY, *The Guilford Press*, 230-248.
- Hair, J., Anderson, R. E., Tatham, R., & Black, W. (1997). *Multivariate data analysis*. Upper health psychology. In: J. H. Harvey, J. E. Maddux, R. P. McGlynn, and C. D. Stoltenberg (Eds.), *Social perception in clinical and counseling psychology*. TX, University Press.
- Ho, R. (1989). Why do people smoke? Motives for the maintenance of smoking behavior and its possible cessation. *Australian Psychologist*, 24, 385-400.
- Khaled, S. M., Bulloch, A.G., Williams, J.V., et al (2012). Persistent heavy smoking as risk factor for major depression (md) incidence-evidence from a longitudinal Canadian cohort of the national population health survey. *J Psychiat Res*, 46, 436-43.
- Maisto, S. A., Galizio, M., Connors, GJ. (2004). eds. *Drug use and abuse*, 4th ed. Belmont, CA, Wadsworth/Thompson Learning.
- Mental Health Foundation (2007). *Smoking and Mental Health*. London: Mental Health Foundation.
- National Statistical Office. (2003a). *Report on population vs. smoking and drinking behaviours survey, 2003*.
- National Statistical Office. (2003b). *Report on survey of population vs. tobacco and liquor consumption, 2003*.
- Office for National Statistics. (2013). *General lifestyle survey overview: A report on*

- the 2011 General Lifestyle Survey*. Newport: Office for National Statistics.
- Ozturk, C., Bektas, M., Yilmaz, E., et al (2011). Smoking status of Turkish nursing students and factors affecting their behavior. *Asian Pac J Cancer Prev*, 12, 1687-92.
- Robinson, S., & Bugler, C. (2010). *Smoking and drinking among adults, 2008*. General Lifestyle Survey, 2008. Office for National Statistics.
- Royal College of Physicians. (2010). *Passive smoking and children*. A report of the Tobacco Advisory Group of the Royal College of Physicians. London: Royal College of Physicians.
- Saravanan, C., Wilks, R (2014). Medical students' experience of and reaction to stress: The role of depression and anxiety. *Scientific World Journal*, 29, 737382.
- Souza, ES., Crippa, JA., Pasian, SR., Martinez, JA. (2010). University of São Paulo reasons for smoking scale: a new tool for the evaluation of smoking motivation. *J Bras Pneumol*, 36, 768-78.
- Supawongse, C., & Buasai, S. (1996). *Smoking behavior of Thai youths: A national survey*. Bangkok: Health Research Institute.
- Surgeon General, Atlanta, (2014). *The health consequences of smoking – 50 years of progress*. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention [CDC], National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- Texas Department of State Health Services. (2007). *Tobacco prevention and control: Strategic plan for 2008-2013*. Texas: Center for Health Statistics.
- Walsh, W. B., & Betz, N. E. (1985). *Tests and Assessment*. Englewood Cliffs, New Jersey: Prentice Hall, Inc.
- World Health Organization [WHO]. (2004). *World Heart Federation Factsheet, 2002*. World Health Organization Website. World No-Tobacco Day.
- World Health Organization [WHO]. (2005). *WHO Framework Convention on Tobacco Control*. Retrieved from [www.who.int/tobacco/framework/WHO\\_FCT\\_english.Pdf](http://www.who.int/tobacco/framework/WHO_FCT_english.Pdf)
- World Health Organization [WHO]. (2006). *Gender, women, and the tobacco epidemic: WHO report on the global tobacco epidemic*. Retrieved from [http://www.who.int/tobacco/publications/gender/en\\_tfi\\_gender\\_women\\_prevalence\\_tobacco\\_use.pdf](http://www.who.int/tobacco/publications/gender/en_tfi_gender_women_prevalence_tobacco_use.pdf)
- World Health Organization [WHO]. (2013). *Prevalence of tobacco use*. Retrieved from <http://www.who.int/gho/tobacco/use/en/>