

# PREDICTORS OF CONDOM USE AMONG HETEROSEXUAL MALE UNIVERSITY STUDENTS IN NORTHERN THAILAND USING A PSYCHOLOGICAL FACTORS MODEL

Jakkrite Pinyaphong<sup>1</sup>, Kriengkrai Srithanaviboonchai<sup>1,2</sup>, Patou Masika Musumari<sup>3</sup>, Arunrat Tangmunkongvorakul<sup>2</sup>, Suwat Chariyalertsak<sup>1,4</sup> and Pikul Phornphibul<sup>5</sup>

<sup>1</sup>Faculty of Medicine, Chiang Mai University; <sup>2</sup>Research Institute for Health Sciences, Chiang Mai University, Chiang Mai, Thailand; <sup>3</sup>Department of Global Health and Socio-epidemiology, Kyoto University School of Public Health, Kyoto, Japan; <sup>4</sup>Faculty of Public Health, Chiang Mai University; <sup>5</sup>Faculty of Nursing, Chiang Mai University, Chiang Mai, Thailand

**Abstract.** Male university students are vulnerable to HIV and other STIs due to inconsistent condom use. There is little data regarding condom use behaviors among heterosexual male university students in Thailand. The purpose of this study was to identify psychological factors predictive of condom use behavior in this population. We constructed a model to determine psychological factors predictive of condom use behaviors. This model was developed from three psychological theories described in this paper: the Health Belief Model, the Theory of Planned Behavior, and the Social Cognitive Theory. We then developed a computer-based questionnaire asking about condom use behavior and administered to sexually active male university students in northern Thailand. The results of this questionnaire were used to evaluate our newly constructed model. A total of 1,200 students were recruited into the study of whom 1,039 completed the questionnaire completely and whose data was used in the results. The constructed model explained 56% of the variance ( $R^2 = 0.56$ ). In this model, higher levels of perceived susceptibility, perceived self-efficacy and subjective norms and lower levels of perceived barriers predicted consistent condom use behavior. Of these, perceived barriers to condom use was the strongest predictor ( $\beta = 0.42$ ) of condom use behavior. This model provides information useful for condom promotion programs targeting the study population. Further studies are needed to determine if this model can be applied to other populations and if programs based on the results of this model can indeed be effective in improving condom use behavior among the study population.

**Keywords:** condom use, HIV prevention, psychological factor model, heterosexual males, university students

---

Correspondence: Kriengkrai Srithanaviboonchai, Faculty of Medicine, Chiang Mai University, Chiang Mai 50200, Thailand.  
Tel: +66 (0) 53 936148; Fax: +66 (0) 53 221849  
E-mail: kriengkrai.s@cmu.ac.th

## INTRODUCTION

Prevention of HIV among young people is an important priority. About 35% of new HIV infections worldwide

occur among those aged 15-24 years old; two-thirds of young people do not have a correct or comprehensive knowledge of HIV (UNAIDS, 2014, *ibid*, 2016). Thailand is facing a rise in HIV and other sexually transmitted infections (STIs) among its adolescents and younger population (National AIDS Committee, 2015). Studies consistently point to a shift in sexual and traditional values among the younger people to explain the vulnerability of Thai youth to STIs and unintended pregnancies (Thato *et al*, 2003; Chamrathirong and Kaiser, 2012; Tangmunkongvorakul *et al*, 2012). Many young people in Thailand have multiple sexual partners and positive attitudes toward premarital sex (Thato *et al*, 2008). The average estimated age of first sexual intercourse decreased from 17-18 years old in 1993 to 14-15 years old in 2011 (Tangmunkongvorakul *et al*, 2012).

Several studies indicate that young Thais do not consistently use condoms in their sexual relationships (Srisuriyawet *et al*, 2006; Khumsaen and Gary, 2008; Musumari *et al*, 2016). This is reflected in the increasing rates of unintended pregnancies and STIs over the past 15 years (Bureau of Epidemiology, 2015). One important change in the sexual behavior of young Thai males includes the shift of sexual debut away from sex workers to regular or steady partners. While condom use with sex workers is very common, studies report infrequent use of condoms with steady and regular partners among Thai adolescents (Jenkin *et al*, 2002; Chamrathirong and Kaiser, 2012).

Although men who have sex with men play a major role in the current epidemic of STIs in Thailand (Chamrathirong and Kaiser, 2012), important dynamics in the sexual behavior of Thai

heterosexual males suggest they might become a significant contributor to the spread of HIV and other STIs (Janepanish *et al*, 2011). A previous study found low condom use among Thai heterosexual males, ranging from 20-60% (Janepanish *et al*, 2011). The Thai Working Group on HIV/AIDS Projection predicted an increase in HIV incidence among heterosexual males if condom use remained less than 80% (Bureau of Epidemiology, 2016).

Thai university students often live away from their families. Similar to university students in other countries, their initial independence comes with challenges, as peer pressure may lead to undesirable and risky situations (Adefuye *et al*, 2009). Our study chose to focus on university students based on research showing a low prevalence of consistent condom use among Thai university students with figures ranging from 21% to 51% (Srisuriyawet *et al*, 2006; Wayuhuerd *et al*, 2010; Chatchawarn, 2011). Male condoms, which are the most widely available type of condom, are primarily male-controlled (Jenkins *et al*, 2002). There are very few studies focused on documenting condom use among heterosexual young males in Thailand (Janepanish *et al*, 2011). A better understanding of correlates of condom use among male university students in particular is needed to inform proper interventions.

Condom use is a multifactorial decision-making process that is affected by a multitude of individual, social, and contextual influences. A growing body of research in western countries has examined the behaviors and psychological factors associated with condom use and identified significant predictors influencing condom use behaviors among adolescents (Kapadia *et al*, 2012; De Araújo

*et al*, 2014; Mehra *et al*, 2014). Interventions designed to address psychological factors not only led to immediate behavior change, but also to consistent condom use (Ralph, 1992). Condom promotion programs for youth should address psychological factors that influence their condom use behavior. While there are many studies in Thailand documenting correlates of condom use among young people (Thato *et al*, 2003; Srisuriyawet *et al*, 2006; Aurpibul *et al*, 2016), only limited research has examined condom use behaviors using psychological theories. The only published study examined whether the psychological factors of the Theory of Planned Behavior could predict condom use (Wayuhuerd *et al*, 2010). No published studies in Thailand examined the psychological factors of more than one theory at the same time regarding this issue.

Our current study attempts to improve the knowledge regarding factors associated with condom use by proposing a psychological model to identify the predictors of condom use among Thai male university students. The proposed model is based on psychological factors from the Health Belief Model (HBM) (Rosenstock, 1990), the Theory of Planned Behavior (TPB) (Ajzen, 1991), and the Social Cognitive Theory (SCT) (Bandura, 1997). These theories have been widely used in the exploration of condom use behavior among youth and have served as frameworks for the development of both HIV-specific models of behavior change and adolescent-specific models of condom use (Espada *et al*, 2016). The reason for combining the psychological factors from 3 different models was because of the difficulty of explaining condom use behavior using a single theory (Munro *et al*, 2007).

## MATERIALS AND METHODS

### Study design, setting and participants

We conducted a cross-sectional study from May to August 2015 among second, third and fourth year male undergraduate students at a government university in northern Thailand. The province where the university is located has one of the highest prevalence of HIV in northern Thailand (National AIDS Committee, 2015). The university is the only government university in this province.

At the time the study was conducted, there were approximately 4,800 male students studying in those three academic years at the university. The required sample size was estimated to be 1,200 based on the assumption that 34.6% of male university students reported consistent condom use (Chatchawarn, 2011), with a margin of error of 5%, a confidence interval of 95%, and 10% non-response rate.

Eighteen groups of students were identified based on the 3 studied year in the 6 faculties of the university. The university's registration department provided the total number of male students for the 18 groups. The sample size for each group was calculated based on the overall number of students. The names of potential participants were then randomly selected from the rosters of all students within each group.

### Development of a hypothesized psychological factor model

Four psychological factors from the HBM were included in our newly created model: perceived susceptibility to the disease, perceived severity of the disease, perceived benefits of behavior change and perceived barriers to behavior change. According to the HBM, individuals are more likely to adopt good health behaviors if

they perceive themselves to be susceptible to illness, and if they thought the consequences of the illness were serious, that an effective solution existed, and that they could surmount the barriers to adopting the effective behavior (Rosenstock, 1990). We included perceived self-efficacy of condom use in our created model since self-efficacy was the most important prerequisite for behavior change in the SCT (Bandura, 1997). A subjective norm from TPB was added to capture the perceived social pressure from significant others to use a condom (Ajzen, 1991).

### Measurements

Three groups of measurements were developed: socio-demographic, behavioral and psychological variables.

**Socio-demographic variables.** The variables included in this category were age, living situation while studying at the university, parental marital status, parental economic status, parental occupation and hobbies.

**Behavioral variables.** Condom use behavior was the primary outcome of the study. It was measured using the question "Did you use a condom every time during sexual intercourse in the past 12 months?" Response options ranged from every time to never. Other sexual behavior variables included age at first sexual intercourse, condom use at first sexual intercourse, number of sexual partners in the last year, condom use during last sexual intercourse, condom use with different types of sexual partners, alcohol and drug use before sexual intercourse, whether the participants ever impregnated someone and history of HIV testing.

**Psychological variables.** Questions measuring psychological variables were adopted from previous research (Thato *et al*, 2003;

*ibid*, 2005; Srisuriyawet *et al*, 2006). These questions included 4 constructs from the HBM (perceived susceptibility, perceived severity, perceived benefits, and perceived barriers), 1 construct from the SCT (perceived self-efficacy of condom use), and 1 construct from the TPB (subjective norm). The definition for each variable, the way it was measured and sample questions are described below.

*Perceived susceptibility* was defined as the perceived likelihood of getting HIV, some other STI or getting someone pregnant. A 12-item scale developed by Thato *et al* (2003) was used. Sample items include: "It is possible that I could get an HIV infection" and "It is possible that I could get a STI". The items were administered on a 5-point Likert scale, ranging from strongly disagree (score of 0) to completely agree (score of 4). The total composite score ranged from 0 to 48 with higher scores indicating a higher degree of susceptibility. The internal consistency with the Cronbach's alpha was 0.77.

*Perceived severity* referred to the participants' perceived severity of contracting HIV and other STI. A 10-item scale developed by Thato *et al* (2003) was used. The items were administered on a 5-point Likert scale, ranging from strongly disagree (score of 0) to completely agree (score of 4). Sample items included: "AIDS is not curable and is a fatal disease" and "STIs can turn into serious illnesses." The total composite score ranged from 0 to 40, with higher scores suggesting higher perceived severity. The internal consistency with the Cronbach's alpha was 0.88.

*Perceived benefits of condom use* referred to the participants' perception about the effectiveness of condoms in preventing HIV and other STIs. A 24-item scale developed by Thato *et al* (2003) was used

to measure this variable. The responses options were rated on a 5-point Likert scale ranging from completely disagree (score of 0) to completely agree (score of 4). Sample items included, "Condom use is effective in protecting against AIDS" and "Condoms are effective against sexually transmitted disease (STIs)." The total composite score ranged from 0 to 96, with higher scores indicated a higher degree of perceived benefits. The internal consistency with the Cronbach's alpha was 0.92.

*Perceived barriers of condom use* referred to the participants' perception about barriers across four domains: emotional, inconvenience, concern for the relationship and accessibility. This construct was measured using a 14-item questionnaire developed by Thato *et al* (2003) rated on a 5-point Likert scale ranging from completely disagree (score of 0) to completely agree (score of 4). Sample items included, "Condoms reduce sexual pleasure" and "The price of condoms is too high to use regularly." The total composite score ranged from 0 to 56, with higher scores indicated a higher degree of perceived of barriers to condom use. The Cronbach's alpha was 0.89.

*Perceived self-efficacy of condom use* measured the participants' confidence in their ability to successfully use a condom during sex. A 14-item questionnaire developed by Thato *et al* (2005) rated on a 5-point Likert-scale ranging from completely disagree (score of 0) to completely agree (score of 4). Sample items included, "I can use a condom correctly from beginning to end of sexual intercourse" and "I feel confident that I can use a condom correctly." The total composite score ranged from 0 to 56, higher scores indicated higher perceived self-efficacy. The Cronbach's alpha was 0.89.

*Subjective norm* assessed the perceived

social pressure from significant others (partners, parents, and close friends) regarding using condoms every time they had sex, their desire for the participants to use condoms every time they had sex, and their expectation that the participants would use condoms every time they had sex. The scale included 3 items developed by Srisuriyawet *et al* (2006) rated by a four-point response category ranging from completely disapproved (score of 0) to approved (score of 3). Sample items included: "My friends think condoms should be used during sex" and "My girlfriend (partner) thinks condoms should be used during sex." The total composite score ranged from 0 to 9, higher scores indicated higher degree of perceived subjective norm. The Cronbach's alpha was 0.93.

### Study procedures

After receiving permission to conduct the study from the Institutional Review Board and the university administration, researchers visited the classrooms of randomly pre-selected students and explained the study to them. Students interested in participating in the study were directed to the computer laboratory of the university where the informed consent process and data collection occurred. Participants were then invited to complete the questionnaire anonymously through Computer-Assisted Self-Interviewing (CASI). Seating at the computer terminals were separated by partitions to ensure privacy. Participants took about 30 minutes on average to complete the questionnaire. All 1,200 students who were approached agreed to participate in the study. A total of 1,091 students completed questionnaires.

### Statistical analysis

Characteristics of the participants

were described using descriptive statistics, which included frequencies, percentages, means, and standard deviations.

Statistical modeling [structural equation modeling (SEM)] performed by Mplus7, was used to analyze the newly created model. SEM is a statistical technique used to test and estimate causal relationships between variables in a model (Iacobucci, 2010). The SEM process used in the current study included the steps described below.

First, a confirmatory factor analysis (CFA) was conducted to test the construct validity of the variables (Iacobucci, 2010). We then tested whether the factor loadings of the observed variables on their latent constructs were statistically significant ( $p < 0.05$ ) and whether the factor loading scores for each item were high enough ( $>0.4$ ) (Knafl and Grey, 2007). Second, path analysis was used to evaluate causal models by examining the relationships between variables and to estimate both the magnitude and significance of causal connections between variables in the model (Iacobucci, 2010) (Fig 1). Finally, non-significant paths were eliminated so that only significant paths predicting condom use remained in the final model (Fig 2). The estimated effects size ( $R^2$ ) of the psychological model predicting condom use was calculated through total effect (direct effect + indirect effect). The effect size of the model was evaluated based on the following values: 0.00 = null effect, 0.10-0.30 = weak or small effect, 0.31 - 0.50 = medium effect,  $> 0.50$  = strong or large effect (Fairchild *et al*, 2009).

To evaluate the model, the overall model fit-index was examined to determine how well the model fit the empirical data. The overall model fit index was determined through four measures:

goodness of fit index (GFI), comparative fit index (CFI) and root mean square errors of approximation (RMSEA). The model fit was assessed based on the following criteria:  $\chi^2/df < 3$ ,  $RMSEA < 0.08$ ,  $GFI > 0.90$  and  $CFI > 0.90$  (Iacobucci, 2010).

### Ethical considerations

This study was approved by the Human Experimentation Committee, Research Institute for Health Sciences, Chiang Mai University. Participation in the study was voluntary and data were not linked with individuals. Written informed consent was obtained from all participants prior to participation in the study.

## RESULTS

### Participant characteristics

A total of 1,039 participants identifying as heterosexual, completed the questionnaire. The average age [standard deviation (SD)] of participants was 20.5(1.4) years old. Sixty-seven percent of participants had sexual intercourse with an average (SD) age of first sexual intercourse of 17.5 (2.3) years old. Among sexually experienced participants, 71.8% had used a condom during their first sexual intercourse. The proportion of participants who reported condom use during last sexual intercourse was 65.2%. Condom use behavior in the past year from the highest to the lowest proportion were: every time (35.6%), most of the time (29.7%), sometimes (26.5%) and never (8.2%). In the past 12 months, 40% of participants had more than one sexual partner and 6.9% of participants had impregnated someone. Only 14.7% of the sample had ever had an HIV test (Table 1).

### Confirmatory factors analysis

Table 2 shows the factor loadings of

Table 1  
Socio-demographic characteristics and sexual behaviors of heterosexual male university students (N=1,039).

Characteristics	No. (%)
Age in years	
< 20	536 (51.6)
≥ 20	503 (48.4)
Ever had sex	
Yes	700 (67.4)
No	339 (32.6)
Age of sexual debut in years <sup>a</sup>	
< 15	174 (24.8)
≥ 15	526 (75.2)
Condom use during first sex <sup>a</sup>	
Yes	501 (71.8)
No	199 (28.2)
Ever been drunk before sexual intercourse <sup>a</sup>	
Yes	496 (70.9)
No	204 (29.1)
Condom use during last sexual intercourse <sup>a</sup>	
Yes	456 (65.2)
No	244 (34.8)
Consistent condom use in the past year <sup>a</sup>	
Every time	248 (35.6)
Most of the time	207 (29.7)
Sometimes	185 (26.5)
Never	57 (8.2)
Number of sexual partners during the past year <sup>a</sup>	
1	419 (59.7)
> 2	277 (40.0)
Missing	4 (0.3)
Ever made someone pregnant <sup>a</sup>	
Yes	48 (6.9)
No	652 (93.1)
Ever had an HIV test <sup>a</sup>	
Yes	103 (14.7)
No	597 (85.3)

<sup>a</sup>Only participants who had ever had sexual intercourse (n = 700).

the psychological factors that predict condom use behaviors. All observed variables loaded significantly on their hypothesized factors, including perceived susceptibility,

perceived severity, perceived benefit, perceived barriers and perceived self-efficacy. After minimal model modifications, fit indices were acceptable for all factors with factor loadings of between 0.44-0.87 ( $p < 0.05$ ).

**Path analysis of our initially created model**

Our initially created model is show in Fig 1.

Our final created model to predict condom use behaviors is shown in Fig 2. Perceived susceptibility was an exogenous variable while the other 3 variables (self-efficacy, perceived barriers, and subjective norm) were endogenous variables. The model proved to have an adequate fit ( $\chi^2/df = 2.12$ ;  $CFI = 0.989$ ;  $GFI = 0.980$ ;  $RMSEA = 0.044$ ). In the final model, higher levels of perceived susceptibility, self-efficacy, subjective norm and lower levels of perceived barriers were associated with higher consistent condom use. The perceived barriers to condom use was the strongest predictor of condom use behavior ( $\beta = 0.42$ ). Higher levels of perceived susceptibility were significantly related to higher levels of self-efficacy, subjective norm, and lower perceived barriers to condom use. There was no relationship between perceived severity and perceived benefits of condom use with any other variables so they were dropped from the initial model to create the final model.

Table 3 shows the effects of psychological variables on condom use behavior. Perceived barriers to condom use had a negative direct effect on condom use ( $cc = -0.42$ ) while subjective norm and self-efficacy with condom use had a positive direct effect on condom use ( $cc = 0.34$  and  $0.20$ ). Perceived susceptibility had both direct and indirect effects on condom use through self-efficacy, perceived barriers to condom use and subjective norm (total

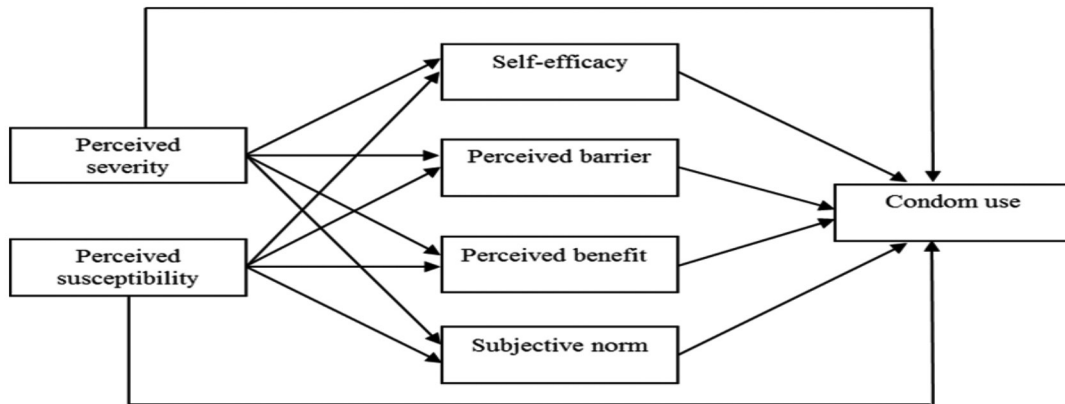


Fig 1—Our initially created model to predict condom use behavior among study subjects.

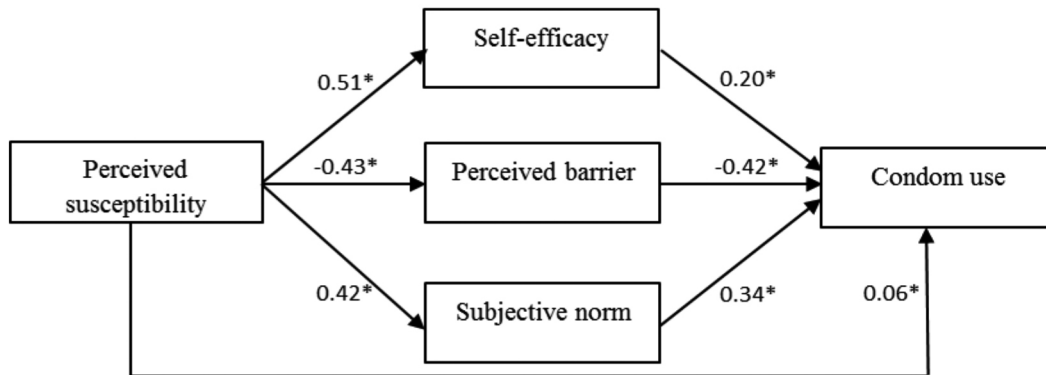


Fig 2—Final created model to predict condom use behavior among study subjects.

cc = 0.38). The final model accounted for 56% of the variance in condom use ( $R^2 = 0.56$ ).

## DISCUSSION

This is the first study in Thailand to use psychological variables from multiple psychological theories all with the SEM technique to identify predictors of condom use among heterosexual male university students. The only previous similar study from Thailand that used psychological variables to predict condom

use focused on adolescents in the general population and tested the constructs of the TPB model (Wayuhued *et al*, 2010).

Our study results show the study subjects were vulnerable to STIs, including HIV, due to high risk sexual behavior. Only a small proportion of study subjects used condoms consistently. The majority of study subjects had multiple sexual partners and drank alcohol before having sex. Similar patterns of risk have been documented in other studies (Srisuriyawet *et al*, 2006; Khumsaen and Gary,



Table 2  
Summary statistics and factor loading of psychological variables in confirmatory factor analysis.

Variables	Scale	Mean	SD	FL
Perceived severity	(0-48)	36.04	4.60	0.48-0.87
Perceived susceptibility	(0-40)	38.39	7.40	0.44-0.81
Perceived benefit of condom use	(0-96)	98.05	12.50	0.47-0.82
Perceived barriers to condom use	(0-60)	44.70	10.90	0.45-0.76
Self-efficacy with condom use	(0-52)	50.20	7.70	0.54-0.84
Subjective norm	(0-90)	6.70	2.70	0.61-0.85

SD, standard deviation; FL, factor loading (all were statistically significant  $p < 0.05$ ).

Table 3  
Correlation coefficient of direct and indirect effects of each psychological variable on condom use behavior among study subjects.

Variables	Condom use ( $R^2 = 0.56$ )		
	Direct effect	Indirect effect	Total effect
Perceived susceptibility	0.06	0.32	0.38
Self-efficacy of condom use	0.20	-	0.20
Perceived barriers to condom use	-0.42	-	-0.42
Subjective norm	0.34	-	0.34

All variables were statistically significant ( $p < 0.05$ ).

2008; Tangmunkongvorakul *et al*, 2010).

The final model revealed that perceived barriers to condom use was the strongest predictor of not using condoms among participants. This is consistent with the results of previous studies (Katikiro and Njau, 2012; Tarkang, 2013) and a meta-analysis evaluating using the HBM (Sheeran *et al*, 1999; Kaneko, 2007). One reason given by subjects for not using condoms is the perception condoms reduce sexual pleasure. Other studies have reported adolescents focus more on sexual pleasure rather than possible negative consequences following sex without a

condom (Tarkang, 2013; Mehra *et al*, 2014). We did not find a relationship between the perceived benefits of condom use and actual condom use. Thus, reducing barriers to condom use might be more effective than increasing awareness of benefits to improve condom use behavior in the study population.

Perceived susceptibility to possible negative consequences following sex without a condom, including possible contraction of HIV and other STIs and getting someone pregnant, not only had a direct positive effect on condom use, but also an indirect positive effect through

self-efficacy, perceived barriers, and subjective norms in our study. Similar findings were reported by a previous study where higher perceived susceptibility resulted in higher self-efficacy, perceived barriers, and subjective norms (Sheeran *et al*, 1999). This suggests targeted interventions need to increase risk awareness by modifying incorrect assumptions which lead to lower perceived risk in order to promote condom use.

We found no relationship between perceived severity and condom use similar to a previous study that found perceived severity had a weak or no effect on behavior (Fehr *et al*, 2015). While the explanation for this remains unclear, one hypothesis (Sheeran *et al*, 1999) suggests perceived severity has to reach a certain threshold before behavior change. It is possible, beyond this threshold behavior might change. One study hypothesized perceived severity has a low variance leading to a smaller effect size (Sheeran *et al*, 1999).

Similar to previous studies (Hounton *et al*, 2005; Khumsaen and Gary, 2008; King *et al*, 2014), our study found self-efficacy was a predictor of condom use among male university students. These results are important because they highlight the predictive power of self-efficacy in condom use behavior (Sheeran *et al*, 1999; Kaneko, 2007). This information is important because it shows self-efficacy is important for modifying sexual risk-taking behaviors leading to more consistent condom use. Therefore, programs promoting condom use must take into consideration of self-efficacy.

Like previous studies (Janepanish *et al*, 2011; Kapadia *et al*, 2012; Espada *et al*, 2016), we found subjective norms are associated with condom use. Condom use behavior was more common among subjects who perceived their peers used condoms, and

their partners, parents or close friends did not condone unprotected sex. Programs to promote condom use should target a second audience: people whom subjects value their opinion.

This was the first study from Thailand to include psychological factors from multiple models and a statistical modeling technique to identify factors associated with condom among heterosexual male university students. Unlike traditional risk factor studies which point out who should be targeted for intervention, this approach suggests the content covered by the intervention program. The final psychological factor model accounted for 56% of variance in condom use behavior. It covers a large effect size and is considered a very robust model in predicting the desired outcome. The large sample size gave statistical power for better modeling. Data collection was conducted through CASI which has been found to reduce response bias for sensitive questions (Le and Vu, 2012).

Our study has limitations. It cannot be applied to other groups because it was performed at a single institution. Condom use may vary by partner type, such as steady partner versus commercial sex worker. We did not distinguish condom use by type of sexual partner. There is also the possibility of social desirability bias due to the sensitive nature of the subject in Thai culture.

In conclusion, our created psychological factor model, constructed from three major psychological theories, found perceived barriers, perceived susceptibility, subjective norms and self-efficacy in condom use affect reported condom use behavior among heterosexual male university students in Thailand. The results of this study suggest an intervention to promote condom use among this population has to be comprehensive and

address multi-levels. At the individual level, the program should address the ways to overcome barriers to condom use, highlight the negative consequences of unsafe sexual behavior and increase self-efficacy in condom use. At the societal and structural levels, health campaigns should aim to establish condom use as a social norm among youth. Similar studies need to be conducted in other settings and among female university students to determine if these results can be applied to other populations.

#### ACKNOWLEDGEMENTS

This study was supported by the Chiang Mai University Center of Excellence in HIV/AIDS Research and the National Research University Project under Thailand's Office of Higher Education Commission. We thank the subject who participated in this study. We also thank the University of Kyoto's "Strategic Young Research Overseas Visit Program for Accelerating Brain Circulation Program" for supporting the collaboration between Kyoto University in Japan and the Research Institute for Health Sciences (RIHES), Chiang Mai University, in Thailand.

#### REFERENCES

- Adefuye AS, Abiona TC, Balogun J A, Lukobo-Durrell M. HIV sexual risk behaviors and perception of risk among college students: implications for planning interventions. *BMC Public Health* 2009; 9: 1-13.
- Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process* 1991; 50: 179-211.
- Aurpibul L, Tangmunkongvorakul A, Mumsari PM, Srithanaviboonchai K, Tarnkehard S. Patterns of sexual behavior in lowland Thai youth and ethnic minorities attending high school in rural Chiang Mai, Thailand. *PLOS One* 2016; 11: e0165866.
- Bandura A. Self-efficacy: The essence of control. New York: H. Freeman, 1997.
- Bureau of Epidemiology, Thailand Ministry of Public Health. Sexually transmitted infections annual epidemiological surveillance report. Nonthaburi: Ministry of Public Health, 2015: 103-5. [Cited 2016 Mar 13] Available from: <http://www.boe.moph.go.th/Annual/AESR2012/index.html>
- Bureau of Epidemiology. HIV/AIDS situation in Thailand. Nonthaburi: Ministry of Public Health, 2016. [Cited 2016 Mar 13] Available from: [http://www.aidsthai.org/aidseenglish/situation\\_02.html](http://www.aidsthai.org/aidseenglish/situation_02.html)
- Chamrathirong A, Kaiser P. The dynamics of condom use with regular and casual partners: analysis of the 2006 national sexual behavior survey of Thailand. *PLOS One* 2012; 7: e42009.
- Chatchawarn T. A study of love sex roles and sexual risk behaviors of Thai undergraduate students in Bangkok. *J Lib* 2011; 1: 118-34.
- De Araújo LF, Teva I, De la Paz Bermúdez M. Psychological and socio-demographic variables associated with sexual risk behavior for sexually transmitted infections/HIV. *Int J Clin Health Psychol* 2014; 14: 120-7.
- Espada JP, Morales A, Guillen-Riquelme A, Ballester R, Orgiles M. Predicting condom use in adolescents: a test of three socio-cognitive models using a structural equation modeling approach. *BMC Public Health* 2016; 16: 1-10.
- Fairchild AJ, Mackinnon DP, Taborga MP, Taylor AB.  $R^2$  effect-size measures for mediation analysis. *Behav Res Methods* 2009; 41: 486-98.
- Fehr SK, Vidourek R, King KA. Intra-and inter-personal barriers to condom use among college students: a review of the literature. *Sex Cult* 2015; 19: 103-21.
- Hounton SH, Carabin H, Henderson NJ. Towards an understanding of barriers to condom use in rural Benin using the

- Health Belief Model: a cross sectional survey. *BMC Public Health* 2005; 5: 1-8.
- Iacobucci D. Structural equations modeling: fit indices, sample size, and advanced topics. *J Consum Psychol* 2010; 20: 90-8.
- Janepanish P, Dancy BL, Park C. Consistent condom use among Thai heterosexual adult males in Bangkok, Thailand. *AIDS Care* 2011; 23: 460-6.
- Jenkins RA, Manopaiboon C, Samuel AP, et al. Condom use among vocational school students in Chiang Rai, Thailand. *AIDS Educ Prev* 2002; 14: 228-45.
- Kaneko N. Association between condom use and perceived barriers to and self-efficacy of safe sex among young women in Japan. *Nurs Health Sci* 2007; 9: 284-9.
- Kapadia F, Frye V, Bonner S, Emmanuel PJ, Samples CL, Latka MH. Perceived peer safer sex norms and sexual risk behaviors among substance-using Latino adolescents. *AIDS Educ Prev* 2012; 24: 27-40.
- Katikiro E, Njau B. Motivating factors and psychosocial barriers to condom use among out-of-school youths in Dar es Salaam, Tanzania: a cross sectional survey using the health belief model. *ISRN AIDS* 2012; 2012: 170739.
- Knafel GJ, Grey M. Factor analysis model evaluation through likelihood cross-validation. *Stat Methods Med Res* 2007; 16: 77-102.
- Khumsaen N, Gary FA. Determinants of actual condom use among adolescents in Thailand. *J Assoc Nurses AIDS Care* 2008; 218-29.
- King KA, Vidourek RA, Singh A. Condom, sex, and sexually transmitted disease: exploring sexual health issue among Asian-Indian college students. *Sex Cult* 2014; 18: 648-63.
- Le LC, Vu LT. Audio computer-assisted self interview compared to traditional interview in an HIV-related behavioral survey in Vietnam. *MEDICC Rev* 2012; 14: 26-31.
- Mehra D, Ostergren PO, Ekman B, Agardh, A. Inconsistent condom use among Ugandan university students from a gender perspective: a cross-sectional study. *Glob Health Action* 2014; 7: 1-9.
- Munro S, Lewin S, Swart T, Volmink J. A review of health behaviour theories: how useful are these for developing interventions to promote long-term medication adherence for TB and HIV/AIDS? *BMC Public Health* 2007; 7: 1-16.
- Musumari PM, Tangmunkongvorakul A, Srithanaviboonchai K, et al. Prevalence and correlates of HIV testing among young people enrolled in non-formal education centers in urban Chiang Mai, Thailand: a cross-sectional study. *PLOS One* 2016; 1: e0153452.
- National AIDS Committee. Thailand AIDS response progress report 2015. Nonthaburi: National AIDS Committee, 2015. [Cited 2015 Mar 13]. Available from: [http://www.unaids.org/sites/default/files/country/documents/THA\\_narrative\\_report\\_2015.pdf](http://www.unaids.org/sites/default/files/country/documents/THA_narrative_report_2015.pdf)
- Ralph JD. Psychological determinants of condom use among adolescents. In: Ralph JD, ed. *Adolescents and AIDS: a generation in jeopardy*. Newbury Park: Sage Publication, 1992.
- Rosenstock IM. The health belief model: explaining health behavior through expectancies. In: Glanz FM, Rimer BK, eds. *Health behavior and education*. San Francisco: Jossey-Bass, 1990: 39-62.
- Sheeran P, Abraham C, Orbell S. Psychosocial correlates of heterosexual condom use: a meta-analysis. *Psychol Bull* 1999; 125: 90-132.
- Srisuriyawet R, Fongkaew W, Villaruel AM. Gender and sexual experience difference in adolescent sexual behavior in Thailand: psychosocial factors. *Thai J Nurs Res* 2006; 10: 215-27.
- Tangmunkongvorakul A, Carmichael G, Banwell C, Seubsman SA, Sleigh, A. In-

- imate relationships among adolescents in different social groups in northern Thailand. *Southeast Asian J Trop Med Public Health* 2010; 41: 1475-93.
- Tangmunkongvorakul A, Carmichael G, Banwell C, Seubsman SA, Sleigh A. Coital experience among adolescents in three social-educational groups in urban Chiang Mai, Thailand. *Asian Popul Stud* 2012; 8: 39-63.
- Tarkang EE. Perceived barriers to condom use among out-of-school adolescents in Kumba, southwest region of Cameroon. *Am J Health Res* 2013; 1: 42-50.
- Thato S, Charron-Prochownik D, Dorn LD, Albrecht SA, Stone CA. Predictors of condom use among adolescent Thai vocational students. *J Nurs Scholarsh* 2003; 35: 157-63.
- Thato S, Hanna KM, Rodcumdee B. Translation and validation of the condom self-efficacy scale with Thai adolescents and young adults. *J Nurs Scholarsh* 2005; 37: 36-40.
- Thato R, Jenkins RA, Dusitsin N. Effects of the culturally-sensitive comprehensive sex education programme among Thai secondary school students. *J Adv Nurs* 2008; 62: 457-69.
- Tafari S, Martinelli D, Germinario C, Prato R. Determining factors for condom use: a survey of young Italian adults. *Eur J Contracept Reprod Health Care* 2010; 15: 24-30.
- UNAIDS. The gap report. Geneva: UNAIDS, 2014. [Cited 2015 Dec 13]. Available from: <http://www.unaids.org/en/resources/campaigns/2014/2014gapreport/gapreport>
- UNAIDS. AIDS by the numbers, AIDS is not over, but it can be. Geneva: UNAIDS, 2016. [Cited 2015 Mar 23]. Available from: [http://www.unaids.org/sites/default/files/media\\_asset/AIDS-by-the-numbers-2016\\_en.pdf](http://www.unaids.org/sites/default/files/media_asset/AIDS-by-the-numbers-2016_en.pdf)
- Wayuhuerd S, Phanchaoenworakul K, Kay CA, Sinsuksai N. Using the theory of planned behavior to predict condom use behavior among Thai adolescents. *Pac Rim Int J Nurs Res Thail* 2010; 14: 315-29.