

PREDICTING FACTORS OF QUIT ATTEMPT IN THAI ADOLESCENTS



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การศึกษาเชิงความสัมพันธ์นี้มีวัตถุประสงค์เพื่อทดสอบอิทธิพลทางตรงและทางอ้อมของปัจจัยทำนายความพยายามเลิกบุหรี่ในวัยรุ่นไทย โดยใช้ทฤษฎีปัญญาทางสังคมและการทบทวนวรรณกรรมที่เป็นงานวิจัยเป็นกรอบแนวคิดในการวิจัย กลุ่มตัวอย่างคือ วัยรุ่นจำนวน 463 คน ที่มีประวัติสูบบุหรี่ กำลังศึกษาในชั้นมัธยมศึกษาตอนต้นและตอนปลาย (ม.1-ม.6) ในโรงเรียนในเครือข่ายคุณกรณรงค์เพื่อการไม่สูบบุหรี่ 12 แห่ง ทั่วประเทศไทย และมีความพยายามเลิกบุหรี่ในช่วง 3 เดือนที่ผ่านมา คัดเลือกโดยการสุ่มแบบหลายขั้นตอน เก็บรวบรวมข้อมูลโดยใช้แบบสอบถามจำนวน 7 ชุด ซึ่งแบบสอบถามทุกชุดผ่านการตรวจสอบความตรงตามเนื้อหา ความตรงเชิงโครงสร้าง และความเที่ยง ได้ค่าที่อยู่ในเกณฑ์ยอมรับได้ การศึกษานี้เก็บรวบรวมข้อมูลในช่วงเดือนตุลาคม-ธันวาคม 2556 กลุ่มตัวอย่างส่วนใหญ่นับถือศาสนาพุทธ (95.46%) เพศชาย (94.17%) ครึ่งหนึ่งของกลุ่มตัวอย่างกำลังศึกษาในชั้นมัธยมศึกษาปีที่ 4-5 (52.70%) มีอายุเฉลี่ย 15.20 ปี (SD=1.38) และเริ่มสูบบุหรี่ครั้งแรกก่อนอายุ 14 ปี (80.13%) การศึกษาครั้งนี้ทดสอบเส้นทางอิทธิพลความสัมพันธ์ระหว่างตัวแปรโดยใช้โปรแกรมลิสเรล 8.53

ผลการศึกษาพบว่า โมเดลที่สร้างขึ้นมีความสอดคล้องกับข้อมูลเชิงประจักษ์ และสามารถอธิบายความผันแปรของความพยายามเลิกบุหรี่ได้ 50 เปอร์เซ็นต์ (Chi-square=14.64, df=7, p=0.05, Chi-square/df=2.09, GIF=0.99, RMSEA=0.049, SRMR=0.05, AGFI=0.97) ตัวแปรปัจจัยทำนายทุกตัวมีอิทธิพลต่อความพยายามเลิกบุหรี่อย่างมีนัยสำคัญทางสถิติที่ระดับ .05 โดยการใช้เวลากับเพื่อนที่สูบบุหรี่มีอิทธิพลทางตรงด้านลบต่อความพยายามเลิกบุหรี่ ($\beta = -.26$) และมีอิทธิพลทางอ้อมด้านลบผ่านความเชื่อในสมรรถนะแห่งตนที่จะไม่สูบบุหรี่ ($\beta = -.25$) และแรงจูงใจในการเลิกบุหรี่ ($\beta = -.25$) ตามลำดับ ส่วนความเชื่อในสมรรถนะแห่งตนที่จะไม่สูบบุหรี่มีอิทธิพลทางตรงด้านบวกต่อความพยายามเลิกบุหรี่ ($\beta = .26$) สำหรับการติดนิโคตินมีอิทธิพลทางตรงด้านลบต่อความพยายามเลิกบุหรี่ ($\beta = -.30$) และมีอิทธิพลทางอ้อมด้านลบผ่านความเชื่อในสมรรถนะแห่งตนที่จะไม่สูบบุหรี่ ($\beta = -.23$) ส่วนแรงจูงใจในการเลิกบุหรี่มีอิทธิพลทางตรงด้านบวกต่อความพยายามเลิกบุหรี่ ($\beta = .24$) เป็นที่น่าสนใจว่าระดับความเข้มข้นของบริการช่วยเลิกบุหรี่มีอิทธิพลทางตรงด้านลบต่อความพยายามเลิกบุหรี่ ($\beta = -.02$) และมีอิทธิพลทางอ้อมด้านบวกผ่านความเชื่อในสมรรถนะแห่งตนที่จะไม่สูบบุหรี่ ($\beta = .04$) และแรงจูงใจในการเลิกบุหรี่ ($\beta = .02$) ตามลำดับ

ผลการศึกษาแสดงให้เห็นว่า ปัจจัยที่มีอิทธิพลมากที่สุดต่อความพยายามเลิกบุหรี่คือ การติดนิโคติน การใช้เวลากับเพื่อนที่สูบบุหรี่ และความเชื่อในสมรรถนะแห่งตนที่จะไม่สูบบุหรี่ ตามลำดับ ดังนั้นการประเมินปัจจัยเหล่านี้จึงมีความสำคัญที่จะช่วยในการพัฒนาโปรแกรมการเลิกบุหรี่ให้มีประสิทธิภาพ สามารถช่วยให้วัยรุ่นเลิกบุหรี่ได้สำเร็จต่อไป

สาขาวิชา พยาบาลศาสตร์

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ลายมือชื่อนิสิต

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SUWIMON ROJNAWEE: PREDICTING FACTORS OF QUIT ATTEMPT IN THAI ADOLESCENTS. ADVISOR: ASSOC. PROF. WARAPORN CHAIYAWAT, D.N.S., CO-ADVISOR: ASSOC. PROF. JINTANA YUNIBHAND, Ph.D., 182 pp.

This study was a correlational study aiming to examine the direct and indirect relationships of the predicting factors of quit attempt in Thai adolescent smokers. The conceptual framework was developed based on social cognitive theory (SCT) and research-literature review. Multi-stage random sampling was used to recruit the sample. They were 463 adolescent smokers in grades 7-12 from 12 schools that belonged to the Teacher's Network against Tobacco (TNT) in all regions of Thailand and had attempted to quit smoking within the past three months. Subjects completed seven self-administered questionnaires. All questionnaires demonstrated acceptable content and construct validity, and reliability. Data were gathered from October to December 2013. The majority of the subjects were Buddhist (95.46%) and males (94.2%). Half of the subjects studied in grade 8-9 (52.70%). The average age was 15.20 years (SD=1.38). Most of them started smoking before 14 years of age (80.13%). Path analysis (LISREL 8.53) was used to test the relationships among variables.

The findings revealed that the hypothesized model fit the empirical data and could explain 50% of the variance of the quit attempt (Chi-square=14.64, df=7, p=0.05, Chi-square/df=2.09, GIF=0.99, RMSEA=0.049, SRMR=0.05, AGFI=0.97). All independent variables had significant relationships with quit attempt at the .05 level. Time spent with peer smokers had a negative direct effect ($\beta = -.26$) on quit attempt, and it had a negative indirect effect on quit attempt through self-efficacy to resist smoking ($\beta = -.25$), and motivation to quit ($\beta = -.25$). Self-efficacy to resist smoking had a positive direct effect ($\beta = .26$) on quit attempt. Nicotine dependence had a negative direct effect ($\beta = -.30$) on quit attempt, and it had a negative indirect effect ($\beta = -.23$) on quit attempt through self-efficacy to resist smoking. Motivation to quit had a positive direct effect ($\beta = .24$) on quit attempt. Interestingly, intensity of smoking cessation intervention had negative direct effect on quit attempt ($\beta = -.02$), and it had a positive indirect effect on the quit attempt through self-efficacy to resist smoking ($\beta = .04$) and motivation to quit ($\beta = .02$).

These findings demonstrated that the highest impact factors influencing quit attempt was nicotine dependence, followed by time spent with peer smokers and self-efficacy to resist smoking. Identifying these variables can help tailor cessation programs to more effectively help adolescents quit smoking.

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Student's Signature

Advisor's Signature

Co-Advisor's Signature

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CHAPTER I

INTRODUCTION

Background and significance of the study

Smoking is the leading cause of various health problems in adolescents (Swann, 2010). Adolescent smokers have illnesses more frequent and are more likely to be hospitalized than non-smokers (Tanski, Klein, Winickoff, Auinger, & Weitzman, 2003). The evidence shows that the earlier smokers quit, the greater their health benefits are (Ellickson, Tucker, & Klein, 2008). Quitting smoking is identified as an important behavior in improving adolescent smokers' health, and reducing smoking-related diseases and deaths (Otten, Bricker, Liu, Comstock, & Peterson, 2011; Welte, Barnes, Tidwell, & Hoffman, 2011). The most important precursor to the performance and success of quitting smoking is the quit attempt (Hughes, Russ, & Messig, 2014; MacFarlane, Paynter, Arroll, & Youdan, 2011; Zhou et al., 2009). Therefore, encouraging adolescent smokers to successfully perform quit attempt is essential. Exploring a specific predicting factor is necessary for developing the strategies to promote smokers' quit attempt.

The quit attempt refers to the number of times that smokers stopped smoking for at least 24 hours (Ershler, Leventhal, Fleming, & Glynn, 1989; Hughes et al., 2014; Starr et al., 2005). Adolescent smokers who made any quit attempts that lasted longer than 24 hours were more likely to succeed in quitting smoking than those who had not sustained such an attempt for that period of time (Centers for Disease Control and Prevention, 2009). Previous studies have shown that about 70% of adolescent smokers in Western and Asian countries, including Thailand have tried

to stop smoking within 30 days but most of them have failed (Joffe et al., 2009; Muramoto, Leischow, Sherrill, Matthews, & Strayer, 2007; National Statistical Office, 2007; Pinsker et al., 2013; Sirichotiratana et al., 2008).

The prevalence of smoking has increased among adolescents worldwide (Centers for Disease Control and Prevention, 2012). In Thailand, the National Statistical Office reported that in 2011, approximately 500,000 Thai adolescents were smokers, and the number of smokers had increased among both male and female adolescents every year (National Statistical Office, 2011). A study of health risk behaviors among Thai adolescents indicated that the most prevalence of cigarette used was adolescents' grades 7–12 (Bunjaroonsilp, 2005).

When adolescents become smokers, they are more likely to have long-term problems regarding their physical and mental well-being, such as respiratory infections, decreased athletic ability, and cognitive impairment (Swann, 2010; World Health Organization, 2012). To solve the aforementioned problems, adolescent smokers need to be encouraged to attempt to quit (Bachmann, Znoj, & Brodbeck, 2012; Song & Ling, 2011). The quit attempt by adolescent smokers is a difficult task owing to the addictive nature of nicotine (Smith, Cavallo, McFetridge, Liss, & Krishnan-Sarin, 2008; Welte, Barnes, Tidwell, & Hoffman, 2011). Therefore the majorities of smoking cessation interventions are in the realm of mental health nursing. On the other hand, prevention the physical and mental health problems and early detection of these adolescent smokers are the main roles of pediatric nurses (Naegle, Baird, & Stein, 2009; Srimoragot, 2009).

Pediatric nurses are the key person for caring children from birth through adolescents. As most of Thai adolescents enter in schools, they spend a greater

percentage of their time in school, including adolescent smokers (United Nations Educational Scientific and Cultural Organization (UNESCO), 2014; United Nations Children's Fund (UNICEF), 2007). Pediatric nurses have the opportunity to contact them in school, such as, providing health assessment, immunization against preventable diseases, and also expanding their roles in tobacco control (Pbert et al., 2008; Potts & Mandelco, 2011).

Thailand was the first Asian nation to implement strict tobacco control policies (Chantornvong et al., 2000; Chantornvong & McCargo, 2001). In 1992, health warnings, strict ban on advertising, ban on smoking in some public places, and marketing ban were put in places with no enforcement (Vathesatogkit, Hughes, & Ritthiphakdee, 2000). The enforcement increased to 50% in 2002 and ends with 75% of full enforcement in 2006 (Levy, Benjakul, Ross, & Ritthiphakdee, 2008). In 2004, strengthening of tobacco control strategies focusing on the smoking prevalence and health effects are recommended for Thai adolescents (Vichit-Vadakan, Aekplakorn, Tanyanont, & Poomkachar, 2004). Therefore, many schools enrolled in the Teacher's Network against Tobacco (TNT) project that has the goal to protect adolescents from the health hazards of cigarette smoking and provide smoking cessation intervention (Action on Smoking and Health Foundation, 2005). Adolescent smokers in the TNT schools had the chance to receive the intervention from teachers who were trained as smoking cessation counselors. However, the effectiveness of schools smoking cessation programs remains inconclusive.

Adolescent smokers need effective smoking cessation intervention provided by health professionals that can understand and help them attempt to quit. Most of these interventions are provided in hospital or outpatient departments (Naegle, Baird,

& Stein, 2009; Srimoragot, 2009). The evidence shows that only adolescent smokers with high level of addiction are referred to cessation services (Dumrongpiwat, 2009; Srimoragot, 2009). On the other hand, Thai adolescent smokers were low to moderately addicted to nicotine and some of them started or just wanted to experiment smoking (Ruangkanchanasetr, Plitponkarnpim, Hetrakul, & Kongsakon, 2005; Vichit-Vadakan et al., 2004). Most of those adolescent smokers have been taught in schools about health problems due to smoking and received advice to perform quit attempt, but they have fairly low success rates (Sirichotiratana et al., 2008).

The success rates are hard to figure out for many reasons. The truth is that majority of the smoking cessation programs for adolescents has separately provided by different disciplines and experts such as teachers and nurses. Interdisciplinary teamwork is beneficial and important for adolescent smokers. For example; teachers and other ancillary school personnel can assist with gathering and reporting information regarding behavior and peers interaction; and pediatric nurses can offer important information about adolescents' behaviors and advise them to perform quit attempt (Audrey, Holliday, & Campbell, 2008; LaSala & Todd, 2000).

In encouraging adolescent smokers to perform and succeed the quit attempt, its predictors need to be explored. An understanding of those predictors can offer insight for the nurses before promoting quit attempt. Many previous studies in western demonstrated the possible factors that influenced adolescents' quit attempt, but the findings are still unclear concerning the direct and indirect relationships with the quit attempt (Augustson et al., 2007; Borland et al., 2010; Branstetter, Horn, Dino, & Zhang, 2009; Bricker et al., 2010; Solomon, Bunn, Pirie,

Worden, & Flynn, 2006). Several authors have highlighted the importance of examining the predictors of the quit attempts and direct/indirect relationships with the quit attempt that have the potential to assist with the development of effective cessation interventions for adolescent smokers (Abrantes et al., 2009; Augustson et al., 2007; Borland et al., 2010).

The existing theories have been used to describe the adolescents' addictive behavior including the Theory of Planned Behaviour (TPB) (Ajzen, 1991), the Health Belief Model (HBM) (Kirscht, 1974), the Transtheoretical Model (TTM) (Prochaska & DiClemente, 1984), and the Social Cognitive Theory (SCT) (Bandura, 1986). The interrelationship between person and environment is a central concept in the nursing paradigm (Reed & Shearer, 2009). Bandura's social cognitive theory indicated that an individual's decision to adapt health behaviors is influenced by distal and proximal environmental influences as well as his/her personal characteristics (Bandura, 1986). Therefore, the SCT was used to guide for selecting the factors in this study.

According to the SCT, an individual's behaviors are impacted by personal and environmental factors (Bandura, 1989). The possible factors that influenced the quit attempts among Western and Thai adolescent smokers were reviewed. Five variables are expected to relate with the quit attempts among Thai adolescent smokers which includes self-efficacy to resist smoking, motivation to quit, and nicotine dependence are considered as the personal factors, whereas time spent with peer smokers and intensity of smoking cessation intervention are considered as environmental factors. All of these variables were selected based on a research-evidence and its relationship which was strongly related to quit attempt.

Objectives of the study

1. To identify the predicting factors of quit attempt among Thai adolescent smokers
2. To examine the direct and indirect relationships of self-efficacy to resist smoking, motivation to quit, nicotine dependence, time spent with peer smokers, and intensity of smoking cessation intervention on quit attempt among Thai adolescent smokers

Hypotheses with rationales

Bandura's social cognitive theory (SCT) explains how people attain and maintain their behavior with a model which attempts to account for the interaction between behavior, person, and environment (Bandura, 1986). The literatures show that the factors related to adolescents' quit attempt are mixed between personal and environmental factors (Augustson et al., 2007; Borland et al., 2010; Branstetter, Horn, Dino, & Zhang, 2009; Bricker et al., 2010; Solomon, Bunn, Pirie, Worden, & Flynn, 2006).

The SCT is broad in scope of human behaviors. The study of specific behavior, particularly quit attempt, needs to deeply review the evidences in order to intertwine the relationships among influencing factors. Thus, the SCT and research-literature review were considered to select and guide the relationships among the variables in hypothesize model (Figure 1). The variables related to adolescents' quit attempt in this study include self-efficacy to resist smoking, motivation to quit, nicotine dependence, time spent with peer smokers, and intensity of smoking cessation intervention. The relationships of these variables on quit attempt are set in five statements as follows.

1. Self-efficacy is an individual's belief in his or her ability to accomplish a certain level of performance. The SCT posits that self-efficacy is a major determinant of outcome expectations (Bandura, 1986). People's beliefs in their personal efficacy influence what courses of action they choose to pursue, how much effort they will invest in activities and their flexibility following setbacks (Bandura, 1994). The higher level of self-efficacy, the more successful a person would be in making and maintaining behavior changes (Bandura, 2001). Self-efficacy is an important factor of quit attempt. Adolescent smokers will perform the quit attempt if they believe in their ability to resist smoking (Chang et al., 2006; Woodruff, Conway, & Edwards, 2008). An individual with high self-efficacy is more likely to perform the quit attempt and to continue his or her efforts to change behavior (Solomon et al., 2006; Sterling et al., 2007). Adolescent smokers that believe in their ability to refrain from smoking in situations in which people frequently smoke such as when being at party or at home, are more likely to be successful in the quit attempt (Solomon et al., 2006). Although, smoking at home and school are prohibited and restricted from parents and teachers, adolescents often smoke in those places without their parents or teachers finding out (Adelman et al., 2001; Bower, Carroll, & Ashman, 2012; Ellison et al., 2006; Wakefield et al., 2000).

Hypothesis 1: Self-efficacy to resist smoking has a positive direct relationship with the quit attempt.

2. Motivation is an individual's desire or need which inspires a certain behaviors as originated from intrinsic and extrinsic forces (Deci & Ryan, 1985). The intrinsic motivation occurs from inside the person such as health concerns. The extrinsic motivation occurs from a source outside of the individual such as family and

society (Ryan & Deci, 2000). The individual will engage in, or be attracted toward activities perceived as having the potential to meet his/her need or desire. A number of recent studies have confirmed that having motivation to quit smoking is necessary to initiate and to be successful in the quit attempt (Branstetter et al., 2009; Myers & MacPherson, 2008). Adolescent smokers succeed with the quit attempt reported high motivation to quit (Harris et al., 2008).

Hypothesis 2: Motivation to quit has a positive direct relationship with the quit attempt.

3. Nicotine is the main active ingredient in tobacco smoke that causes and maintains tobacco addiction. Nicotine obtained from smoking activates brain reward pathways and makes smokers feel happy, relaxed, and makes them more alert and energetic (DiFranza et al., 2002). Nicotine has an action inside the brain's pleasure center, produces tolerance, and leads to psychological and physical dependence. These mean that smokers must frequently and increasingly smoke in order to experience the pleasure of cigarette use, resulting in dependent of nicotine (Rosecrans & Karin, 1998). Overcoming nicotine dependence is a major barrier to the quit attempt, as the adverse symptoms associated with craving makes quit attempt difficult and relapse frequent (Heikkinen, Broms, Pitkaniemi, Koskenvuo, & Meurman, 2009). The craving is a powerful need for smoking and usually occurs during the first few weeks after quitting smoking (Bagot, Heishman, & Moolchan, 2007). Adolescent smokers find it difficult to refrain from smoking (Brandon et al., 2004; Vaid, 2008). The evidence shows that adolescent smokers who attempted to quit frequently reported craving. Adolescent smokers that have succeeded in the quit attempt reported fewer or less severe of this symptom than those that failed in their attempt (Centers for

Disease Control and Prevention, 2009; Gwaltney, Bartolomei, Colby, & Kahler, 2008; McDermott et al., 2009).

In addition, adolescents with high nicotine addiction demonstrate low self-efficacy to resist smoking (Gervais et al., 2006; Scragg et al., 2008; Van Zundert et al., 2009). Self-efficacy plays a role in an individual's belief in his/her ability to control his or her thoughts, feelings, behaviors, and the environment. When a person experiences the craving or withdrawal symptoms, his or her thought patterns about the ability to resist smoking will be influenced. Nicotine dependence maintains the habit of cigarette smoking among adolescents and the number of cigarettes per day will increase (McDermott et al., 2009). It is well documented that adolescent smokers with high levels of nicotine dependence have difficulties resisting smoking when they are exposed to close friends who are smokers and when they are bored or stressed (Gwaltney et al., 2008; Welte et al., 2011).

Hypothesis 3: Nicotine dependence has a negative direct relationship with the quit attempt and it has a negative indirect relationship with the quit attempt through self-efficacy to resist smoking.

4. Friends are crucial for adolescents' development because adolescence is a time of socialization outside home and many adolescents are influenced by the behaviors of their friends (Kobus & Henry, 2010; Okoli, Richardson, Ratner, & Johnson, 2009). Peer groups tend to be quite homogenous in adolescent substance use patterns, and thus, it is possible that friends who smoke could stimulate others to continue smoking and discourage quitting smoking. Spending more time with smokers implies less time in nonsmoking environment, resulting in fewer and failure in quit attempts (Stanton et al., 2006). Adolescent smokers are less likely to be successful in

the quit attempt if they spend more time with friend smokers (McVea et al., 2009; Tucker et al., 2005). Friend smokers can shape adolescents' perception that the majority of teenagers are smoking, pushing a non-smoker or smoker who attempt to quit in the direction of trying to continue smoking. Adolescent smokers reported difficulty in resisting smoking when their close friends smoked in front of them, teasing them, and offering them cigarettes (McVea et al., 2009).

Hypothesis 4: Time spent with peer smokers has a negative direct relationship with the quit attempt.

5. There is a strong relationship between counseling intensity and quitting success (Lancaster & Stead, 2005; Rice & Stead, 2009; Sussman & Sun, 2009). More intensive interventions are more effective and will provide a greater degree of contact between smokers and providers than low intensity interventions. The intensity of the intervention is defined as the amount of advice, counseling, self-help materials and follow-ups that provided by healthcare professions to help people quit smoking (Bize et al., 2006). The effectiveness of advice is greater if the advice is more intensive and includes a follow-up (Tobacco Use and Dependence Guideline Panel, 2008). Recently, smoking cessation intervention among adolescents ranged from less intensive efforts to more intensive efforts delivered to cigarette users either individually or in groups. In recent updates evidence of the benefit of a low intensity intervention has become weaker than that of more intensive intervention (Lancaster & Stead, 2005). Systematic reviews of smoking cessation interventions (e.g. Rice, & Stead, 2009) have confirmed that the high intensity of the intervention was related to quit attempt and long-term abstinence.

The evidence shows that most smoking cessation interventions is focused on enhancing adolescents' self-efficacy and motivation to quit (Myers & MacPherson, 2008; Rice & Stead, 2009; Solomon et al., 2006; Villanti, McKay, Abrams, Holtgrave, & Bowie, 2010). These interventions can be made more intense by increasing the amount of counseling, the amount of self-help materials, and the number of follow-ups that are provided by healthcare professions (Pbert et al., 2008; Rice et al., 2013; Sussman & Sun, 2009; Tobacco Use and Dependence Guideline Panel, 2008). The mean self-efficacy and motivation to quit scores of adolescent smokers that participated in those programs significantly improved at the end of the program (Chaiyaparn, 2009; Dumrongpiwat, 2009; Srimoragot, 2009).

Hypothesis 5: Intensity of smoking cessation intervention has a positive direct relationship with the quit attempt, and it has an indirect relationship with the quit attempt through self-efficacy to resist smoking and the motivation to quit.

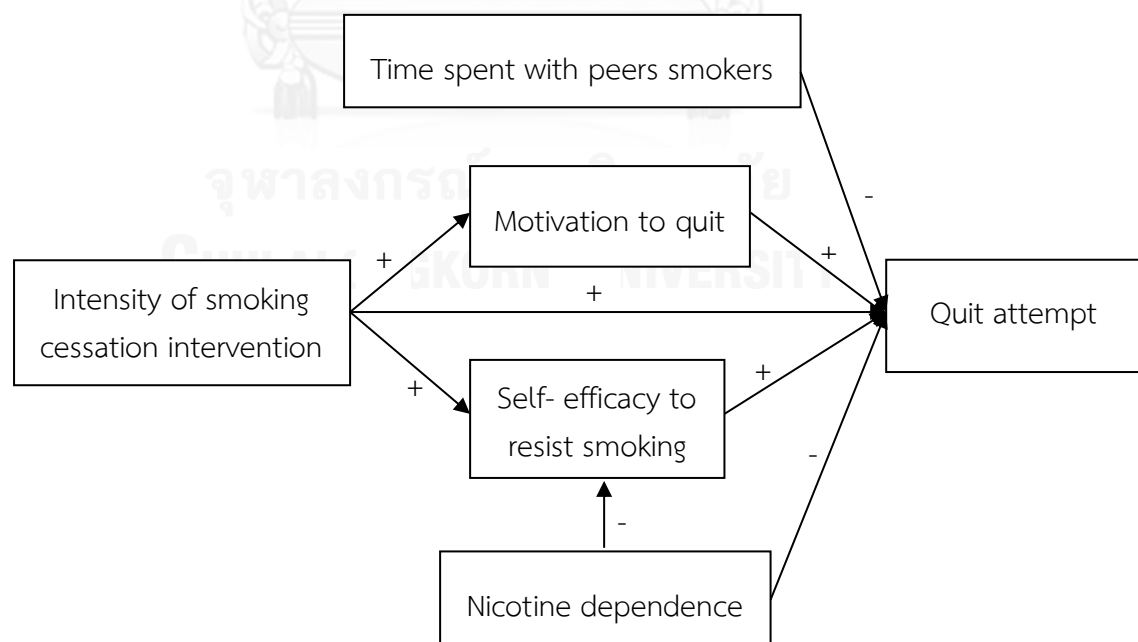


Figure 1 Hypothesized path model of the study

Scope of the study

This study examined the direct and indirect relationships of self-efficacy to resist smoking, motivation to quit, nicotine dependence, time spent with peer smokers, and intensity of smoking cessation intervention on quit attempt. The target population was Thai adolescent smokers that studied in grade7 to grade12. Schools that belonged to the Teacher's Network against Tobacco (TNT) in all regions of Thailand were the study settings. The data were gathered from October to December 2013.

Operational definitions

Quit attempt refers to the number of times that adolescent smokers stopped smoking for 24 hours during the past 30 days. It was measured by the "Quit attempt questionnaire-Thai version," modified by the researcher from Fagan et al.'s Quit attempt questionnaire (Fagan et al., 2007).

Self-efficacy to resist smoking refers to the adolescent smokers' belief in their ability to refrain from smoking in situations in which people frequently smoke that is, being at home, at a friend's house, at school, at a party, when stressed out, and when bored during the past 3 months. It was measured by the "Self-efficacy to resist smoking scale-Thai version," modified by the researcher from Vaid's Self-efficacy to resist smoking scale (Vaid, 2008).

Motivation to quit refers to adolescent smokers' desire to stop smoking originated from intrinsic and extrinsic forces during the past 3 months. The desire originating from within an individual (e.g., health concerns and self-image) is called intrinsic motivation, whereas extrinsic motivation refers to the desire from external sources outside of the individual (e.g., social concerns, financial considerations, and

anti-smoking policies). It was measured by the “Motivation To Quit Scale (MTQS),” which was developed by the researcher.

Nicotine dependence refers to the adolescent smokers’ difficulty to refrain from smoking during the past 3 months. It was measured by the “Hooked on Nicotine Checklist-Thai version (HONCT)” modified by the researcher from DiFranza et al.’s HONC (DiFranza et al., 2002).

Time spent with peer smokers refers to the amount of time in minutes that adolescent smokers spent with friends who smoked per week during the past 3 months. It was measured by the “Time spent with peer smokers questionnaire-Thai version,” modified by the researcher from Jones et al.’s Time spent with peer smokers questionnaire (Jones et al., 2004).

Intensity of smoking cessation intervention refers to the amount of individual or group counseling/advice, self-help materials, and follow-up services that adolescent smokers received from healthcare professions (physicians, nurses, psychiatrists, and dentists) in a wide variety of settings (hospitals, communities, schools, telephone quitline, and public/private health department clinics). It was measured using the “Intensity of Smoking Cessation Intervention Questionnaires (ISCIQ)” which was developed by the researcher.

Expected benefits

1. The study provides knowledge for nurses in promoting quit attempt and preventing the health problems related to smoking of Thai adolescent smokers.
2. Nurses can use the findings to guide and develop a smoking cessation program for Thai adolescent smokers.

3. The findings can guide nurses and researchers to develop further researches among Thai adolescent smokers.



CHAPTER II

LITERATURE REVIEW

This chapter presents a comprehensive literature review. The review covers the following topics: 1) smoking in adolescents, 2) adolescents' quit attempt, 3) factors influencing the quit attempt among Thai adolescents, 4) social cognitive theory, and 5) nurses' roles in quitting smoking.

Smoking in adolescents

Adolescence is the period in which the individual is required to adapt and adjust his or her childhood behaviors to culturally-acceptable adult forms. It is a developmental phase in which impulsivity, novelty seeking, and suboptimal decision making are considered to be normative traits (Chambers, Taylor, & Potenza, 2003), and in which individuals are still in the process of maturing and developing self-reflective and introspective skills (Steinberg & Cauffman, 1996). Adolescence is characterized as a stormy and stressful period of life. Adolescents' moods are influenced by hormonal processes and social cognitive, and environmental (Bower, Carroll, & Ashman, 2012). Family, school, and peer group also influence adolescent behavior. All of these influences are very important and will contribute to adolescent risk behaviors such as smoking, drinking, drug abuse, and engaging in unsafe sex (Bartlett, Holditch-Davis, Belyea, Halpern, & Beeber, 2006).

The initiation of cigarette smoking usually occurs during adolescence; around 80% of smokers in many countries (such as the USA, UK, Malaysia, Korea etc.) that have smoked daily reported having their first cigarette before the age of 18 years (Costello, Dierker, Jones, & Rose, 2008; Park, 2011; Siahpush et al., 2008; West,

McEwen, Bolling, & Owen, 2001). Adolescents struggling to establish a new self-identity use this behavior to rebel against the social norms of authority figures (Myers & Kelly, 2006).

In general, during the adolescence period an individual should start performing good habitual practice. It should also be a period when they learn about the negative effects of smoking such as harm to their health and wasting of money so that they will not become addicted to smoking (Gilpin, White, White, & Pierce, 2009). In contrast, adolescents' smoking behavior can often be predicted from their beliefs about the consequences of smoking and their values in attaining these consequences (Berg et al., 2009; Ling, Neilands, & Glantz, 2009). As adolescents always spend increasing time with friends, they are placed in new social contexts in which cigarette smoking may be more prevalent.

Smoking status is commonly broken down into three categories: current smoker, ex-smoker and never-smoker. Current smoker is identified as someone who has smoked greater than 100 cigarettes in their lifetime and currently smokes at least monthly. Ex-smoker is identified as someone who has smoked greater than 100 cigarettes in their lifetime, does not currently smoke, but used to smoke daily. The amount of time for which subjects were required to have refrained from smoking to be considered ex-smokers varied from 1 day (Yuan et al., 2000) to 5 years (Kreuzer et al., 1998). Never-smoker is someone who has not smoked (Le Calvez et al., 2005). The evidences in western showed that 20% of adolescent were current smokers, 30% were ex-smokers, and 50% were never-smokers (Audrain-McGovern et al., 2009; Australian Bureau of Statistics, 2008; Morrison, Banas, & Burke, 2003; Sterling et al., 2007).

Adolescents begin smoking for a variety of reasons, such as fashion and social pressure to smoke, which includes the imitation of smoking behavior and attitudes of parents and other adults. They also associate smoking with mature behavior and they view smoking as the popular thing to do. Smoking for them is also an outlet for school, social, or home pressures, and signifies their transition from childhood to adulthood. Once smoking behavior is established, smoking itself produces enough reinforcement to sustain the practice without the initial pressure (Costello et al., 2008). Adolescents may use cigarettes as a rite of passage from their former childhood and to mark the ongoing process of becoming adults. Smoking can provide many adolescents with the courage to engage in various peer-approved and high-risk behaviors. Although the dangers of smoking are well-known, the prevalence of smoking is still increasing (de Dios, Vaughan, Stanton, & Niaura, 2009). Smokers that started smoking when they were young are normally addicted to smoking and are less likely to perform smoking cessation successfully (Yearwood, Pearson, & Newland, 2012).

As of 2009, the Centers for Disease Control and Prevention estimated that 19.5% of adolescents in USA (15-18 years old) were current smokers (Centers for Disease Control and Prevention, 2009). The literature revealed that the onset of cigarette smoking among adolescents was from 15 to 18 years of age. For example, in North America and Western Europe, it was reported that regularly-smoking adults began cigarette smoking between the ages of 13 and 15 (Costello et al., 2008). Most adult smokers in the UK commenced their smoking habit before the age of 13 (82%) and still were smokers (West, McEwen, Bolling, & Owen, 2001).

The evidence showed that male adolescents admit to more cigarette use than female adolescents, where usage of cigarettes was more regular (daily). It has been suggested that drug use (including smoking) by females is more socially controlled and policed in general than that of males (Keane, 2000; MacDonald & Wright, 2002). The smoking prevalence rates increased in both the male and female population, where smoking prevalence among male adolescents was higher than female adolescents (Thakur, Lenka, Bhardwaj, & Kumar, 2010). However, female adolescent smokers showed a much larger increase. Moreover, the prevalence of smoking is higher among adolescents that exhibit low academic performance (e.g., a low grade point average compared with same-age adolescents that have a high grade point average (Audrain-McGovern et al., 2004). Adolescents that began to smoke before the age of 18 are more likely to smoke longer and to experience increased difficulty in smoking cessation (Ellison et al., 2006).

In conclusion, adolescence is the period where smoking begins. Large numbers of adolescents continue to initiate smoking and become regular cigarette smokers. The initiation of smoking in adolescence is associated with an increased likelihood of smoking in adulthood. Therefore, tobacco researches should essentially focus on this population.

Smoking in Thai adolescents

The prevalence of smoking has also increased in the young population (Petcharoen, Sensatien, Manosuntorn, & Autawat, 2011), and the prevalence of smoking among adolescent females varied between 0.10% and 1.29% during the period of 2004-2009 (Sommit, Meeyai, Iamanan, & Pitayarangsarit, 2013). The Tobacco Control Research and Knowledge Management Centre reported that the smoking

prevalence of Thai adolescents increased from 7.25% in 2007 to 7.62% in 2009 and to 9.21% in 2011 (Thipphayarangsarit, Aim-a-nan, Pankrajang, & Sommit, 2012). The adolescent smoking prevalence from year to year is not different. A recent statistical update reported that approximately 500,000 Thai adolescent were smokers each year (National Statistical Office, 2011).

A survey of smoking among 15-18 year-old smokers showed that the rate of male smokers increased to 14.36%, with the largest increases in the southern and northeastern regions (Bureau of Tobacco Consumption Control, 2009). Most of Thai adolescents who smoke were current smokers (70%), and 30% of those were ex-smokers (Meesawat, 2007). Moreover, the literature indicates that Thai male adolescents are more likely to initiate daily smoking than females (Sirichotiratana et al., 2008; Sirirassamee et al., 2009).

It has been estimated that 80% of smokers started smoking between the ages of 13 and 18 years (Green et al, 2007; U.S. Department of Health and Human Services, 2014). The behavior of Thai adolescent smokers is similar to other cultures, in that, curiosity is a predominant characteristic in smoking initiation in this age group (Supawongse, Buasai, & Tantigate, 1997). A survey on the smoking behavior of Thai adolescents in 1999 and 2009 showed that the mean age of adolescents when they start smoking is around 12-13 years of age (Homsin, Srisuphan, Pohl, Tiansawad, & Patumanond, 2009; Promnuch, 2006). The study also showed that Thai adolescent smokers aged between 13 and 18 (n=927) reported first smoking a whole cigarette at 14.6 years of age (SD=1.9). More than half (60.4%) of Thai who begins to smoke and current smokers bought cigarettes by themselves; and 7.5% said that someone

bought the cigarettes on their behalf (Sirirassamee, Sirirassamee, Borland, Omar, & Driezen, 2011).

The major reasons for cigarettes smoking on the part of Thai adolescences between the age of 15 and 18 were wanting to taste cigarettes, being persuaded by friends or imitating them, wanting to be a member of their group, being mature, wanting to be smart, having family members that smoked, and wanting to reduce their stress or anxiety (National Health Statistical Office, 2006; Vichit-Vadakan et al., 2004). Factors that influence Thai adolescents to smoke included age, gender, family conflicts, having positive attitude toward smoking, performance in school and smoking status among friends, teachers, parents and family members (Suwanteerangkul, 2000).

Almost all Thai adolescents enter in school. They spend a greater percentage of their time in school, because the Thai Constitution (2007) requires that government should provide a minimum of 12 years quality and free of charge basic education. This system consists of 6 years of primary school (grade 1 to 6) and 6 years of secondary school (grade 7 to 12). Therefore, the smoking prevalence among adolescents in school is higher than that of those who dropped out of school. Vichit-Vadakan and colleagues (2004) indicated that the prevalence of smoking among Thai school children aged 12 to 18 years was high. Moreover, adolescents in vocational schools were more likely to smoke than those in secondary schools.

Aforementioned, most of Thai adolescent smokers started smoking at an early age. School represents the second most influential environment in an adolescent's life, having home as the primary/first. As a result, school adolescents initiate smoking. Schools have been a long priority setting for adolescents' health

promotion activity (Steinberg & Cauffman, 1996; Yearwood, Pearson, & Newland, 2012). Furthermore, a study of health risk behaviors among Thai students in grades 7–12 indicated that tobacco use was the most prevalent health risk behavior among this age group (Bunjaroonsilp, 2005). Therefore, to be most effective, smoking cessation programs for Thai adolescents should focus on secondary school (grade 7 to 12).

In brief, the prevalence of smoking in Thai adolescents has increased. Most of them enter in school and the prevalence of adolescent smokers in grade 7-12 was high. Encouraging Thai adolescent smokers in this group to perform quit attempt is the benefit. Therefore, this study was focused on adolescent smokers in grade7-12.

Tobacco control policies in adolescents

The smoking prevalence rates among adolescents are still alarmingly high worldwide (Centers for Disease Control and Prevention, 2012). The explanation is that most of the tobacco industry has shifted its target marketing to the young population. The marketing efforts involve promotional activities that reduce the price of cigarettes and the use of other forms of tobacco, such as smokeless tobacco. Moreover, adolescents are likely to be exposed to messages and images about smoking in movies, video games, and websites.

Consequently, many countries (e.g., USA, Australia, Canada, Singapore, etc.) are concentrating on public health policies to protect young people from the tobacco industry, for instance, the prohibition of smoking in school, precautions printed on cigarettes boxes, and the prohibition of persons under 18 of age to buy cigarettes (Lando et al., 2010). In Thailand, the Thai government recognizes the importance of the problems of tobacco use by the young and much of Thailand's

tobacco control efforts have been achieved by government and nongovernment organizations (NGOs). Since 1992, Thailand had legislated two tobacco control laws. They are the Tobacco Products Control Act and the Non-smokers' Health Protection Act. The Tobacco Products Control Act (1992) banned advertising in the electronic, print media and on billboards. Additionally, the sale of tobacco products to persons under 18 years and the sale from vending machines are also prohibited, as sales of smokeless tobacco too. But the policies are not enforced in the year (Vathesatogkit, Hughes, & Ritthphakdee, 2000). The enforcement increased to 50% in 2002, and ends with 75% of full enforcement in 2006 (Levy et al., 2008). The Non-smokers' Health Protection Act banned smoking in public places and workplaces. The places with total ban include all public transports, outdoor exercising, learning park or center, occupation train center, cinemas, stores, public park, zoo, botanical park, bank institution, oil or gas station, passenger terminal of all kinds including airport, boat pier and air-conditioned restaurants/internet shop etc.

In 2008, the tobacco control policies in Thailand was developed based on the MPOWER: Monitor tobacco use and interventions, Protect people from tobacco smoke, Offer help to quit tobacco use, Warn about the dangers of tobacco, Enforce bans on tobacco advertising, promotion and sponsorship, and Raise on tobacco taxes and develop sustainable alternatives to tobacco growing. In addition, the Thai Health Professional Alliance against Tobacco is a group that has capacities for policy implementation, including leadership and commitment to tobacco control and program management. These policy strategies continually achieve (Bureau of Tobacco Consumption Control, 2009).

In addition, the Nation Plan and Policies for Tobacco Control in Thailand (2010-2014) was set up to protect young people from smoking, following the World Health Organization's (WHO) - Framework Convention on Tobacco Control (FCTC), in which one strategy aimed on the prevention of the initiation of smoking on the part of new tobacco consumers, related to adolescents, by providing education to youth and teachers, limiting or preventing appeals to youth's smoking initiation, preventing the youth from having access to tobacco, and supporting quit-smoking program for smokers. The Ministry of Health has directed all trading units in all health premises around the country to refrain from selling cigarettes (Bureau of Tobacco Consumption Control, 2009)

It is uncertain whether the tobacco control strategies are effective in Thailand knowing that the prevalence of adolescent smokers is still increasing. Not only have policies been set up by the government and non-government organizations, but also tobacco control campaigns have been established targeting Thai adolescents (World Health Organization, 2011).

Understanding Thailand's tobacco control policies requires an appreciation of the complex sociocultural, political, and even personal dynamics. These interact can shape Thai's thinking and policymaking to prevent the effects of smoking on Thai population. The outcome of this study will provide the predictors of quit attempt in adolescent smokers that the important precursor to develop and to be successful in quit-smoke program are the policies recommended.

Teacher's Network against Tobacco (TNT)

Recognizing the smoking prevalence among adolescents in schools, the Action on Smoking and Health (ASH) Foundation created the project called the Teacher's Network against Tobacco (TNT). The TNT was established in Thailand since 2005 with objectives to improve the capacity of teachers as a stronger campaigner, in order for them to be able to use information for solid campaign planning and proceed activities to correlate with school context, to promote and support teachers to build up capacity and potentially initiate tobacco control activities, especially, to protect children and youth from the health hazards of cigarette smoke. The teachers have been trained to be a counselor or advisor for providing smoking prevention and smoking cessation intervention (Action on Smoking and Health Foundation, 2005). The teachers have the potential in providing an intervention and campaign for smoking cessation to their students. In each school, teachers are required to report their task to the foundation (e.g., the number of student smokers, the results of the intervention, etc.). Examples of activities are building up of smoke-free school policy, participating in opposing the display of cigarette packs or logos in stores, preparing and testing curricular on smoke-free secondary schools, etc.

In 2012, there were around 35,000 schools in Thailand (Ministry of Education, 2012) wherein, only 1,000 schools joined in the TNT campaign (Action on Smoking and Health Foundation, 2012). Those schools had students that ranged from elementary to the high school level. The majority of TNT schools were located in a big city such as Chiang Mai, Bangkok, Rayong, Khonkaen, and Songkla. The possibility explanation is that schools in rural areas had lack of resource and opportunity to receive the smoking information campaigns and they are less likely to join due to

lack of interest with the said project. The intensity of the intervention differs in each TNT school. The intensity of implementation level differs between individuals and schools, and as an overall, the most important and concrete achievement developed so far by TNT is the development of policy for schools to be smoke free environment according to the law. This project is expanding to cover more schools in all areas.

Teaching and learning extended achievements in schools under TNT compared to school outside of the network, all of which would be evaluated for its success and achievements, and then the results will be useful for the development of appropriate TNT activities. However, the effectiveness of intervention provided by teachers in TNT schools has not been proved. Only one study was conducted to evaluate this project; Chomchoey and colleagues (2011) found that 96.5% of adolescents from TNT schools (N=459) have acknowledged and received information about campaigns against smoking and knowledge on the harmful effects of smoking, whereas 94.3% of adolescents from non-TNT schools (N=477) have acknowledge and received information. The attitude for not smoking in adolescents from TNT schools and non-TNT schools was no significant difference ($t=1.31$, $p=0.19$).

During the data collection processes of this study, the researcher had a chance to interview 23 teachers that were smoking cessation counselors in 23 TNT schools from all regions of Thailand. Based on the interview, adolescent smokers in TNT schools often receive mixed interventions regarding school policies concerning tobacco use in the schools. School policies designed to assist adolescents with tobacco prevention, education, and cessation. Some adolescent smokers received many sessions of counseling and follow-up from healthcare professions; however,

many schools often lacked resources to enforce policies and many schools did not provide any intervention for adolescent smokers. The teachers pointed out that the interventions that are provided in TNT schools may not differ from those in non-TNT schools. The teachers reported that they tried to offer the classes to develop knowledge regarding the adverse health effects of tobacco, but it lacked content in developing skills to resist smoking. Most of teachers indicated that the interventions they provide were not effective.

The literature indicated that the suitably-trained counselors are recommended for effective smoking cessation intervention (Stead, Bergson, & Lancaster, 2008). For instance, counselors of Thailand National Quitline (TNQ) were both theoretically and practically trained for at least three months (Thailand National Quitline, 2013). Evidence also proves that quitline is an effective service (Yunibhand, Chaiyawat, Preechawong, & Rojnawee, 2013). On the other hand, the teachers in TNT schools have been trained to be a counselor for 1-3 days (Action on Smoking and Health Foundation, 2005). It would not be suitable for addictive behaviors. Therefore, the evidence showed that the effectiveness of schools smoking cessation programs in Thailand remains inconclusive (Termsirikulchai, Benjakul, Kengganpanich, Theskeyan, & Nakju, 2008; World Health Organization, 2011).

In conclusion, adolescent smoker's characteristics and environment in TNT schools and non-TNT schools is not much different, and the effectiveness of TNT school's intervention has not been proved. However, providing intervention is better than no intervention. Determining the prevalence of adolescent smokers is difficult because they keep smoking as secret. TNT schools are the places which

have the report about information and prevalence of adolescent smokers. Therefore, the TNT schools were used as the study setting.

Effects of smoking on adolescents' health

Smoking is a major health hazard as well as the chief preventable cause of death worldwide today (Centers for Disease Control and Prevention, 2012). The hazards of smoking at any age are undisputed; however, a preventive approach to adolescent smoking is important. Because of its addictive nature, smoking begun in childhood and adolescence can result in a lifetime habit, with increased morbidity and early mortality (Andrews & Tingen, 2006).

Most adolescent smokers are aware of the hazards of smoking, yet thousands of them begin smoking each year. Many of these adolescent smokers have an optimistic bias, believing that the dangers do not apply to them. In addition to this optimistic bias, studies have examined at least four explanations for why people begin smoking while being aware of the dangers of this practice. These reasons include genetic predisposition, peer pressure, advertising, and weight control (Kleinjan, van den Eijnden, & Engels, 2009).

Since the early 1950s, scientific evidence has documented that more than twenty five diseases are strongly suspected to be causally associated with smoking, such as lung cancer, and asthma (Centers for Disease Control and Prevention, 2012). Although the onset of early smoking may appear harmless, it will form a serious health problem in the future, not only for an active smoker but also for a passive smoker (Brook et al., 2006). Apart from these health consequences, smoking is also a significant economic burden on families and societies. In addition, smoking is known as a “gateway drug” that often leads to other, more serious, substance abuse, such

as marijuana, cocaine, heroin, opium, and alcohol (Nelson et al., 2008). Cigarette smokers are more likely to get into other risk behaviors such as fighting, and carrying weapons (Oksuz, Mutlu, & Malhan, 2007).

The literature indicates that adolescent smokers are aware of the health effects and negative consequences related to smoking. Adolescent smokers perceived the positive and negative consequences of cigarette smoking including emotional benefits, long-term health hazards, self-confidence, and body image. The authors concluded that adolescents were aware of the health risk associated with smoking (Murphy-Hoefer, Alder, & Higbee, 2004).

Similarly, the International Tobacco Control Policy Project (ITC) in Thailand has interviewed 3,000 smokers from across the country. One thousand were aged 13 to 17 in both smokers and non-smokers. There were 328 adolescent smokers in wave 1 to wave 2 and 182 adolescent smokers in wave 2 to wave 3. The study found that Thai adolescent smokers have a remarkably high awareness of the risks of smoking and are highly influenced by health warnings and tried to quit, but they remain unsuccessful (Siahpush, et al., 2008).

In conclusion, smoking in adolescent is the leading cause of various health problems. Although, the negative effects of smoking are considered by adolescents, the smoking prevalence among adolescents is still increasing. Helping adolescent smokers perform quit attempt is an important precursor for solving the problems.

Adolescents' quit attempt

Many authors defined the quit attempt, for example; the Oxford Dictionary (2009) defined "quit" as to leave, usually permanently, or stop or discontinue. "Attempt" is defined as making an effort to achieve or complete something difficult.

In addition, quit attempt was defined as the number of times that smoker stopped smoking (Ershler, Leventhal, Fleming, & Glynn, 1989), number of attempts to completely refrain from smoking of 24-hour periods of abstinence from cigarettes (Centers for Disease Control and Prevention, 2009; Starr et al., 2005), number of 24 hour periods of abstinence in the last 30 days (Etter & Sutton, 2002), in the last two to six months (Pallonen, Prochaska, Velicer, Prokhorov, & Smith, 1998), in the last 12 months (Burt & Peterson, 1998) or in the last three years (Engels, Knibbe, de Vries, & Drop, 1998). The evidence showed that quit attempts in the previous 30 days are better predictors of smoking cessation than quit attempts in the past 12 months (Etter & Sutton, 2002; Tzelepis et al., 2012).

Most definitions of quit attempt in the smoking cessation literature specify a time-period. The length of smoking abstinence ranges from at least 24 hours and extends up to 6 months (Hughes et al., 2014; Mermelstein et al., 2002). Quit attempts can be measured by recording “how many times did smokers attempted to quit for 24 hours” (Moran, Wechsler, & Rigotti, 2004; Zhou et al., 2009). Twenty-four hours of abstinence from smoking as an initial outcome measure which suggests that smokers have taken a minimal amount of action towards smoking cessation (Clark, Kviz, Crittenden, & Warnecke, 1988). In brief, quit attempt refers to the number of times that smokers stopped smoking for 24 hours.

The number of recent quit attempts among smokers is generally seen as a predictor of smoking cessation. Adolescent smokers that made any quit attempts that lasted longer than 24 hours are much more likely to succeed in quitting smoking than those that have not sustained to quit for that long (Moran et al., 2004).

The literature in Western countries has shown that around 70% of adolescent smokers want to stop smoking and frequent quit attempts were reported, but they remain unsuccessful. For example, 65% of adolescent smokers in Switzerland (N=728) had previously attempted to quit, and only 17% of them were motivated to make the quit attempt within the next 6 months (Bachmann et al., 2012). Adolescent smokers in Florida were less likely to made one or two quit attempts. Younger (age, 16 years) and non-daily smokers experienced a similar or higher prevalence of quit attempts compared with older (age >16 years) or daily smokers (Bancej et al., 2007). Around 63.5% of adolescent smokers (N=2,033) in USA reported making a quit attempt in the last year, only 10% of them were able to successfully quit (Abrantes et al., 2009).

Self-quitting was the most frequently used as smoking cessation method for adolescent smokers. For example, adolescent smokers in USA (n=4,401) have stopped smoking without acknowledging making a quit attempt, less likely to have used a quit aid (OR=0.28 [95%CI=0.13–0.59]), and less likely to display pro-tobacco attitudes/beliefs and only 25% of the self-quitters had been successful (McClure et al., 2013). The literatures indicated that many health centers offered cessation programs for adolescent smokers. However, most of them had no one waiting for services, and a few of them had even discontinued the program because of the lack of interest (Solberg, Asche, Boyle, McCarty, & Toele, 2007; Wechsler et al., 2001).

Quit attempt in Thai adolescents

In Thailand, there is a little research on the quit attempt of adolescents regarding smoking; the majority of studies have focused on smoking cessation programs. The evidence indicated that most of Thai adolescent smokers want to

stop smoking, but few of those that attempt to quit are successful. Supawongse, Buasai, and Tantiket (1997) surveyed 5,598 Thai adolescents (15-22 years old) in 16 provinces across the country and showed that 74.1% of subjects who smoke reported that they wanted to stop smoking; 60.7% were taught about the specific health effects of tobacco use, and 82.0% stated that they had tried to stop smoking during the past year but they failed.

A study also showed that most of Thai adolescent in Bangkok had tried smoking, while those who tried to quit went back to smoke. The most successful quitters indicated that they could not successfully quit at the first time and they often went back to smoke because they could not resist their craving and could not resist smoking seeing their friends smoke (Ua-kit, 2006)

Similar with other countries, Thai adolescent smokers frequently reported self-quitting. The strategies that most frequently used were abruptly stopping, chewing gums or candy, and gradually reducing number of cigarettes per day. A small percent of these smokers asked for helps from health care personnel. This information implies that a great number of adolescents remain smoking and it is rather difficult to be successful in attempting to quit (Chaiyapan, 2009; Promnuch, 2006; Sirichotiratana et al., 2008).

Quit attempt measures

Today, no standard measures of the quit attempt does exist. The quit attempt is typically assessed by a single-item questionnaire and the quality of measures were not established. Three questionnaires have been developed, but the names of those measures were not addressed.

Fagan et al. (2007) created a questionnaire for assessing quit attempts in young adult smokers by asking: “How many times during the past 12 months have you stopped smoking for 1 day or longer?” Responses were categorized into 1 or more quit attempts and zero quit attempts.

Zhou et al. (2009) developed a measure of quit attempts for adults in their cohort study as defined by affirmative response to the question “During the past 3 months, have you made a serious attempt to stop smoking for good that lasted for at least a day (24 h)?” This definition excludes quit attempts that lasted less than a day, helping to ensure that only serious quit attempts were counted.

MacFarlane et al. (2011) developed questionnaire to measure the number of quit attempts by asking adult smokers: “In the last three months, how many times did you make a serious effort to quit?” There were seven response options which ranged from none up to more than 10 times.

Most of the existing instruments were developed in Western countries, and no psychometric properties were tested; however, Fagan et al.’s instrument can be applied to this study. The construct of this concept is similar with this study. However, a modification processes and psychometric testing are needed.

In conclusion, quit attempt refers to the abstinence from smoking for 24 hours. Most of adolescents who smoke tried to make quit attempt during the past, especially in 30 days, but they remain unsuccessful. The explanation about the factors that affect or predict this behavior is necessary to help adolescents successful in their attempt.

Social cognitive theory

Social cognitive theory (SCT) is based on the social learning theory that was developed by Bandura in 1986 and has been used in health behavior aspects such as nutrition health promotion, prevention and tobacco cessation programs, and healthy heart programs (DiClemente et al., 2013). SCT rests on several basic assumptions. First, humans have flexibility to learn a variety of behaviors in diverse situations. Second, the model that includes behavioral, environmental, and personal factors are triadic reciprocal causation. Humans can evaluate and regulate their cultural and social environments into relatively consistent ways. Third, humans have the ability to control over the nature and quality of their lives. People are the producers as well as the products of social systems. Fourth, external and internal factors were regulated form people. Internal factors include self-observation, judgmental process, and self-reaction, whereas external factors include people's physical and social environment. Fifth, people response their actions by attempting to regulate their behavior through moral agency. When people face with morally ambiguous situations, they typically attempt to redefine the behavior, dehumanize or blame the victims of their behavior, disregard or distort the consequences of their behavior, and displace or diffuse responsibility for their actions (Bandura, 1989; Feist & Feist, 2009).

The theory favors a conception of interaction based on triadic reciprocity (Bandura, 1989). In this model of reciprocal determinism, which is summarized schematically in Figure 2, behavior, cognitive and other personal factors, and environmental influences operate interactively as determinants of each other. The unique feature of SCT is the emphasis on social influence and its emphasis on external and internal social reinforcement.

SCT evaluates individuals and their behavior as it pertains to environmental and social influences. In the social cognitive view people are driven by inner forces nor automatically shaped and controlled by external stimuli. Rather, human functioning is explained in term of model of triadic reciprocity in which behavior, cognitive and other personal factors, and environmental events operate as interacting determinants of each other.

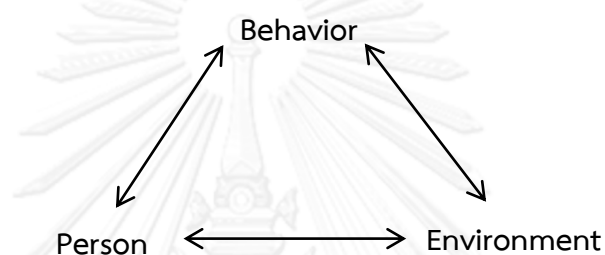


Figure 2 Schematic of the relations between the three classes of determinants in triadic reciprocal causation

In this triadic reciprocal determinism, the term reciprocal refers to the mutual action between causal factors. The term determinism is used in this model to signify the production of effects by certain factors, rather than in the doctrinal sense of actions being completely determined by a prior sequence of causes operating independently of the individual. Many factors are often needed to create a given effect. Because of the multiplicity of interacting influences, the same factor can be a part of different effects. Particular factors are, therefore, associated with effects probabilistically rather than inevitably (Bandura, 1989).

By “person” Bandura means largely, but not exclusively, such cognitive factors as memory, anticipation, planning, and judging. Because people possess and use these cognitive capacities, they have some capacity to select or to restructure

their environment: that is, cognition at least partially determines which environmental events can be used in the future.

Environmental influences can affect persons apart from their behavior, as when thoughts and feelings are modified through modeling, tuition, or social persuasion. Personal determinants are not disembodied from the person presiding over them and his or her physical characteristics. People also evoke different reactions from their social environment through their physical characteristics, such as their age, size, race, sex, and physical attractiveness.

It is important to understand that reciprocal triadic causation involves all three pathways collectively. Bandura defines behavior as an act that produces an outcome, and an outcome as the consequence of a behavior. Without these outcome expectations being realized, the person may easily lose interest in repeating the behavior day after day and may succumb to perform risk or unhealthy behaviors. Thus it is the behavior that led the person to change his or her outcome expectation. However, this altering of outcome expectations is less likely to occur in a supportive environment, which provides extrinsic positive reinforcement for the risk behaviors. The triangle, in essence, operates as a whole, never as independent parts.

Applying the SCT in smoking cessation behavior, based on the principles of this theory, individual behaviors are affected by learning from peers, parents, tobacco advertisement, and other influences within the community. The behavioral differences among populations were related to the individual's learning environment that varied based on culture, community structure, social support channels, and geographic location (Lee, Akers, & Borg, 2004). The SCT can be predicting the outcomes of a serious quit attempt of daily smoking adolescents. Adolescents are

subject to cigarette smoking in various settings and stages in life that directly and indirectly influence initiation and daily smoking, and quit attempt (Van Zundert et al., 2009). Previous studies used the SCT for predicting adolescents' smoking cessation which includes the individual's perception on the importance of quitting (Branstetter et al., 2009), commitment to quitting smoking (McCuller et al., 2006), motives for smoking (Myers, McCarthy, MacPherson, & Brown, 2003) and self-efficacy for quitting (Solomon et al., 2006).

The SCT was chosen for this study based on its ability to evaluate influencing factors that are potential factors for adolescents' quit attempt. In particular, the theory is used to guide the variables into study and explain the interrelationships of personal, environmental, and behavioral factors.

Factors influencing the quit attempt among Thai adolescents

A number of previous studies have examined the factors that influenced the quit attempt among adolescent smokers. The majority of these works have focused on the factors connected with successful quitting (i.e., cessation). The literature highlighted the importance of examining the factors of attempts separately from the factors of successful quitting (Rose et al., 1996). This assertion is open to challenge in view of the difference in smoking patterns, lifestyles, and attitudes between smokers that have successfully quit and those that have attempted to quit. The findings from this study motivate many researchers to conduct the researches on quit attempt in adolescents because quit attempt is an important precursor to perform successful quitting, and has the potential to reduce health problems (Bachmann et al., 2012).

The conceptual framework for this study is based on the social cognitive theory and literature-review. The literatures relevance on quit attempt were

reviewed, including the literature examining the relationships between the quit attempt and the independent variables, which were self-efficacy to resist smoking, motivation to quit, nicotine dependence, time spent with peer smokers and intensity of smoking cessation intervention. The theoretical definition, operational definition, relationship to quit attempt and the measure for each influencing factor are presented as follows.

Self-efficacy to resist smoking

Self-efficacy is the central concept of the social cognitive theory established by Bandura, who stressed that human behavior is affected by efficacy expectation and outcome expectation. Regarding efficacy expectation (or called self-efficacy), “self” is the identity of a person while “efficacy” is defined as the power to produce an effect. The combination of these meanings implies an individual’s belief in his or her capabilities to organize and execute courses of action. It determines one’s willingness to face a difficult situation. When lacking self-efficacy, a person is likely to be overwhelmed by thoughts of fear and frustration. On the other hand, high self-efficacy leads to resolved actions that one takes to overcome a challenge (Bandura, 1997).

Bandura’s conceptualization of self-efficacy has been directly adapted to addictive behaviors, including smoking cessation. It should be noted that different terms are often used interchangeably in the literature to refer to self-efficacy related to smoking cessation, including self-efficacy to quit smoking (Joseph, Manafi, Lakovaki, & Cooper, 2003), quitting self-efficacy, smoking cessation self-efficacy (Brown et al., 2003), smoking refusal self-efficacy (Chang et al., 2006), and self-efficacy/confidence to resist smoking (Adelman et al., 2001). The majority of these

terms (refusal, resist, avoid, refrain, abstain) focus not just on the single act of quitting but also on one's ability to sustain a quit attempt. Therefore, the generic term self-efficacy to resist smoking was used in the current study.

There has been much evidence supporting the role of self-efficacy to resist smoking in predicting successful attempts to quit as well as with the initiation of a quit attempt (Adelman et al., 2001; Gwaltney et al., 2009; Solomon et al., 2006; Sterling et al., 2007; Vaid, 2008). Self-efficacy to resist smoking is defined as a belief in one's ability to abstain from smoking in situations in which people frequently smoke such as at a party, at home, etc. (Adelman et al., 2001).

Self-efficacy is important to behavioral change and maintenance. People with low self-efficacy for a particular task may dwell on their personal deficiencies rather than thinking about how to accomplish the task (Bandura, 2001). In contrast, the evidence indicates that feelings of self-efficacy concerning a particular behavior activate people to engage in or resist that new behavior. The higher level of self-efficacy, the more successful a person would be in making and maintaining behavioral changes. A person is less likely to try to change his or her behavior, if he or she has little or no ability to control that behavior. If he does decide to try, he is more likely to give up when results are not immediate or setbacks occur (Bandura, 1997).

Self-efficacy is composed of four major sources: physiological and affective states, vicarious experience, enactive mastery experience, and verbal persuasion. First, physiological and affective states influence the judgments of capability. People with skills to reduce aversive physiological reactions will evaluate their self-efficacy as higher. Second, vicarious experience is a way of influencing the capability. The

success of others can enhance people's belief about their own capabilities. Next, enactive mastery experience provides the most influential source of efficacy information, because it is based on authentic mastery experiences. Fourth, verbal persuasion involves exposure to the verbal judgments of others and is often used in combination with other sources (Bandura, 1997).

Adolescent smokers that believe in their ability to refrain from smoking in various situations, such as when being at a party, at school or at home are more likely to be successful in the quit attempt (Solomon et al., 2006). Smoking at home and school are prohibited and restricted from parents and teachers, but adolescent smokers often smoke in those places (Adelman et al., 2001). Adolescent smokers reported that there's nothing to do at home, they often find the way to smoke in their house where their parents will not find out. For example, they are going to smoke at night when everyone is sleeping and when taking a bath where they use deodorant/air freshener to remove the smell. Adolescents in school have to deal with peer pressure and most of them were asked by their friend to smoke with him/her. They were told also to go to a place where no one else will go such as an old toilet or storage room in school for smoking, resulting in failure to quit (Bower, Carroll, & Ashman, 2012; Ellison et al., 2006; Wakefield et al., 2000).

Adolescent smokers that participate in a smoking cessation intervention have high self-efficacy in resisting smoking, and that self-efficacy in resisting smoking predicted the increased odds of abstinence (Woodruff, Conway, & Edwards, 2008). Adolescent smokers that have a high level of self-efficacy to resist smoking are more likely to experience a successful attempt and cessation rate. For example, twenty-three percent (N=494) of high-school students in Taipei from 39 classes in 16

vocational schools reported smoking at baseline, of which 15.4% stopped smoking by the third follow-up time point. For quitters, protective factors such as refusal self-efficacy had increased over time (Chang et al., 2006).

In addition, the history of quit attempts will affect the beliefs about future quitting. Adolescent smokers who have never tried to quit and haven't failed yet may have higher quit self-efficacy just as those smokers who made a successful quit attempts that had higher levels of self-efficacy. Prior quit attempts that resulted in a longer period of abstinence were associated with enhanced quit self-efficacy. Those who never tried to quit felt more efficacious than those whose prior attempts were short lived (24 hours) (Yzer & van den Putte, 2006).

Self-efficacy to resist smoking measures

Currently, existing measures for assessing self-efficacy to resist smoking have been developed and are being used for adolescent smokers. These include three measures: 1) the Smoking Self-Efficacy Questionnaire (SSEQ), 2) the Smoking Self-Efficacy Survey questionnaire (SSES-36), and 3) the Self-efficacy to resist smoking scale. The details of each measure are described below.

The classical smoking self-efficacy instrument is the Smoking Self-Efficacy Questionnaire (SSEQ) by Colletti, Supnick, and Payne (1985). The scale consists of 17 items, and was designed to measure an individual's ability to resist the urge to smoke in 17 different situations. The CVI was acceptable. The internal consistency coefficient was .90 at pre-treatment and .91 after treatment of 3 weeks. This instrument was developed for Western adult smokers and applied for adolescents. Each item uses a 7-point Likert-type scale ("not at all sure I am able to"

(-3) to "very sure I am able to" (+3)). This instrument is an old version and there are many redundant items.

The Smoking Self-Efficacy Survey questionnaires (SSES-36) measured the self-efficacy to resist smoking in adolescent smokers, developed by Lawrance (1989). This instrument was based on Bandura's self-efficacy theory and assessed adolescents' perceived ability to resist smoking. The SSES-36 consists of three subscales, opportunity to smoke, emotional stress, and the influence of friends, each containing 12 items, for a total 36 items. Higher scores on each subscale indicated increased perceived ability to resist smoking. Each item uses a 6-point Likert-type scale, ranging from 1 for "I am very sure I would smoke" to 6 for "I am very sure I would not smoke". Exploratory factor analysis (EFA) produced three factors with a factor loading for each item higher than 0.6 and Cronbach's alpha ranged from .94 to .97. There are many redundant items, such as How sure are you that you could resist smoking cigarettes: When you are uptight, When you are bored, When you feel frustrated or When you want to look cool, When you want to look better etc. Moreover, it is a long version and takes more time for answering; therefore it would not be appropriate to use as sample for adolescents in school setting because of time constraint.

The Self-efficacy to resist smoking scale was developed by Adelman et al. (2001) to specifically use for adolescents smoking cessation. The self-efficacy to resist smoking scale was identified domains where people frequently smoke. This scale consists of 7 questions: "How confident are you that you will be able to quit smoking?" and "How confident are you that you will be able to resist smoking in the following situations: at home?, at a friend's house?, at a party?, at school?, when

bored?, and when stressed out?” Responses were scored on a 6-point scale ranging from “I am completely sure I will NOT quit [resist] smoking” (score= 1) to “I am completely sure I will quit [resist] smoking” (score= 6). Psychometric properties were not established for this measure.

In 2008 Vaid conducted a study entitled “Self-efficacy to resist smoking as a mediator between nicotine dependence and quit attempt in Adolescent smokers in Alabama.” The self-efficacy to resist smoking scale (Adelman et al., 2001) was modified in the study. The revised version consists of 6 items: “How do you feel about being able to resist smoking in the following situations: at home?, at a friend’s house?, at a party?, at school?, when bored?, and when stressed out?” Response options were presented using a 5-point Likert-type scale (completely sure I could keep from smoking to completely sure I could not keep from smoking). Vaid (2008) established a Cronbach’s alpha of .86 for this scale based on the data for the Evaluation of the Not-On-Tobacco Smoking Cessation Program for Adolescents (Kohler, Schoenberger, Beasley, & Phillips, 2008). This instrument was designed specifically for adolescent smokers, and focuses on self-efficacy as it relates to the adolescent’s belief in his or her ability to refrain from smoking. It is a short version, is easy to answer, no redundant items and an acceptable range of reliability.

In conclusion, this study, self-efficacy to resist smoking refers to the adolescent smokers’ belief in their ability to refrain from smoking in situations in which people frequently smoke that is, being at home, at a friend’s house, at school, at a party, when stressed out, and when bored during the past 3 months. It was measured by the “Self-efficacy to resist smoking scale-Thai version,” modified by the

researcher from Vaid's Self-efficacy to resist smoking scale (Vaid, 2008). The details of modification processes and psychometric testing are presented in Chapter III.

Motivation to quit

The word "motivation" comes from the Latin root meaning "to move" and is an attempt to understand what drives people in a certain direction or toward a certain objective. The concept of motivation is typically described through the tenets of self-determination theory (Deci & Ryan, 1985). Self-determination is a quality of human functioning that involves the experience of choice, in other word, the experience of an internal perceived locus of causality. It is integral to intrinsically motivated behavior and is also evident in some extrinsically motivated behaviors. Stated differently, self-determination is the capacity to choose and to have those choices, rather than reinforcement contingencies, drives, or any other forces or pressures, be the determinants of one's actions. But self-determination is more than a capacity; it is also a desire or need (Deci & Ryan, 1985).

Self-determination theory emphasizes on stimulus-response associations that developed through reinforcement (i.e., drive-reduction) processes. It indicates that the human organism is innately active and is also vulnerable to being passive and to develop fractionated structures. These vulnerabilities are the means through which the organism becomes conditioned and through which its psychological functioning becomes rigid. The theory describes motivation as an individual's desire or need which inspires a certain behavior as originated by stimulating forces (Deci & Ryan, 1985). These forces occur from inside and outside of the individual. Action or behavior does not occur spontaneously but is induced by either internal motives or environmental incentive. Intrinsic motivation, in contrast, does not come from an

external source but instead is inherent in the activity being performed. Extrinsically motivated behavior is coerced (forced) by environmental contingencies, while intrinsically motivated behavior is freely chosen. The individual will engage in, or be attracted toward activities perceived as having the potential to meet his/her need or desire (Deci & Ryan, 1985).

With regard to smoking, motivation is defined as a smoker's desire to stop smoking originated by stimulating forces. The desire originating from within an individual (e.g., health, self-image) is called intrinsic motivation, whereas an extrinsic motivation refers to external sources outside of the individual (e.g., friends, family, social pressures) (Curry, Sporer, Pugach, Campbell, & Emery, 2007; Downey, Rosengren, & Donovan, 2001; Joseph, Grimshaw, Amjad, & Stanton, 2005; Ryan & Deci, 2000). Studies have provided information on the motivation to quit by asking adolescent smokers to retrospectively recall their motivations for past quit attempts (McCuller et al., 2006; Myers & MacPherson, 2008; Turner & Mermelstein, 2004). Health concern was the most prevalent motivator for quitting as reported (McCuller et al., 2006). Adolescent smokers who worried more about their health were more likely to quit (Dijkstra & Brosschot, 2003). McCaul et al. (2006) indicated that worry motivates self-protecting behaviors. These research findings are supported by Leventhal's model of health threats that suggests a threat (such as the negative health effects from smoking) provokes an attempt to control the danger represented by the threat and an attempt to control the negative emotions caused by the threat.

Other frequently-reported motivation includes social (peer or family) concerns (Myers & MacPherson, 2004; Thiri Aung, Hickman Iii, & Moolchan, 2003), and financial consideration (MacFarlane et al., 2011). The evidence showed that increased

taxes on tobacco greatly affected young people more, as they are more price sensitive than adult smokers (Franz, 2008; Reed, Anderson, Vaughn, & Burns, 2008). One study in New Zealand indicated that the tax increase on tobacco has resulted in more young adult smokers (16-24 years old) making an attempt to quit smoking (MacFarlane et al., 2011)

In Thailand, three studies identified the motivation to quit as a reason to quit among adolescent smokers. Pocherd (1995) investigated the reasons for quitting smoking of technical college students in Petchabun province using the in-depth interview technique. The reasons for quitting smoking include fear of being ill, fear of being addicted, self-image concerning, wastefulness, the results of smoking campaigns and the family's suggestions, health deterioration, the increasing cost of cigarette, the teacher's and peer's suggestions, being a good model, and bad smell. In 2007, Chu-iad found that the motivation for quitting among vocational students of the upper southern area (N=225) were health concerns, family's suggestion, girlfriend/ boyfriend's suggestion, self-image, social disapproval, fear of being ill, difficulty in applying for work, and smoke-free policy. Chaiyaparn (2009) found that the reasons to stop smoking among male adolescent smokers were parents' complaint, not enough money to buy cigarettes, social disapproval, and fear of being ill in the future.

In conclusion, motivations to quit among adolescent smokers can be summarized in two dimensions: intrinsic motivation which consists of health concerns and self-image, and extrinsic motivation which consists of social concerns, financial considerations, and anti-smoking policies (Figure 3).

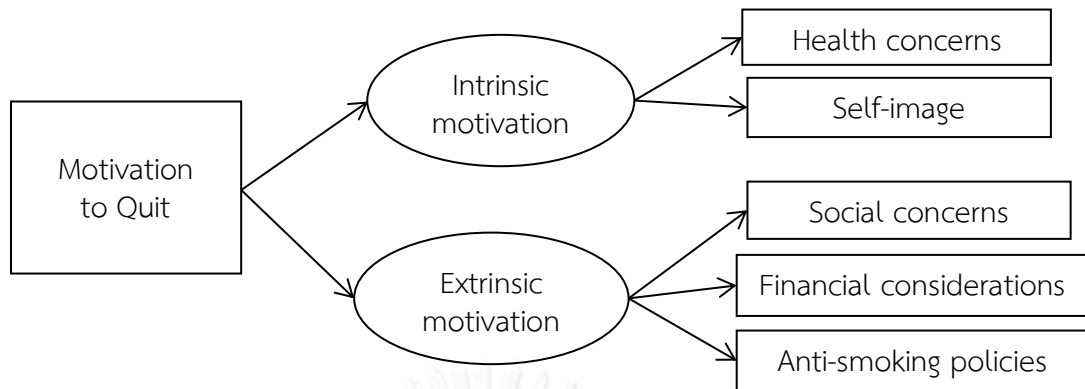


Figure 3 The structural domain of motivation to quit

Motivation to quit measures

There are four existing measures were developed for adolescent smokers: 1) the Motivation to quit questionnaire, 2) the questionnaire from Turner & Mermelstein's (no measure's name addressed), 3) the Sixteen motivation to quit index, and 4) the Adolescent Reasons For Quitting Questionnaire (ARFQ). The details of each measure are described below.

The motivation to quit questionnaire (Riedel, Robinson, Klesges, & McLain-Allen, 2002) was used to assess the reasons that actually motivate a future quit attempt. After the treatment, if the participants had made a quit attempt, they were asked "Which of the following things motivated you to quit?" Participants answered "yes" or "no" to the following potential motivators: (1) concerns about smoking's effect on my future health; (2) concerns about smoking's effect on my health right now; (3) concerns about athletic performance; (4) the cost of cigarettes; (5) the number of teenagers who do not smoke; (6) other teenagers' attitudes about smoking; (7) the true relationship between smoking and weight; and (8) concerns about how smoking affects my appearance (hair, teeth, etc.). However, this measure

has some limitations; for example, the family's suggestion and anti-smoke policies are motivations to quit on the part of Thai adolescent smokers, but were not included in this instrument. Psychometric properties were not established.

Turner & Mermelstein (2004) examined the motivation to quit among adolescents in a smoking cessation program. The motivation to quit was assessed with a single item of "how is motivated the respondent to quit smoking" on a scale where 1 was "not at all motivated" and 10 "extremely motivated". Overall, the level of motivation to quit was scored by computing a possible means score range from 1 to 10 with higher mean scores indicating high motivation to quit. The mean score ≤ 5 indicated low motivation, and the mean score > 5 indicated high motivation. No psychometric properties were established.

The sixteen motivation to quit index (McCuller et al., 2006) assessed the motivation to quit smoking among adolescent smokers on a 4-point scale. Six items were designed to assess the 3 components of energy (i.e. capacity match, social pressure, and lifestyle stability), and two additional general energy items were included to form an eight-item energy index. Six other items were intended to tap the 3 dimensions of direction (i.e. self-image, affect, and curiosity). This instrument had a Cronbach's alpha .86.

The Adolescent Reasons For Quitting Questionnaire (ARFQ) (Myers & MacPherson, 2008) was used to assess the motivation to quit. The ARFQ includes 16 items rated on the current importance for quitting on a 5-point scale from 0 (not a reason to stop smoking) to 4 (extremely important reason to stop smoking). The measure contains three factors: 1) short-term consequences (9 items), 2) social

disapproval (5 items), and 3) long-term concerns (2 items). Cronbach's alphas were .86, .73, and .85 for factors 1, 2, and 3 respectively.

Not only were the instruments for assessing the motivation to quit on the part of adolescents reviewed but also in adult groups as well, for example: the reasons for quitting (RFQ) scale Curry and colleagues (1990) was used to assess participants' level of intrinsic and extrinsic motivation to quit smoking. The RFQ assesses two domains of motivation to quit smoking include intrinsic motivation (e.g., health concern and self-control) and extrinsic motivation (e.g., immediate reinforcement and social pressure). The subjects rate each item, or reason for quitting, on a scale of 0 to 4, based on how true that reason to quit for them currently. The RFQ has demonstrated good validity and reliability.

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 (McCuller et al., 2006) and the Adolescent Reasons for Quitting Smoking (ARFQ) measure (Myers & MacPherson, 2008). Typically either intrinsic or extrinsic dimensions are applied. Another measure, the Motivation for Quitting Questionnaire (Riedel et al., 2002), no psychometric properties were established. One measure was developed based on adult lifestyle, the Reasons for Quitting (RFQ measure) (Curry, Wagner, & Grothaus, 1990), since adults have characteristics and pursue lifestyles that differ from those of adolescents; therefore, such a measure would not be appropriate for use with an adolescent population.

In conclusion, this study, motivation to quit refers to adolescent smokers' desire to stop smoking originated by intrinsic and extrinsic forces during the

past 3 months. The desire originating from within an individual (e.g., health concerns and self-image) is called intrinsic motivation, whereas extrinsic motivation refers to external sources outside of the individual (e.g., social concerns, financial considerations, and anti-smoking policies). It was measured by the “Motivation To Quit Scale (MTQS),” which was developed by the researcher. The details of development processes and psychometric testing are presented in Chapter III.

Nicotine dependence

Nicotine is a major component of cigarettes and can cause addiction because it has psychoactive effects and functions as reinforcement (Gwaltney et al., 2008). Nicotine dependence is defined as the compulsive use of cigarettes (Fagerstrom & Schneider, 1989; O'Loughlin, Tarasuk, Difranza, & Paradis, 2002). Brandon et al. (2004) defined nicotine dependence as a difficulty to refrain from smoking. According to the DSM-IV, nicotine dependence refers to the occurrence of three out of seven symptoms during a 12-month period. These symptoms include physiological, psychological, and behavioral markers of nicotine dependence (American Psychiatric Association, 1994). The current study, nicotine dependence refers to the adolescent smokers' difficulty to refrain from smoking during the past 3 months.

Nicotine obtained from smoking activates brain reward pathways and makes smokers feel happy, relaxed, and makes them more alert and energetic. This is why nicotine dependence is considered as a reason why smokers find it difficult to quit and to remain abstinent (Colby & Gwaltney, 2007; Gwaltney et al., 2008). Nicotine often produces pleasurable effects, tolerance and physical dependence, characterized by withdrawal symptoms that usually follow the deprivation of nicotine. Recent research seems to indicate that the nicotine in tobacco is more

addictive. Independent of nicotine, smoke seems to change people's anti-depressive enzymes in the brain (Rosecrans & Karin, 1998). Nicotine causes some people to feel more alert and others to feel drowsy and relaxed. The cycle is repeated puff after puff.

The literature shows that cigarettes and other forms of tobacco are addictive because of the presence of nicotine. Reports on smoking and health have noted that nicotine addiction is more common than addiction to other substances, such as heroin, cocaine, or alcohol (Centers for Disease Control and Prevention, 2012). Nicotine dependence maintains the habit of cigarette smoking from adolescence into adulthood, and it has shown good predictability in terms of quitting smoking among adolescent smokers (Chandola et al., 2004; Gervais et al., 2006; Scragg et al., 2008). Previous studies reported that adolescent smokers that were successful in the quit attempt reported fewer or less severe nicotine withdrawal symptoms than those who were not successful in the attempt (Bancej et al., 2007; Heikkinen et al., 2009; Van Zundert et al., 2009).

Nicotine dependence was also significantly associated with quit attempt among smokers. Adolescent smokers with higher nicotine dependence are indicated by the number of cigarettes smoked (more than 20 per day). Quit attempts were also low in this population among those who had higher nicotine dependence as indicated by the latency to the first cigarette after waking. However, in this segment, those current smokers whose latency to first cigarette was 30 minutes or less after waking were less likely to have made one or more quit attempts as compared to those current smokers who had a longer latency to the first cigarette (Fagan et al., 2007).

The evidence shows that adolescent smokers who attempted to quit over a period of 28 days reported craving frequently. The results also showed that this symptom was quite stable at a relatively low level during the 5 days prior to the quit day. A significant decrease in symptom was visible during the week following the quit day, and within 2 weeks of post-quit (Fagan et al., 2007; Van Zundert et al., 2009).

Some researchers discussed the role that self-efficacy plays in an individual's belief in his/her ability to control over thoughts, feelings, behaviors, and the environment. They stated that the definition of nicotine dependence refers to previous loss of control over smoking and or/difficultly refraining from smoking (Brandon et al., 2004; Vaid, 2008). DiClemente and Prochaska (1998) postulated that self-efficacy has an important relationship with nicotine dependence; in fact, if self-efficacy is a causal determinant of loss of control, it may be a core component of tobacco dependence. As with persistent smoking, adolescents believing they can refrain from smoking is influenced the quit attempt (Solomon et al., 2006; Sterling et al., 2007). When a person experiences the craving, his or her thought patterns about the ability to quit smoking will be influenced. According to Bandura (1986) thought patterns are influenced by one's perception of his or her ability to change a behavior. Those that do not consider themselves capable of interacting with their environment successfully will experience a great deal of stress and future efforts to change behavior will be undermined. On the other hand, those are efficacious experience less stress when confronted with failure, and are more likely to attempt the behavior change again.

Nicotine dependence measures

Nicotine dependence is typically assessed by a self-report questionnaire. Most of measures were developed for adult smokers. Much less is known about nicotine dependence in adolescent smokers. There are two measures that widely-used for assessing nicotine dependence among adolescent smokers: 1) the Fagerström Test for Nicotine Dependence (FTND), and 2) the Hooked on Nicotine Checklist (HONC). The details of each measure are presented below.

The most commonly-used measure of nicotine dependence is the Fagerström Test for Nicotine Dependence (FTND) (Heatherton, Kozlowski, Frecker, & Fagerström, 1991), which is derived from the eight-item Fagerström Tolerance Questionnaire (FTQ) (Fagerström, 1978). The scale is designed to assess the physiological and psychological aspects of nicotine tolerance. The FTND is a six-item self-report scale. Scores range from 0 to 10 with higher scores reflecting greater nicotine dependence. The FTND has demonstrated acceptable psychometric properties in a sample of Thai adult smokers with Cronbach alphas of .80-.91 (Boonchan, 2007; Parn-in, 2009). The purpose for developing this measure was to determine nicotine dependence among adult smokers, since adults have smoking behaviors (e.g., amount of cigarettes) and pursue lifestyles that differ from those of adolescents; therefore, this measure would not be appropriate for use with an adolescent population.

The Hooked on Nicotine Checklist (HONC) (DiFranza et al., 2002) was derived from a theory-based definition of nicotine dependence, which postulates that a person is hooked when they have experienced a loss of autonomy over their use of nicotine. It includes 10 dichotomous (Yes=1, No=0) items that assess cravings,

loss of control, withdrawal symptoms, and psychological addiction. A continuous HONC score was also computed by summing the scores obtained for each item and then dividing by the number of items to which there was a response. The minimum score was 0 and the maximum score was 10. Respondents indicated physiological and psychological experiences of addiction to nicotine on the HONC. Higher scores indicated greater nicotine dependence.

DiFranza et al. (2002) reported on the internal consistency of the HONC (Cronbach's alpha of .94) as part of an assessment of five measures of nicotine dependence in a sample of 679 seventh grade students and found that the 10 items on the HONC explained 66% of the variance. Moreover, prior studies have shown acceptable reliability (DiFranza, Savageau, Fletcher, & et al., 2007; Kozlowski, 2007; Wellman et al., 2006).

The HONC was developed specifically for adolescents, and has a stronger theoretical foundation than previous measures (DiFranza et al., 2002; O'Loughlin et al., 2002). The benefit for using the HONC is more sensitive to low-level smoking (MacPherson, Strong, & Myers, 2008) and is useful in predicting the development of dependence among adolescent smokers (Ziedonis, Haberstroh, Hanos Zimmermann, Miceli, & Foulds, 2006). It was frequently used, short and easily applied in survey research, and can be considered the most practical measures to identify nicotine dependence in adolescent smokers.

In conclusion, this study, nicotine dependence refers to the adolescent smokers' difficulty to refrain from smoking during the past 3 months. It was measured by the "Hooked on Nicotine Checklist-Thai version (HONCT)" modified

from DiFranza et al.'s HONC (DiFranza et al., 2002). The details of modification processes and psychometric testing are presented in Chapter III.

Time spent with peer smokers

Time spent with peer smokers is defined as the amount of time that an individual spends with friends that smoke (Jones et al., 2004). Smoking is closely tied to social influences, especially peer pressure. This factor causes the adolescent, on occasion, to use various drugs in order to gain acceptance, to relieve stress, or to escape unpleasant feelings. Peer groups tend to be quite homogenous in adolescent substance use patterns, and thus, it is possible that friends who smoke could stimulate others to continue smoking and discourage quitting smoking. This is related to the adolescent's quit attempt (McVea et al., 2009; Tucker et al., 2005). Adolescent smokers who tried to quit smoking reported that their friends made it more difficult to stop by offering them cigarettes, providing harassment, and smoking around the individual (McVea et al., 2009).

Given the link between peer smoking and adolescent patterns of quit attempt, it seems reasonable to speculate that other peer behaviors may also influence the success of smoking cessation. As proposed by previous studies, the strength of friends' relationships and the frequency of contact have influences on adolescent's smoking behavior, because these relationships are persistent, valued, and emotional for adolescents. Peer pressure from smokers obstructs quit attempts. Spending more time with smokers infers less time in nonsmoking environment, leading to a faster path to seek help for cessation, resulting in fewer quit attempts (Kobus & Henry, 2010; Okoli et al., 2009). Individuals interact more often and spend more time with close friends, and time spent together provides opportunities for

influence (Brook et al., 2006; Hoffman et al., 2007; Tucker et al., 2005). It is interesting to note that cessation efforts of smokers are affected in an environment where others are smoking.

Among adolescent smokers who had at least one quit attempt, time spent with friends who smoke was inversely associated with the number of prior quit attempts, suggesting a potential relationship between an adolescent's affiliation with smoking peers, smoking identity, and fewer quit attempts (Jones et al., 2004). Many studies have provided evidence to support that peers' smoking behavior influence others who do not smoke and those that are attempting to quit. For example, Morrison, Banas, and Burke (2003) reported that 62.1% of college undergraduates had tried to quit, and 29.3% reported that they failed because they were around others that smoked (N= 204). Morrell, Cohen, Bacchi, and West (2005) examined the smoking behaviors of 21,410 adolescent smokers in Texas. The findings indicated that the Texan adolescents were more likely to have tried smoking at least once and reported that they become a smoker if more than 75% of their friends smoked.

In addition, adolescent smokers that engaged themselves in helpful peer influences were more likely to attempt to quit than those that had not engaged in helpful peer influences (Stanton et al., 2006). The literature showed that adolescent smokers who told their peer smokers that they planned to reduce smoking reported that their peers provided some incentive for making the quit attempt such as offered them cigarettes, continued to smoke around them, and teased them about trying to quit. They reported difficulty quitting when their smoking peers engaged in these harmful behaviors. (Ali, 2011; McVea et al., 2009).

Smoking is also influenced by family relations (Morgenstern, Sargent, Engels, Florek, & Hanewinkel, 2013). The nature of the family has changed considerably during this century with new structures and transitions, such as the mother starting to work when her children enter school, or parental divorce and remarriage. The successive generations of adolescents have matured in circumstances often quite different from those of their parents' adolescence. The trend modeling of intergenerational interactions has taken away from today's adolescents and has contributed to configurative culture, in which peers act as increasingly important models for its member (Simons-Morton & Farhat, 2010). As a consequence, adolescents spend more time with their friends and more time is spent socializing with friends than being engaged in any other non-school activities (i.e. studying, working, extra-curricular activities) (Brown, 2004).

Time spent with peer smokers measures

There are two measures for assessing the time spent with peer smokers among adolescents. The details of each measure are presented below.

Peer smoking questionnaire was developed by Audrain-McGovern et al. (2009). This measure asked the following: "whether the adolescents' best friend smokes" and "how many of his or her other four best male and four best female friends smoke". The quality of measure was not established.

Time spent with peer smokers questionnaire was developed by Jones et al. (2004). The questions asked the following: 1) "Do you have friends who smoke (a) yes (b) no" 2) "If you have friends who smoke, how often do you see them? (a) daily (b) a couple of times a week" 3) "How much time do you spend with smoking friends you see: (a) daily (b) a couple of times a week" The reported time with friend

smokers was converted into hours and summed to generate the total hours spent with friend smokers per week. Due to the imprecise nature of reported times, the sample are divided into two groups (low and high) duration of time spent with friends that smoke. Thirty-hour per week was used as a reference point. This measure assessed the duration of time that smokers spent with their friend smokers using single-items. No psychometric properties were established. This measure was selected to be used in the current study. Because it was developed for the adolescent population and the construct of time spent with peer smokers congruent with the current study, a modification process and psychometric testing of this measure are needed.

In conclusion, this study, time spent with peer smokers refers to the amount of time in minutes that adolescent smokers spent with friends who smoked during the past 3 months. It was measured by the “Time spent with peer smokers questionnaire-Thai version,” modified by the researcher from Jones et al.’s Time spent with peer smokers questionnaire (Jones et al., 2004). The details of modification processes and psychometric testing are presented in Chapter III.

Intensity of smoking cessation intervention

The Oxford Dictionary (2009) defined “intensity” as the quality or amount or condition of being strong, concentrated or the degree to which something is difficult or strong. Rice & Stead (2009) defined “smoking cessation intervention” as the provision of advice or counseling by any suitably-trained person (e.g., physicians, nurses, psychiatrists, dentists, tobacco treatment specialists, teachers, friends etc.), aiming to help people to stop smoking.

Recently, there have been varieties of smoking cessation interventions for adolescent smokers. The intensity is different in each intervention. Intensity of the intervention is defined as the amount of advice or counseling, self-help materials, follow-ups, and/or strategies to help people quit smoking (Figure 4). It can be provided by healthcare professions (e.g., physicians, nurses, psychiatrists, dentists), and it is designed to be used in a wide variety of settings (e.g., academic health centers; public health department clinics; telephone quitline; dental offices; pharmacies; mental health and substance abuse treatment clinics; managed care organizations; hospitals, including emergency departments; and school or worksite clinics) (Tobacco Use and Dependence Guideline Panel, 2008).

In Thailand, most of adolescent smoking intervention programs have focused on prevention (Srimoragot, 2009; Termsirikulchai et al., 2008). Although Thailand has a national policy on setting up and supporting smoking cessation intervention, the programs have focused on adult smokers. Only brief clinical intervention is frequently provided. The more intense clinical intervention can lead to higher success rate but may not be practical in routine practice for most practitioners because of time constraint (Sittipunt, 2005; Srimoragot, 2009). The information reported in this section indicates a need for effective tobacco cessation programs designed specifically for Thai adolescent smokers.

Intensity of the smoking cessation intervention was an important factor of quit attempt and in determining the effectiveness of cessation programs (Sussman & Sun, 2009). In general, the more intense the treatment intervention, the greater is the rate of abstinence. Systematic reviews (Lancaster & Stead, 2005; Rice & Stead, 2009) have confirmed the effectiveness of advice to stop smoking from the health

professions (Breland et al., 2009). Interventions with physician's brief advice to quit, combined with face-to-face counseling and telephone follow-up with a nurse or trained smoking cessation counselor were achieved to increase cessation rates (Stead, Bergson, & Lancaster, 2008).

Dino, Pignataro, Breland, Murray, and Horn (2011) also found some interesting findings related to program intensity. These researchers found that an intensive cessation program (i.e., N-O-T) was equally effective for adolescent smokers with a range of nicotine dependence and initial stages of change. In contrast, a brief 20-minute intervention was effective only with adolescent smokers who had low levels of dependence and were moderately or highly motivated to quit. This suggests that adolescents require multiple meetings in order to gain the benefit of a cessation intervention.

A meta-analysis study found that there were 43 studies involving the treatment sessions in which, zero or one session was used as the reference group. Smoking cessation increased as the number of person-to-person counseling sessions increased from 2 to 3 sessions (OR=1.4; 95% CI, 1.1–1.7) to 4 to 8 sessions (OR=1.9; 95% CI, 1.6–2.2) to >8 sessions (OR=2.3; 95% CI, 2.1–3.0). Both individual and group counseling give a clinically significant advantage over self-help or no treatment comparison groups. Those methods were effective, whether individual or group counseling delivered. The results from the literature review provide no evidence that group therapy is more effective than individual counselling (Stead et al., 2008). In brief, multiple counseling sessions increase smoking abstinence rates over those produced by zero or one session.

Most of the counselors typically provide self-help materials to smokers. It was referred to individually-tailored materials that are designed to address smoker-specific variables, such as regency of quitting, support sources, and concerns about quitting provided by counselors. Types of self-help materials include: paper-based (i.e., pamphlets, booklets, mailings, and manuals), and technology-based (i.e., videos, audios, mass media, and computer programs/Internet). The supplementation of advice with aids such as self-help material is more effective than advice alone (Ryckman, Bercaw, Ellis, Wolf, & Elgert, 2006; Stead et al., 2008). Based on a systematic review of the literature, smokers that received no materials at all had a lower quit smoking rate than those that received self-help materials (N=10,872; RR 1.36; 95% CI 1.19 to 1.55). Furthermore, different types of self-help materials (written materials, audio and video tape) have equivalent effects (Lancaster & Stead, 2005).

The effectiveness of advice is greater if the advice is more intensive and includes multiple times of follow-up. Multiple follow-up contact increases the smoking cessation rate. The Smoking Clinical Practice Guideline (2008) recommended the criteria for follow-up within one week, two weeks, one month, three months, six months, and twelve months after the quit date. The intervention demonstrated a statistically-significant effect at six months follow-up, and there was no difference quit rate between six months and twelve months follow-up (Tobacco Use and Dependence Guideline Panel, 2008).

However, the persistence of the high adolescent smoking rate suggests that the group of adolescents that already smoke still need to be targeted with smoking cessation programs. Traditional strategies for treating the problem of nicotine

addiction have emphasized identifying the negative aspects of cigarette use and expecting people to use their willpower to stay abstinent (Krishnan-Sarin et al., 2007). It was indicated that adolescent smokers require effective and appropriate cessation resources.

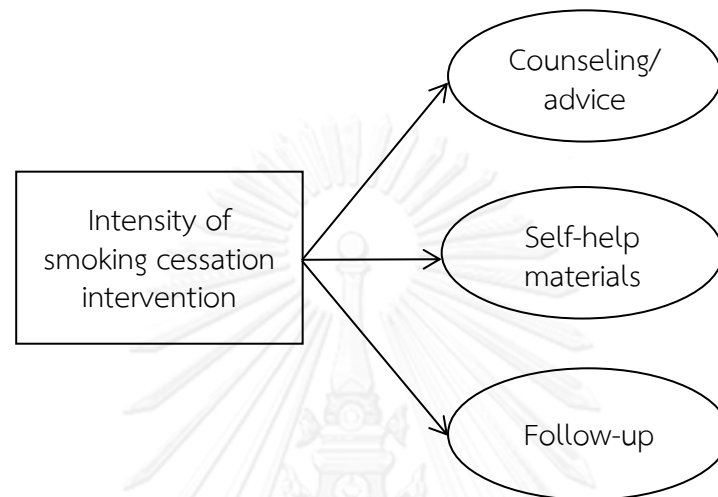


Figure 4 The structural domain of intensity of smoking cessation intervention

Intensity of smoking cessation measures

A recent exhaustive review of intensity measures concluded the lack of a widely accepted and psychometrically-sound research tool for assessing intensity of smoking cessation intervention” This is the suggestion from previous studies relevant to this concept.

The Australia Tobacco Organization (2008) suggested that measuring the intensity of a smoking cessation intervention should include the contact time, and person-to-person sessions.

The Clinical Practice Guideline panels (2008) indicated that more counseling session, contact time, and follow-up contact increased the smoking cessation rate.

Rice and Stead (2009) conducted a systematic review of nursing interventions for smoking cessation. The intensity of the smoking cessation intervention was measured by the counseling sessions, the materials provided, and the follow-ups.

Unfortunately, there is no valid and reliable measure to assess intensity of smoking cessation intervention among Thai adolescents. Therefore, the researcher developed the Intensity of Smoking Cessation Questionnaire (ISCQ) for assessing the intensity of the interventions especially for adolescent smokers.

In conclusion, this study, intensity of smoking cessation intervention refers to the amount of individual or group counseling/advice, self-help materials, and follow-up services that adolescent smokers received from any healthcare professions (e.g., physicians, nurses, psychiatrists, and dentists) in a wide variety of settings (e.g., hospitals, communities, schools, telephone quitline, and public/private health department clinics). It was measured using the “Intensity of Smoking Cessation Intervention Questionnaires (ISCIQ)” which was developed by the researcher. The details of development processes and psychometric testing are presented in Chapter III.

Nurses’ roles in quitting smoking

The younger a person begins to smoke, the greater is his or her risk of smoking-induced diseases such as cancer or heart disease. The evidence shows that most of adolescent smokers want to stop smoking and frequent quit attempts are reported, but they remain unsuccessful (Abrantes et al., 2009; Bancej et al., 2007; Tucker et al., 2005). Adolescent smokers keep their smoking confidential, resulting in a lack of opportunity to receive advice from their parents or any healthcare

professions. Quitting smoking by adolescent smokers is a difficult task owing to the addictive nature of nicotine (Smith et al., 2008; Welte et al., 2011). Adolescent smokers need professional persons to advise them to quit.

Smoking is not only a people's lifestyle or habit, but is also an illness. Since 1992, the WHO has classified smoking as a chronic illness (according to the WHO International Classification of Diseases code ICD F 17.2) (World Health Organization, 1992). Furthermore, smoking is the addictive substance (Smith et al., 2008; Welte et al., 2011). Therefore, smoking cessation interventions typically occur in health care setting, especially psychiatric area. Most of these interventions are provided in hospital or outpatient departments (Naegle, Baird, & Stein, 2009; Srimoragot, 2009). Adolescent smokers are less likely to go to health-care services, they usually used their own strategies to stop smoking (e.g., cutting down) (McClure et al., 2013). Only, those with high level of addiction received the services (Dumrongpiwat, 2009; Srimoragot, 2009).

The smoking cessation interventions in Thailand are not separate between adolescent and adult smokers. The intervention comprises four strategies: health care settings with cessation services, Thai Health Professional Alliance against Tobacco, Nicotine Replacement Therapy, and Quit line.

1. Health care settings with cessation services: The "5A" is a guideline on smoking cessation recommended for health care providers. They have been advised to help smokers quit by following cessation guidelines based on the "5A" (ask, advise, assess, assist, and arrange) (Tobacco Use and Dependence Guideline Panel, 2008). The details of the guideline are presented in Table 1.

Table 1 The guidelines of “5A”

| 5A Steps | Intervention |
|----------|--|
| Ask | Ask the smoker about his or her smoking status. |
| Advise | Advise the smoker to stop smoking with a statement that quitting smoking is the single best thing he or she can do for his or her health. |
| Assess | Assess motivation to stop smoking by asking if the smoker is willing to make a quit attempt at this time (i.e., stage of change). |
| Assist | Assist the smokers and provide treatments so that she/he will be able to quit smoking successfully. |
| Arrange | Arrange for follow up contacts, begin within the first week after the quit date. For smoker unwilling to make a quit attempt at the time, address tobacco dependence and willingness to quit at next clinic visit. |

The “5A” had an increased likelihood of quitting compared to smokers without intervention even when smokers are not willing to make a quit attempt at that time (Breland et al., 2009). However, the evidence showed that most of the clinics could not successfully and effectively do the follow up (Srimoragot, 2009; Termsirikulchai et al., 2008; World Health Organization, 2011).

2. Therapy using medication: Medicines used for smoking cessation are 1) Nicotine Replacement Therapy (NRT) in forms of nicotine chewing gum or polacrilex, and the nicotine patch, both of which are restricted to sale under a pharmacist’s supervision only; 2) tablets which are non-Nicotine such as Bupropion HCL (Amfebutamone) and Nortriptyline (World Health Organization, 2011). Many studies have indicated that the use of nicotine replacement therapy is inappropriate for

adolescent smokers (Klesges, Johnson, Somes, Zbikowski, & Robinson, 2003; Killen et al., 2004; Sittipunt, 2005).

3. Quitline: It aims to give advice and assistance on smoking cessation. The number of smokers that received the quitline service has increased from 1,200 in 1994 to 17,697 in 2013. The phone number of this quit line appear on the labels of cigarette packages as well. Only 1,773 Thai adolescent smokers received the counseling from quitline in 2012 and 3,245 in 2013, accounted for 10-18% of all smokers who received the quitline service (Thailand National Quitline, 2013).

4. Thai Health Professional Alliance against Tobacco: This network has been established in 2004, consists of professionals from eight health related fields: medicine, dentistry, nursing, pharmacy, medical technology, physical therapy, public health and psychology. During the past 3 years, the network, particularly physicians, dentists, nurses, pharmacists, and medical technologists, have actively involved in smoking cessation activities (Termsirikulchai et al., 2008). The network has offered short training courses for health professionals, including nurses, to improve their knowledge and skills in relation to smoking cessation, and to increase the delivery of tobacco dependence treatment (Bureau of Tobacco Consumption Control, 2009; World Health Organization, 2010).

Nurses are the largest health care workforce and are involved in nearly all levels of care. The International Council of Nurses (1999) has stated that nurses have been identified as an instrumental partner in tobacco control because they have a great opportunity to improve the health and lives of their patients through encouraging tobacco use cessation/reduction and implementing strategies to assist patients in their efforts to abstain from tobacco. When individuals want to stop

smoking, it is a challenge for nurses to help them due to the nature of nicotine addiction. Nicotine is highly addictive and withdrawal can be both difficult and unpleasant. The result is that many smokers find themselves unable to stop. The challenge is to incorporate smoking cessation interventions as part of standard nursing practice so that all adolescents will be asked about their cigarettes use and those that smoked are given advice to quit along with reinforcement and follow-up.

Hollis, Lichtenstein, Vogt, Stevens, and Biglan (1993) found that nurse-assisted counseling was more effective than physician advice alone in increasing cessation rates among patients in a primary care setting. The nurse counselor offered brief counseling on a specific plan of action, provided a quit-smoking kit, and arranged a follow-up phone call. At 12-month follow-up, adolescent smokers in nurse-assisted groups had quit smoking higher than those in the physician advice alone group.

Smoking is considered as a "pediatric disease"; most of all people who ever try a cigarette try by age 18; and 90% of new smokers are children and adolescents (Park, 2011; Thipphayarangsarit et al., 2012; Tyc & Throckmorton-Belzer, 2006). Every day, more than 3,000 adolescents in the USA smoke their first cigarette (U.S. Department of Health and Human Services, 2014). In Thailand, approximately 200,000 adolescents become new smokers in each year (Bureau of Tobacco Consumption Control, 2009). Adolescents that smoked are more likely to be hospitalized than those that do not, and will incur higher lifetime medical expenditures than never-smokers. Quitting smoking decreases health care costs, improves the quality of care, decreases outpatient visits, and decreases hospital admissions (Otten, Bricker, Liu, Comstock, & Peterson, 2011; Welte, Barnes, Tidwell, & Hoffman, 2011).

Pediatric nurses have the opportunity to contact adolescent smokers in health care and non-healthcare settings (e.g., school and communities) for providing preventive and screening services, health education and assistance with decision-making about health, health assessment, and immunization against preventable diseases. Pediatric nurses that have contact with children and adolescents are in an excellent position to provide information about substance abuse and to serve as patient advocates. They play a significant role in protecting children from illness and injury, assisting them to attain optimal levels on health, regardless of health problems, and rehabilitation in a wide variety of settings (Ball, Bindler, & Cowen, 2010). Therefore, pediatric nurses have the right and responsibility to prevent the physical and mental health problems and early detection of adolescent smokers (Srimoragot, 2009).

In conclusion, most adolescent smokers want to quit and make serious attempts to quit but most are still unsuccessful with their efforts to stop. However, few seek assistance from healthcare profession. Nurses play an important role to promote smoker's health, especially pediatric nurse. Smoking is started in young population that is the greatest predictor of continuous smoking in adulthood. Pediatric nurses have a tremendous opportunity to play a key role in treating adolescent smokers. Therefore, detectable, accessible, and effective treatment approaches are needed for adolescent smokers.

CHAPTER III

METHODOLOGY

This chapter describes the information on 1) research design, 2) population and sample, 3) instrumentation, 4) protection of human subjects, 5) data collection, and 6) data analysis.

Research design

A correlational research design was used to examine the direct and indirect relationship between quit attempt and the set of influencing factors including self-efficacy to resist smoking, motivation to quit, nicotine dependence, time spent with peer smokers, and intensity of smoking cessation intervention.

Population and sample

The target population in this study was Thai adolescent smokers that studied in grade7 to grade12.

Literature indicated that recruiting adolescent smokers into tobacco use research could be a challenge (Berg et al., 2009). Adolescent smokers often report being uninterested in participating in tobacco use research, particularly cessation studies, because they are afraid of punishment from parents or teachers (Gross et al., 2008). It is difficult to determine the actual prevalence rates of smokers because this information has seldom been reported. There was no proven way to reach adolescent smokers from the general population and recruit them into a smoking cessation study.

Fortunately, schools that belong to the Teacher's Network against Tobacco (TNT) are the places which have the report about information and prevalence of

adolescent smokers. Therefore, the TNT schools in all parts of Thailand, including the northern, central, northeastern, eastern, and southern regions were used as the study setting.

In 2012, there were around 1,000 schools in the network. Those schools had students that ranged from elementary to high school level. There were 609 TNT schools that had students in grade 7 to grade 12. Adolescent smokers in TNT and non-TNT schools are similar in terms of individual characteristics and environmental surroundings (Chomchoey et al., 2011). Therefore, adolescent smokers in TNT schools could represent Thai adolescent smokers. The adolescent smoking prevalence in each year was not different. Approximately 500,000 Thai adolescents were smokers (National Statistical Office, 2011). As a result, this number of smokers could be used to calculate the sample for this study.

Sample size calculation

The sample size was calculated using the formula of Krejcie and Morgan (1970), which determined the appropriate sample size for the study.

$$n = \frac{\chi^2 N p (1-p)}{e^2 (N-1) + \chi^2 p (1-p)}$$

where, n=sample size;

N=population, So N=500,000

e = allowable error in estimating prevalence = 0.05

χ^2 = Chi-square at degree of freedom equal 1 with a confidence

coefficient of 95%, So $\chi^2 = 3.841$

p= estimated proportion = 0.5

$$n = \frac{(3.841)(500,000)(0.5)(1-0.5)}{(0.05)^2(500,000-1)+(3.841)(0.5)(1-0.5)}$$

$$n = \frac{480125}{1250.96}$$

$$n = 384$$

Consequently, 15% of the total sample size was added to take into account drop outs (Stratton, O'Toole, & Wetzel, 2005). The current study should have at least 443 Thai adolescent smokers.

Sampling technique

The multi-stage random sampling procedure was used for a probability sample of Thai adolescent smokers from five regions: the 1) northern, 2) northeastern, 3) central, 4) eastern, and 5) southern parts of Thailand. The following steps were followed in order to obtain samples:

1. The Office of the Basic Education Commission (2011) classified schools in Thailand as small, medium, large and extra-large sizes. The researcher wrote the name of each TNT schools on each of the piece of paper and separated the schools following the school sizes into four groups in each region.

2. One school of each group was selected using simple random sampling without replacement procedure by drawing lots. Thus, four TNT schools that had different school sizes from each region were selected in order to determine the number of smokers in each school. So, there were 20 TNT schools from five regions.

3. The telephone call technique was used to determine the prevalence of adolescent smokers in each region from the teachers that were smoking cessation counselors at 20 TNT schools. Based on this survey, the average number of smokers in each different school's size was 40. It was also found that the schools size or

numbers of students in each school were not related to the number of smokers. The researcher concluded that the number of adolescent smokers was not different in each region. As a result, 40 adolescent smokers would be recruited from each school. Therefore, 12 schools were required to meet the sample size.

4. There were 609 TNT schools that had adolescents in grades 7 to grade 12 in all regions. The majority of those schools were located in a big city such as 109 schools in Chiang Mai, 96 schools in Bangkok, 72 schools in Rayong, 101 schools in Khonkaen, 53 schools in Mahasarakham, and 112 schools in Songkla provinces. This study required 12 TNT schools, accounting for 1.97%.

5. This study required 1.97% of the TNT schools for each region. For the calculation, there were 2.25, 2.19, 1.67, 3.35, and 2.54 schools in northern, central, eastern, northeastern, and southern parts, respectively. The decimal that was higher than 0.5 was rounded up and that less than 0.5 was rounded down an integer value. So it was 2 schools from the northern, central, and eastern part, and 3 schools from the northeastern and southern part of Thailand.

6. Simple random sampling without replacement procedure by drawing lots was used to recruit the schools from each region. The probability to pick the TNT school's lottery in the big city was high. So, it was 2 schools in Chiang Mai, 1 school in Bangkok, 1 school in Pathumthani, 1 school in Rayong, 1 school in Chonburi, 1 school in Khonkaen, 1 school in Mahasarakham, 1 school in Roi-et, and 3 schools in Songkla provinces.

7. In each school, the name lists of all adolescent smokers were provided by the teachers that were smoking cessation counselors.

8. The adolescents that met the inclusion criteria were recruited by the researcher. As a result, there were 549 adolescent smokers in the TNT schools from all regions, and 486 (88.52%) of those met the inclusion criteria of the study (Figure 5).

Sample selection

The inclusion criteria for this study were: 1) being a student in grade 7 to 12, 2) being a current or ex-smoker. Current smoker refers to adolescents who were daily smoke. Ex-smoker refers to adolescent who had stop smoking for 1 day to three months, 3) attempting to quit within the past 3 months, 4) no diagnosis of learning disability (LD), attention deficit hyperactivity disorder (ADHD) and mental retardation (MR), and 5) willingness to participate in the study.

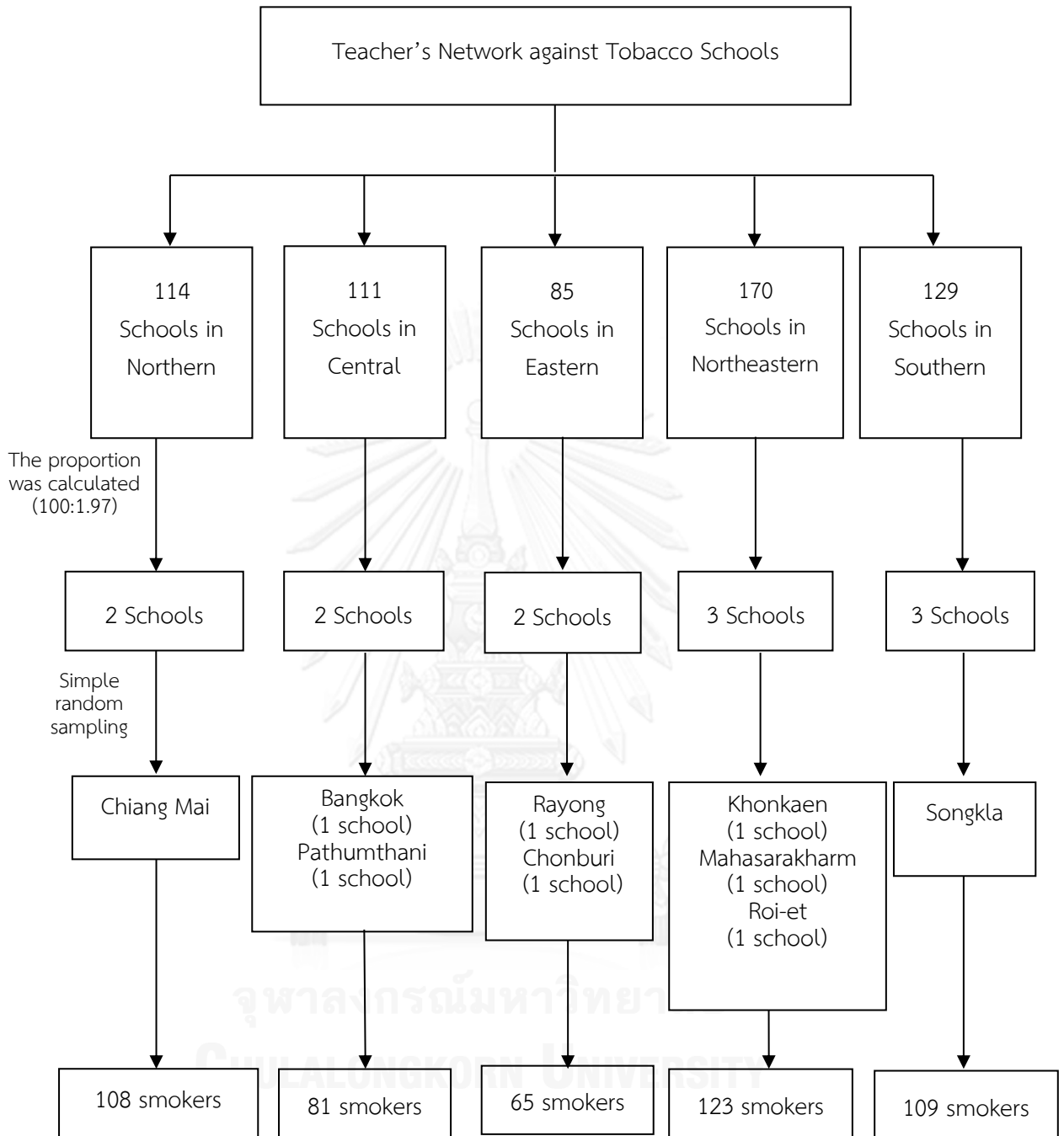


Figure 5 Sampling method of the study

Demographic characteristics of the study sample

A total of 486 adolescent smokers participated in the study. After considering the criterion of outliers (absolute Z score > 3), 23 subjects were excluded. In summary, 463 adolescent smokers were analyzed.

Table 2 Number and percentage of subjects' demographic characteristics classified by gender, age, level of education, grades from previous semester, religion, and residing (n=463)

| Demographic characteristics | n | % |
|-----------------------------|-----|-------|
| Gender | | |
| Male | 436 | 94.17 |
| Female | 27 | 5.83 |
| Age | | |
| 12 | 2 | 0.43 |
| 13 | 46 | 9.94 |
| 14 | 115 | 24.84 |
| 15 | 116 | 25.05 |
| 16 | 88 | 19.01 |
| 17 | 72 | 15.55 |
| 18 | 24 | 5.18 |
| Level of education | | |
| Grade 7 | 32 | 6.91 |
| Grade 8 | 112 | 24.19 |
| Grade 9 | 132 | 28.51 |
| Grade 10 | 76 | 16.41 |
| Grade 11 | 89 | 19.23 |
| Grade 12 | 22 | 4.75 |

Table 2 Number and percentage of subjects' demographic characteristics classified by gender, age, level of education, grades from previous semester, religion, and residing (n=463) (Continued)

| Demographic characteristics | n | % |
|--------------------------------------|-----|-------|
| Grades from previous semester | | |
| Unknown (no response) | 43 | 9.29 |
| < 1.00 | 6 | 1.30 |
| 1.00-1.50 | 54 | 11.66 |
| 1.51-2.00 | 85 | 18.36 |
| 2.01-2.50 | 140 | 30.24 |
| 2.51-3.00 | 90 | 19.43 |
| 3.01-3.50 | 31 | 6.70 |
| 3.51-4.00 | 14 | 3.02 |
| Religion | | |
| Buddhist | 442 | 95.46 |
| Muslim | 14 | 3.02 |
| Christian | 7 | 1.52 |
| Residing | | |
| Alone | 6 | 1.30 |
| With parents | 411 | 88.76 |
| With boy friend | 1 | 0.22 |
| With friend | 1 | 0.22 |
| With relatives | 44 | 9.50 |

As shown in Table 2, almost all of the subjects were male (94.17%) and Buddhist (95.46%). Most of the subjects lived with their parents (88.76%). Around 50% of the subjects were 14-15 years old. Half of the subjects studied in grade 8-9 (52.70%). Most of the subjects had grades from the previous semester \leq 2.50

(61.56%) and 9.29% of the subjects provided no response to this question. Only 3.02% of the subjects had grades higher than 3.50.

Table 3 Number and percentage of subjects' smoking history classified by age when smoking began and number of cigarettes smoked per day (n=463)

| Smoking history | n | % |
|---|-----|-------|
| Age when smoking began (years old) | | |
| 5-8 | 8 | 1.73 |
| 9-12 | 156 | 33.69 |
| 13-15 | 267 | 57.67 |
| 16-18 | 32 | 6.91 |
| Number of cigarettes smoked per day (cigarettes) | | |
| 1-5 | 396 | 85.53 |
| 6-10 | 58 | 12.53 |
| 11-15 | 5 | 1.08 |
| 16-20 | 3 | 0.64 |
| >20 | 1 | 0.22 |

As shown in Table 3, the age of the subjects when they began smoking ranged from 5-18 years, 35.42% of the subjects started smoking when they were in primary school, and 57.67% started smoking during their secondary school (grade7-9). The lowest age at the beginning of the subjects' smoking was 5 years (n=2), followed by 7 (n=1), and 8 (n=5) years of age, respectively. Nearly half of the subjects had smoked 1 cigarette per day (40.41%).

Instrumentation

The research instruments consisted of: 1) the Time spent with peer smokers questionnaire-Thai version, 2) the Hooked on Nicotine Checklist-Thai version (HONCT), 3) the Self-efficacy to resist smoking scale-Thai version, 4) the Quit attempt questionnaire-Thai version, 5) the Motivation To Quit Scale (MTQS), 6) the Intensity of Smoking Cessation Intervention Questionnaire (ISCIQ), and 7) Demographic data sheet. All of the data of the influencing factors were gathered from the three-month retrospective subjects' report. It is the period of memory-recall. Adolescence is the stage of risk behavior initiated and easily changed. Many activities are performed during the period and may have an effect on quit attempt. For quit attempt, it was measured in the past 30 days because quit attempt frequently performed in that period failed (Joffe et al., 2009; Pinsker et al., 2013).

Four instruments (the Time spent with peer smokers, the HONC, the Self-efficacy to resist smoking scale, and the Quit attempt questionnaire) were translated from English into Thai language and modified. The other two measures (MTQS, and ISCIQ) were developed by the researcher. The details of translation, modification, and item selection procedures of each instrument were described. After that, content validity, construct validity and reliability are presented.

1. Time spent with peer smokers questionnaire was developed by Jones et al. (2004). This measure assessed the duration of time that adolescent smokers spent with their friend smokers. This self-report questionnaire consists of three questions: 1) "Do you have friends who smoke: (a) yes (b) no" 2) "If you have friends who smoke, how often do you see them?: (a) daily (b) a couple of times a week." 3) "How much time do you spend with smoking friends you see: (a) daily (b) a couple of times

a week.” The reported time with friends that smoked was converted into hours and summed up to generate the total hours spent with friends that smoked per week. Due to the imprecise nature of reported times, the sample were divided into two groups (low and high) duration of time spent with friends that smoke. Thirty-hours per week was used as a reference point. No psychometric properties were established.

After obtaining permission from the authors, the Time spent with peer smokers questionnaire was translated using the Brislin’s back-translation model (Brislin, 1970). First, the instrument was translated from English into Thai language by linguistic experts in the translation and interpretation service unit at the Language Institute, Chulalongkorn University. Next, the Thai version was back translated to English by the linguistic experts of the Language Institute, Chulalongkorn University; but there are different persons from first step. After that, the researcher compared the original and Thai-back translated version, and discussed the Thai-back translated version in relation to the original version to ensure linguistic and conceptual equivalence with the back-translator experts. Then, the existing measures were modified to be specific for the purpose of this study.

Time spent with peer smokers questionnaire-Thai version consists of three items as the original one. However, this study focused on the three-month retrospective subjects’ report, the phase “in the past three months” was added in item 2. In addition, item 2 and 3 were changed to open-ended question. In item 3, the amount of time either in hours or minutes was reported. The reason is that adolescent may not able to reverse their spending time from hours to minutes. So, the researcher decided the way to answer this item in hours or minutes. The

reported amount of days in item 2 was multiplied by the time in minutes with friends that smoked in item 3. Therefore, the total minutes that adolescent smokers spent with friend smokers per week is calculated. Higher scores indicated greater time spent with peer smokers.

Next, the items selection of time spent with peer smokers questionnaire-Thai version was done for identifying the appropriate items and for improving the items quality that would be contained. The subjects used for this procedure were convenience sample of 230 adolescent smokers in grades 7 to 12 from 7 schools that belonged to the TNT in Bangkok and had attempted to quit smoking within the past three months. They were aged between 12 and 18 years. Most of them were male (94.83%), Buddhist (91.26%), and living with their parents (88.34%). The average age of first cigarettes used was 15 years ($SD=1.45$) and the number of cigarettes used per day ranged from 1-40, with a mean of 6.40 ($SD=6.01$). As the subjects completed the questionnaire, their behaviors, such as pausing, skipping items, or asking for answers from friends, were recorded as misunderstandings, denoting items that are difficult to understand or that they are reluctant to answer. To determine the appropriateness and clarity of the wording of each item, ten adolescent smokers that had those behaviors were selected through convenience sampling. They were interviewed regarding the problems that occur during the answering of questionnaire. Based on this interview, the items were not changed.

1.1 Content validity

Time spent with peer smokers questionnaire tested the content validity. Content validity concerns the degree to which an instrument has an appropriate sample of items for the construct being measured and adequately

covers the construct domain (Nunnally & Bernstein, 1994). The content validity were established by seven experts (two experts were physicians with experience in smoking cessation service, four experts were professional nurse instructors with experience in instrument development and smoking cessation research, and one expert was a teacher in a school that belonged to the TNT with experience in smoking cessation service). These seven experts evaluated the content validity of the instruments by place one of four-point scales that reflected relevance to the objectives of the measure (1= not relevant, 2= somewhat relevant, 3= quite relevant, 4= very relevant) in each item (Polit, Beck, & Owen, 2007).

Additionally, the experts were asked to clarify their reasons if they did not agree with any of the items. The acceptable score were equal to or higher than .80 (Polit, Beck, & Owen, 2007). The content validity index of Time spent with peer smokers questionnaire-Thai version was 1.00 in both scale-content validity index (S-CVI) and item- content validity index (I-CVI).

1.2 Reliability

Time spent with peer smokers-Thai version determined reliability by considering the stability using the test-retest method. Test-retest is a two-score method of computing reliability involving the temporal stability of a measure, or how constant scores remain from one occasion to another (DeVellis, 2003). For using the test-retest in this study, the time period for conducting test-retest was two weeks and the score of two-time testing was calculated with Pearson's correlation coefficient (r). The acceptable correlation coefficient was greater than .80 (Crocker & Algina, 1986). Convenience sample of 106 adolescent smokers from the same group of sample that used in construct validity procedure were recruited (N=319) [see

construct validity in page 83]. The results were .92 for time spent with the peer smokers questionnaire. The summary of the measure is presented in Table 4.

Table 4 Number of items, scoring rang, S-CVI, I-CVI, and reliability of Time spent with peer smokers questionnaire-Thai version

| Instrument | Number of item | Scoring Range | S-CVI | I-CVI | Reliability |
|---|-------------------|----------------------|-------|-------|-------------|
| Time spent with peer smokers questionnaire-Thai version | 3 | 0-10080 (minutes) | 1.00 | 1.00 | r=.92 |

2. The Hooked on Nicotine Checklist (HONC) was developed by DiFranza et al (2002). It was designed for assessing nicotine dependence among adolescent smokers. It includes 10 dichotomous (Yes, No) questions. The HONC score was also computed by summing the scores obtained for each item and then dividing by the number of items to which there was a response. The minimum score was 0 and the maximum score was 10. Higher scores indicated greater nicotine dependence. Cronbach's alpha of this instrument was .94.

The Hooked on Nicotine Checklist (HONC) was translated by the same processes of the Time spent with peer smokers questionnaire. The HONC-Thai version (HONCT) contains the same number of questions and format as the original one. The phase, "in the past three months" was also added to the instruction of questionnaire. The items selection was conducted with the same processes of the Time spent with peer smokers questionnaire-Thai version. Based on the processes,

the sentence “because you couldn’t smoke” in item 7, 8, and 10 was deleted because it would confuse the participants to answer.

The item selection processes and the precision of the items was examined using corrected item-total correlation. According to Nunnally and Bernstein (1994), corrected item-total correlation should be $>.30-.70$. The HONCT had corrected item-total correlations $.30-.63$. 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 (DeVellis, 2003). The purpose for using the EFA in this process was to determine if items fell under the component they were created 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 and the Kaiser-Meyer-Olkin (KMO) value was $.85$ and accounted for 60.38% of the variance, which is adequate for the relationships between the items, and also indicates the appropriateness of a factor analysis (Hair, 2010). After application of the EFA, factor loadings greater than 0.30 was chosen (DeVellis, 2003). All ten items of HONCT had a factor loading ranging from $.49$ to $.80$. The results of EFA with varimax rotation for the scale had Eigen values 3.41 , which is acceptable (Hair, 2010). In brief, the HONCT contains ten items with one component that are not modified.

2.1 Content validity

The HONCT tested the content validity on the same processes of Time spent with peer smokers questionnaire-Thai version. The S-CVI of the HONCT was $.96$ and $.71-1.00$ for I-CVI.

2.2 Construct validity

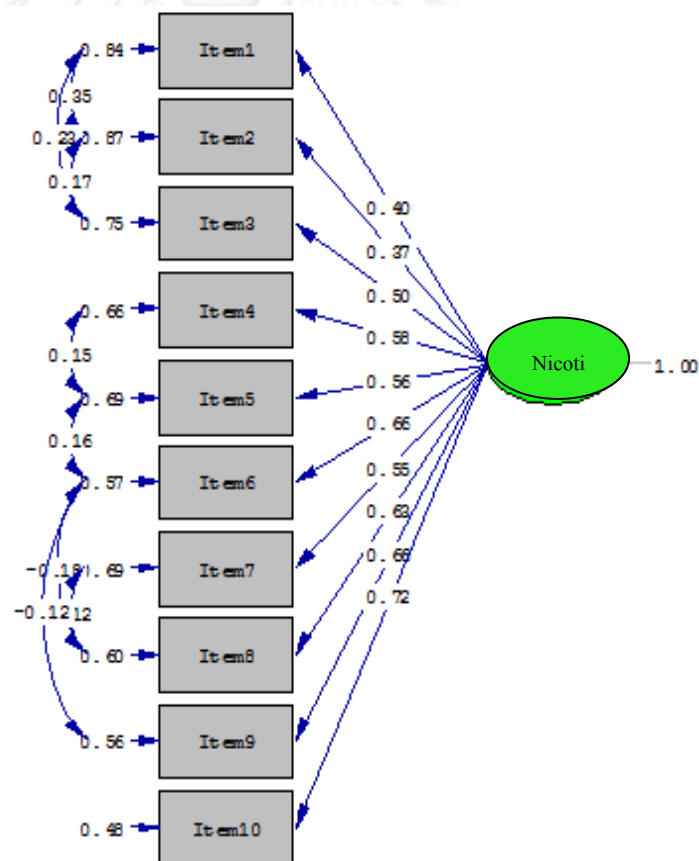
Convenience samples of 319 adolescent smokers in grades 7 to 12 from 5 TNT schools in Bangkok and attempted to quit smoking within the past three months were used to test the construct validity. Confirmatory factor analysis (CFA) was conducted to examine whether a particular factor model provided a good fit to the data. The results indicated that there were ten items and one domain in the CFA. The results showed that the factor loading of all items ranging from .37 to .72 were statistically significant at .05 (Table 5).

Table 5 Factor loading and construct validity of HONCT (n=319)

| Item | Mean | Corrected Item- Total Correlation | Standardized factor loading |
|---------|------|--------------------------------------|--------------------------------|
| Item 1 | 0.60 | 0.45 | 0.40 |
| Item 2 | 0.44 | 0.41 | 0.37 |
| Item 3 | 0.54 | 0.51 | 0.50 |
| Item 4 | 0.35 | 0.53 | 0.58 |
| Item 5 | 0.37 | 0.53 | 0.56 |
| Item 6 | 0.44 | 0.54 | 0.66 |
| Item 7 | 0.45 | 0.52 | 0.55 |
| Item 8 | 0.39 | 0.56 | 0.63 |
| Item 9 | 0.39 | 0.56 | 0.66 |
| Item 10 | 0.47 | 0.61 | 0.72 |

Most fit indices of the model were acceptable (chi-square (χ^2) = 49.05, degree of freedom (df)= 27, goodness-of-fit index (GFI)= 0.97, adjust goodness of fit index (AGFI)= 0.94, root-mean-square error of approximation (RMSEA)= 0.05), except the significance of χ^2 . However, non-significant result of HOCNT was obtained for the

χ^2 test that should be $> .05$. 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 (Hair, 2010). 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 (Kline, 1998). This study, the χ^2/df value of all the measurement models was accepted. Other goodness-of-fit indices such as the $GFI > 0.90$, $AGFI > 0.90$, $RMSEA < 0.05$ indicated a good fit (Jöreskog & Sörbom, 1996; Reisinger & Mavondo, 2007) as shown in Figure 6.



Chi-Square=49.05, df=27, P-value=0.00585, RMSEA=0.051

Note. Nicot=Nicotine dependence

Figure 6 Measurement model of nicotine dependence

2.3 Reliability

Reliability of the HONCT was determined by considering internal consistency analysis using Cronbach's alpha coefficient. The results showed that the HONCT had Cronbach's alpha .83 that was acceptable. The summary of the measure is presented in Table 6.

Table 6 Number of items, scoring rang, S-CVI, I-CVI, and reliability of HONCT

| Instrument | Number of item | Scoring Range | S-CVI | I-CVI | Reliability |
|------------|-------------------|------------------|-------|----------|----------------|
| HONCT | 10 | 0-10 | .96 | .71-1.00 | $\alpha = .83$ |

3. Self-efficacy to resist scale was developed by Vaid (2008). This instrument was designed specifically for adolescent smokers, and identified adolescent smokers' ability to resist smoking in situations in which people frequently smoke. It is a self-report questionnaire that consists of six questions: "How do you feel about being able to resist smoking in the following situations: 1) at home?, 2) at a friend's house?, 3) at a party?, 4) at school?, 5) when bored?, and 6) when stressed out?" Response options were presented using a 5-point Likert-type scale (completely sure I could keep from smoking to completely sure I could not keep from smoking). The total scale was scored by computing the mathematical mean across all items, yielding a possible mean score range from 1 to 5. Cronbach's alpha of this scale was .86 (Kohler, Schoenberger, Beasley, & Phillips, 2008).

The Self-efficacy to resist smoking scale was translated from English into Thai language which was the same processes of the Time spent with peer smokers questionnaire. The Self-efficacy to resist smoking scale-Thai version contains the

same format as the original one. The phrase “in the past three months” was also added to the stem of the question.

The items selection was conducted with the same processes of the HONCT. The results showed that all items of the Self-efficacy to resist smoking scale-Thai version had item-total correlations .39-.69. The assumptions of the EFA were tested: Bartlett’s test of sphericity was significant and the Kaiser-Meyer-Olkin (KMO) value was .75 and accounted for 52.01% of the variance. All six items of the scale had a factor loading ranging from .51 to .83. The results of EFA with varimax rotation for the scale had Eigen values 3.12, which is acceptable. In brief, the Self-efficacy to resist smoking scale-Thai version contains six items with one component that is the situations in which people frequently smoke. No items are modified.

3.1 Content validity

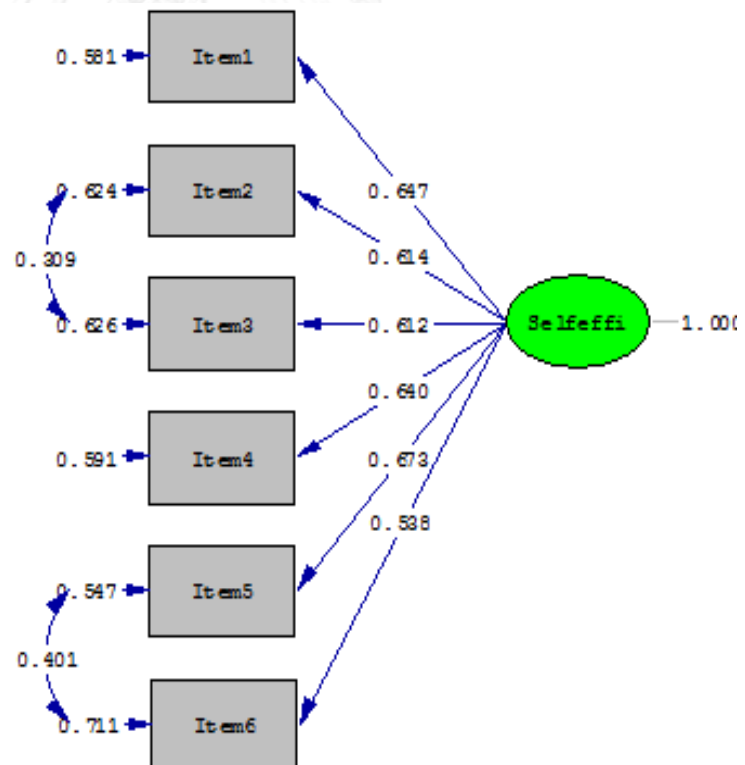
The Self-efficacy to resist smoking scale-Thai version tested the content validity on the same processes of Time spent with peer smokers questionnaire. The S-CVI of the scale was .98 and .86-1.00 for I-CVI.

3.2 Construct validity

The construct validity of the Self-efficacy to resist smoking scale-Thai version was tested on the same processes of the HONCT. The results showed that there were 6 items and 1 domain in the confirmatory factor analysis (CFA). The results showed that the factor loading of all items ranging from 0.54 to 0.67 were statistically significant at .05 (Table 7). All fit indices of the model were acceptable ($\chi^2=12.82$, $df= 7$, $p\text{-value}= 0.07$, $GFI= 0.99$, $AGFI= 0.96$, $RMSEA= 0.05$) as shown in Figure 7.

Table 7 Factor loading and construct validity of Self-efficacy to resist smoking scale-Thai version (n=319)

| Item | Mean | Corrected Item- Total Correlation | Standardized factor loading |
|--------|------|--------------------------------------|--------------------------------|
| Item 1 | 3.58 | 0.54 | 0.65 |
| Item 2 | 3.27 | 0.61 | 0.61 |
| Item 3 | 3.18 | 0.61 | 0.61 |
| Item 4 | 3.34 | 0.52 | 0.64 |
| Item 5 | 3.18 | 0.68 | 0.67 |
| Item 6 | 3.07 | 0.57 | 0.54 |



Chi-Square=12.82, df=7, P-value=0.07668, RMSEA=0.051

Figure 7 Measurement model of self-efficacy to resist smoking

3.3 Reliability

Reliability of the Self-efficacy to resist smoking scale-Thai version was determined by considering internal consistency analysis using Cronbach's alpha coefficient. The results showed the Cronbach's alpha of .82. The summary of the measure is presented in Table 8.

Table 8 Number of items, scoring rang, S-CVI, I-CVI, and reliability of Self-efficacy to resist smoking scale-Thai version

| Instrument | Number of item | Scoring Range | S-CVI | I-CVI | Reliability |
|--|-------------------|------------------|-------|----------|----------------|
| Self-efficacy to resist smoking scale-Thai version | 6 | 1-5 | .98 | .86-1.00 | $\alpha = .82$ |

4. Quit attempt questionnaire was developed by Fagan et al. (2007). It was designed for assessing quit attempts in young adult smokers. It was a single-item questionnaire: "How many times during the past 12 months have you stopped smoking for 1 day or longer?" Responses were categorized into 1 or more quit attempts and zero quit attempts. No psychometric properties were established.

The Quit attempt questionnaire was translated from English into Thai language which was the same processes of the Time spent with peer smokers questionnaire. Quit attempt in this study was measured in the past 30 days. The Quit attempt questionnaire-Thai version would fit the study by changing the period of time from "12 months" to "thirty days" and the duration of abstinence from "for 1 day or longer" to "24 hours". It was changed to open-ended question, the number (i.e., 0, 1, 2, etc.) of quit attempts were reported. The explanation is that if

adolescent continue stop smoking for 1 day, he reports “1”. If adolescent continue stop smoking for 15 days, he reports “15”. The item selection was conducted the same processes of the Time spent with peer smoker questionnaire-Thai version. Based on the processes, the item was not modified.

4.1 Content validity

The Quit attempt questionnaire-Thai version was tested the content validity on the same processes of Time spent with peer smokers questionnaire-Thai version. The S-CVI and I-CVI of the scale were .86.

4.2 Reliability

The Quit attempt questionnaire-Thai version was determined reliability by considering the stability using the same processes of the Time spent with peer smokers questionnaire-Thai version. The result was .85. The summary of the measure is presented in Table 9.

Table 9 Number of items, scoring rang, S-CVI, I-CVI, and reliability of Quit attempt questionnaire-Thai version

| Instrument | Number of item | Scoring Range | S-CVI | I-CVI | Reliability |
|---|-------------------|------------------|-------|-------|-------------|
| Quit attempt questionnaire-Thai version | 1 | 0-30 (times) | .86 | .86 | r= .85 |

5. Motivation To Quit Scale (MTQS) was developed by the researcher based on the self-determination theory (Deci & Ryan, 1985) and literature review. In particular, the guidelines for scale development proposed by DeVillis (2003), Nunnally & Bernstein (1994), and Crocker & Algina (1986) were applied. The processes

of generating the item pool began with a broad review of the literature on the motivation to quit, identifying operational definitions, reviewing existing instruments, and determining the dimensions of the concept. The scale contains two dimensions: intrinsic motivation (e.g., health concerns (item 1-4), and self-image (item 5-15)) and extrinsic motivation (e.g., social concerns (item 16-30), financial considerations (31-34), and anti-smoking policies (item 35-38)). An initial pool of 38 items on a 5-Likert scale was written to reflect the logical and semantic content of the concept of motivation. Adolescents' motivations to quit within the past 3 months were reported. All items were worded positively with 1= not at all agree and 5= extremely agree. 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 (Burton, Sudweeks, Merrill, & Wood, 1991). The total scale was scored by computing the mathematical mean across all items yielding a possible mean score that ranged from 1 to 5 with higher mean scores indicating high motivation to quit.

The initial pool of MTQS consists of 38 items, after considering the criterion of scale content validity index (S-CVI) that should be greater than .80 (Polit, Beck, & Owen, 2007). Two items were deleted; only 36 items of MTQS were tested for item selection. The items selection was conducted through the same processes of the HONCT. Based on the processes, five items were modified to further clarify the meaning and to be suitable for use with Thai adolescent smokers. The MTQS consisted of 36 items and five components (health concerns, self-image, social concerns, financial

considerations, and anti-smoking policies), with a KMO of .93 and accounted for 56.81% of the variance. All items had a factor loading that ranged from 0.43 to 0.76. Those with high loadings on each component are grouped together. It was showed that items generated from the same component were grouped together.

5.1 Content validity

The MTQS tested the content validity on the same processes of Time spent with peer smokers questionnaire-Thai version. To achieve the minimum criterion of the Scale-CVI (S-CVI) so that it will be greater than .80 and represent the content domain, two items of the MTQS were deleted. The S-CVI and Item-CVI for the 36 items were increased to .81 and .57-1.00 respectively. Thus, the MTQS contains 36 items, which represents the content domain.

5.2 Construct validity

The construct validity of the MTQS was tested on the same processes of the HONCT. The results showed that there were 36 items and two domains: intrinsic (health concern and self-image) and extrinsic (social concern, financial consideration, and anti-smoking policies) motivation in the first level of confirmatory factor analysis (CFA). The results showed that the factor loading of all items ranging from 0.49 to 0.81 were statistically significant. For the second level of the CFA, all regression weights 0.83 to 1.00 were statistically significant .05 (Table 10). It was indicated that the force from intrinsic and extrinsic motivation were actual predictors of the motivation to quit. In addition, squared multiple correlation ranged from 0.61-1.00. Most of fit indices of the model were acceptable, except the significance of chi-square ($\chi^2=1031.44$, $df= 545$, $p\text{-value}= 0.00$, $GFI= 0.92$, $AGFI= 0.89$, $RMSEA= 0.05$) as shown in Figure 8.

Table 10 Factor loading and construct validity of MTQS (n=319)

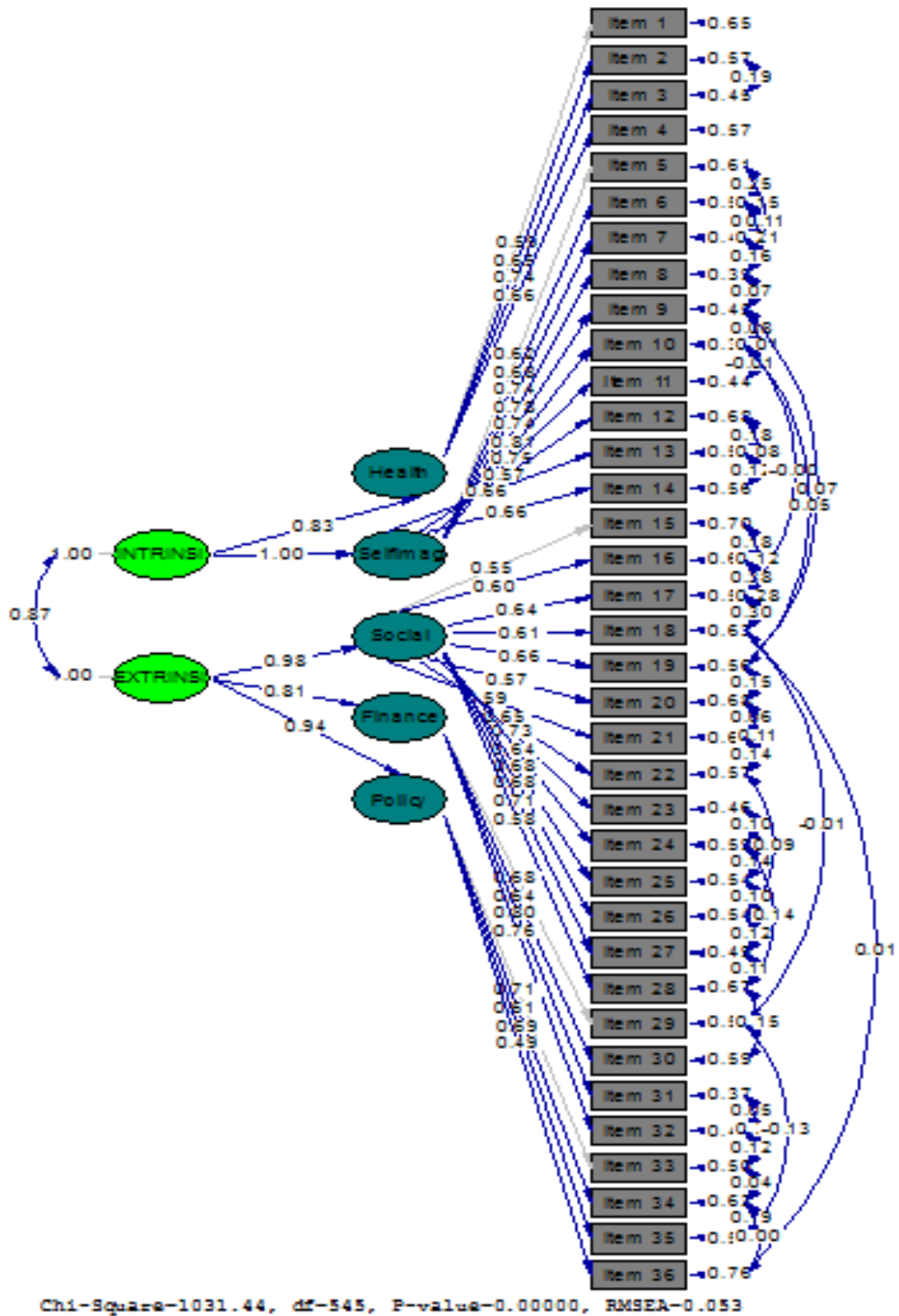
| Item | Mean | Corrected Item- Total Correlation | Standardized factor loading | | | | |
|---------|------|--------------------------------------|-----------------------------|------|------|------|------|
| | | | Health | Self | Soci | Fina | Poli |
| Item 1 | 3.32 | 0.61 | 0.59 | | | | |
| Item 2 | 3.33 | 0.63 | 0.65 | | | | |
| Item 3 | 3.35 | 0.61 | 0.74 | | | | |
| Item 4 | 3.37 | 0.63 | 0.66 | | | | |
| Item 5 | 3.37 | 0.67 | | 0.62 | | | |
| Item 6 | 3.40 | 0.68 | | 0.68 | | | |
| Item 7 | 3.55 | 0.72 | | 0.74 | | | |
| Item 8 | 3.49 | 0.71 | | 0.78 | | | |
| Item 9 | 3.54 | 0.68 | | 0.74 | | | |
| Item 10 | 3.66 | 0.70 | | 0.81 | | | |
| Item 11 | 3.34 | 0.59 | | 0.75 | | | |
| Item 12 | 3.40 | 0.66 | | 0.57 | | | |
| Item 13 | 3.40 | 0.66 | | 0.66 | | | |
| Item 14 | 3.52 | 0.66 | | 0.66 | | | |
| Item 15 | 3.43 | 0.62 | | | 0.55 | | |
| Item 16 | 3.50 | 0.64 | | | 0.60 | | |
| Item 17 | 3.35 | 0.64 | | | 0.64 | | |
| Item 18 | 3.42 | 0.63 | | | 0.61 | | |
| Item 19 | 3.36 | 0.65 | | | 0.66 | | |
| Item 20 | 3.30 | 0.54 | | | 0.57 | | |
| Item 21 | 3.45 | 0.52 | | | 0.59 | | |
| Item 22 | 3.37 | 0.64 | | | 0.65 | | |
| Item 23 | 3.51 | 0.60 | | | 0.73 | | |
| Item 24 | 3.45 | 0.61 | | | 0.64 | | |
| Item 25 | 3.85 | 0.63 | | | 0.68 | | |
| Item 26 | 3.48 | 0.66 | | | 0.68 | | |

Table 10 Factor loading and construct validity of Motivation to Quit (n=319)

(Continued)

| Item | Mean | Corrected Item- Total Correlation | Standardized factor loading | | | | |
|---------|--|--------------------------------------|-----------------------------|-------|-------|-------|-------|
| | | | Health | Self | Soci | Fina | Poli |
| Item 27 | 3.51 | 0.69 | | | 0.71 | | |
| Item 28 | 3.34 | 0.58 | | | 0.58 | | |
| Item 29 | 3.49 | 0.64 | | | | 0.68 | |
| Item 30 | 3.33 | 0.57 | | | | 0.64 | |
| Item 31 | 3.53 | 0.63 | | | | 0.80 | |
| Item 32 | 3.61 | 0.60 | | | | 0.76 | |
| Item 33 | 3.53 | 0.64 | | | | | 0.71 |
| Item 34 | 3.33 | 0.62 | | | | | 0.61 |
| Item 35 | 3.35 | 0.61 | | | | | 0.69 |
| Item 36 | 3.36 | 0.60 | | | | | 0.49 |
| | Factor loading | | 0.83 | 1 | 0.98 | 0.81 | 0.94 |
| | t-value | | 12.24 | 12.65 | 11.52 | 12.46 | 13.22 |
| | Construct validity (Squared Multiple correlation) (R^2) | | 0.61 | 0.89 | 0.91 | 0.75 | 1 |

Note. Health= Health concern, Self= Self-image, Soci= Social consideration, Fina= Financial consideration, Poli= Smoke-free policy



Note. INTRINSI= Intrinsic motivation, EXTRINSIC= Extrinsic motivation, Health= Health concern, Selfmag= Self-image, Social= Social consideration, Finance= Financial consideration, Policy= Smoke-free policy

Figure 8 Measurement model of motivation to quit

5.3 Reliability

Reliability of the MTQS was determined by considering the internal consistency using the same processes of the HONCT. A Cronbach's alpha coefficient of .96 was obtained for the overall scale. The summary of the measure is presented in Table 11.

Table 11 Number of items, scoring rang, S-CVI, I-CVI, and reliability of MTQS

| Instrument | Number of item | Scoring Range | S-CVI | I-CVI | Reliability |
|-----------------------------|-------------------|------------------|-------|----------|----------------|
| Motivation to quit scale | 36 | 1-5 | .81 | .57-1.00 | $\alpha = .96$ |

6. Intensity of Smoking Cessation Intervention Questionnaire (ISCIQ) was developed by the researcher based on the literature review. This instrument was developed the same processes with the MTQS. The ISCIQ consists of four components: counseling, paper-based material, technology-based material, and home visit. An initial pool of 10 items on a dichotomous (Yes=1, No=0) scale was written. The intensity of smoking cessation intervention that adolescent smokers received from healthcare professions within the past 3 months was reported. The possible score ranged from 0-10. For item 2, 3, 4, and 5, the following questions: "Have you ever received any leaflet, pamphlets, manual books, CD/DVD/video, and computer programs about quitting smoking from any healthcare professionals (physicians, nurses, psychiatrist, and dentists)?" were asked. If "No" these items are scored as 0. If "Yes" the subjects were asked "Have you ever read or used it?" If "No" these items are scored as 0. If "Yes" these items are scored as 1. The measure's score was computed by summing the scores obtained for each item and

then dividing by the number of items to which there was a response. Higher scores indicated higher intensity of smoking cessation intervention.

The items selection was conducted the same processes with the HONCT. The ISCIQ consisted of ten items that were not modified and four components (counseling, paper-based material, technology-based material, and home visit), with a KMO of .65 and accounted for 62.75% of the variance. All items had a factor loading ranging from 0.50 to 0.87. It was showed that items generated from the same component were grouped together.

6.1 Content validity

The ISCIQ tested the content validity on the same processes of Time spent with peer smokers questionnaire-Thai version. The S-CVI and Item-CVI for the 10 items were .94 and .71-1.00, respectively.

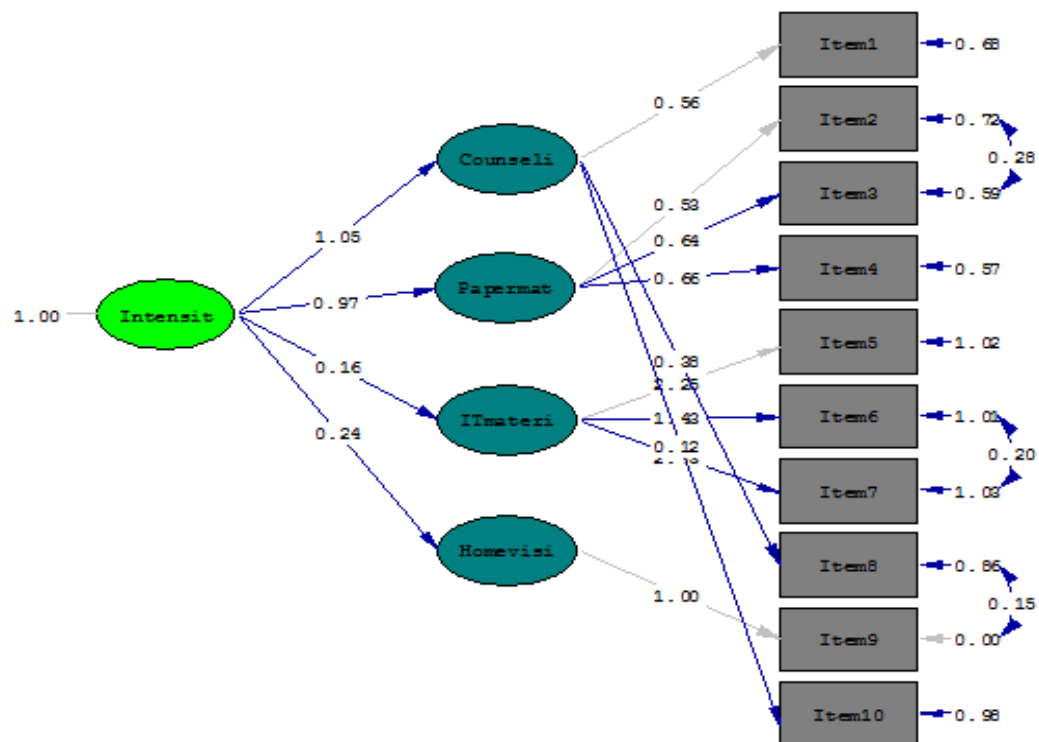
6.2 Construct validity

The construct validity of the ISCIQ was tested on the same processes of the HONCT. The results showed that there were 10 items and four components: Counseling, Paper-based material, Technology-based material, and Home visiting in the first level of confirmatory factor analysis (CFA). The results showed that the factor loading of all items ranging from 0.12 to 1.73 were statistically significant (Table 12). For the second level of the CFA, all regression weights 0.16 to 1.05 were statistically significant at .05. In addition, squared multiple correlation ranged from 0.05 to 1.00. All fit indices of the model were acceptable ($\chi^2=40.35$, $df= 29$, $p\text{-value}= 0.07$, $GFI= 0.98$, $AGFI= 0.95$, $RMSEA= 0.03$) as shown in Figure 9.

Table 12 Factor loading and construct validity of ISCIQ (n=319)

| Item | Mean | Corrected Item- Total Correlation | Standardized factor loading | | | |
|---------|--|--------------------------------------|-----------------------------|-------|------|-------|
| | | | Counse | Paper | IT | Visit |
| Item 1 | 0.67 | 0.52 | 0.56 | | | |
| Item 2 | 0.63 | 0.64 | | 0.53 | | |
| Item 3 | 0.73 | 0.62 | | 0.64 | | |
| Item 4 | 0.57 | 0.70 | | 0.66 | | |
| Item 5 | 0.33 | 0.49 | | | 1.25 | |
| Item 6 | 0.00 | 0.34 | | | 1.43 | |
| Item 7 | 0.43 | 0.37 | | | 1.73 | |
| Item 8 | 0.20 | 0.30 | 0.38 | | | |
| Item 9 | 0.07 | - | | | | 1 |
| Item 10 | 0.00 | - | 0.12 | | | |
| | Factor loading | | 1.05 | 0.97 | 0.16 | 0.24 |
| | t-value | | 9.19 | 7.50 | 5.37 | 3.58 |
| | Construct validity (Squared Multiple Correlation) (R^2) | | 1 | 0.94 | 1 | 0.05 |

Note. Counse= Counseling, Paper= Paper-based material, IT= Technology-based material, Visit= Home visiting



Chi-Square=40.53, df=29, P-value=0.07571, RMSEA=0.035

Note. Intensit= Intensity of smoking cessation intervention, Counseling= Counseling, Itmateri= Technology-based material, Homevisi= Home visiting, Papermat= Paper-based material

Figure 9 Measurement model of intensity of smoking cessation intervention

6.3 Reliability

Reliability of the ISCIQ was determined by considering the internal consistency using the same processes of the HONCT. A Cronbach's alpha coefficient of .79 was obtained for the overall scale. The summary of the measure is presented in Table 13.

Table 13 Number of items, scoring rang, S-CVI, I-CVI, and reliability of ISCIQ

| Instrument | Number of item | Scoring Range | S-CVI | I-CVI | Reliability |
|------------|----------------|---------------|-------|----------|----------------|
| ISCIQ | 10 | 0-10 | .94 | .71-1.00 | $\alpha = .79$ |

7. Demographics data sheet was developed by the researcher. It consists of ten open-ended questions regarding their current age, gender, religion, level of education, grades from the previous semester, sibling, residence, smoking history, age when smoking began, and number of cigarettes smoked per day.

Instrument summary

The final version of instruments used in this study is presented in Appendix E. Four instruments were translated and modified from the existing instruments (time spent with peer smokers questionnaire-Thai version, the HONCT, the self-efficacy to resist smoking scale-Thai version, and the quit attempt questionnaire-Thai version). Two instruments were developed by the researcher (MTQS, and ISCIQ). All instruments demonstrated satisfactory validity and reliability

Protection of human subjects

This study was approved by the Ethical Review Committee for Research Involving Human Research Subjects, Health Sciences Group, Chulalongkorn University. 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. It was approved by the Ethical Review Committee. All of adolescent smokers were approached in a private room at school. The potential risks to participants were minimal, such as emotional discomfort when answering some questions. Participants were informed that if at any time they felt discomfort or embarrassment, they can discuss it with the researcher. There was no harm to the participants in this study. Participants took 30-45 minutes to complete the questionnaire packet. After completing the questionnaires, they were put into an

envelope and sealed, and were directly sent to the researcher to ensure confidentiality. Their names were not included; rather, a code number was used. The results of the study were reported as a whole picture. All data were destroyed upon the completion of the study.

Data collection

Data were gathered from October to December 2013. The data collection procedures were done in following steps:

1. After the study was approved, the permission for collecting the data was obtained from the directors of each school.
2. The researcher asked for a list of the adolescent smokers from the teachers who were smoking cessation counselors at each school, and asked them to set up a meeting between the researcher and adolescent smokers.
3. When it came to the appointment date, all adolescent smokers on the name list were asked to wait for the researcher outside an available classroom at school.
4. The researcher explained the details of the study, including purpose, inclusion criteria, benefit, and risk to all adolescent smokers.
5. The researcher individually asked the adolescent smokers according to the inclusion criteria in front of the room. Those that met the criteria were invited into the room, while those that did not meet the criteria were asked to wait outside with teachers. The researcher informed them that after the subjects who met the criteria completed questionnaires, they were invited into the room to receive information about smoking cessation resources from the researcher together with their friends.

6. Each subjects in the room received the information sheet about the purpose, content, and benefit and risk of the study from the researcher.

7. After the subjects read the information, verbal permission was obtained from them. Those that agree to participate in this study received the packet that included the questionnaires.

8. After completing the questionnaires, they were putted into an envelope and sealed for preventing other subjects from copying the answers.

9. The subjects were asked to make a queue and directly send case-by-case the questionnaires to the researcher for ensuring confidentiality.

10. The researcher opened the packet of questionnaire and examined the questionnaires for completeness of the data. The subjects were asked to answer any missing items and clarify ambiguous answers. Especially, Quit attempt questionnaire-Thai version, the researcher asked the subjects to describe their understanding on what they answered.

11. After that, each participant received a pen and a note-book in appreciation for their participation.

12. Before the participants left the room, both adolescents that waited outside and those that sat in the private room received information about resources for smoking cessation services from the researcher (such as the smoking cessation clinic in the hospitals, websites, quitline, etc.) that could help them quit smoking.

Data analysis

A total of 486 adolescent smokers participated in the study. After collecting the data, the researcher prepared and completed the data by using eye screening. Then, 10% of the subjects' data was checked by an outside person to prevent

random and systematic errors (e.g., typing or coding the wrong value). Next, the descriptive statistics using computer software were tested concerning missing data and outliers.

No missing data occurred in this study. Many strategies were used to ensure the accurate and complete data. For instance, the packet that included the questionnaire was sent individually to the researcher case-by-case. Each subject was immediately asked to complete all of the items and clarify ambiguous answers. Moreover, the cross-checking technique was used to ensure that the data were complementary and valid.

Due to the criterion of outliers, the raw data that had the absolute of Z scores greater 3 were identified as outlier data (Barnett & Lewis, 1994). As a result, 23 subjects were excluded. Therefore, data of a total sample of 463 adolescent smokers then were analyzed in the study.

After the researcher prepared and completed the data screening, the assumptions underlying the multivariate analysis for path analysis were tested, including normality, linearity, homoscedasticity, and multicollinearity. The results showed that there was no violation of the assumptions underlying path analysis, as presented in appendix F. The path analysis command in Lisrel 8.53 was used to examine the direct, indirectly mediated, and total contribution of quit attempts. An alpha level of .05 was set as the acceptable level of significance for this study.

CHAPTER IV

RESULTS

This chapter presents 1) characteristics of the study variables, 2) statistical analysis to test the predictors of adolescents' quit attempt, 3) hypotheses testing, 4) direct and indirect effects of influencing factors on quit attempt, and 5) additional findings.

1. Characteristics of the study variables

The six major variables in the current study including that time spent with peer smokers, nicotine dependence, self-efficacy to resist smoking, quit attempt, motivation to quit, and intensity of smoking cessation intervention were examined. The detail regarding characteristics of each variable is presented.

Table 14 Possible range, actual range, mean, standard deviation (SD), skewness, and kurtosis of time spent with peer smokers

| Variables | Possible range | Actual range | Mean | SD | Skewness (Z value) | Kurtosis (Z value) |
|------------------------------|-------------------|--------------|---------|---------|--------------------|--------------------|
| Time spent with peer smokers | 0-10080 (minutes) | 10-5880 | 1540.38 | 1396.73 | 1.02 (0.11) | 0.20 (0.23) |

Table 14, the total time that subjects spent with peer smokers in 1 week ranged from 10 to 5880 minutes (4 days and 2 hours) with a mean of 1540.38 (SD=1396.73). The total time spent with peer smokers had a positive skewness and kurtosis value of 1.02 and 0.20, respectively.

Table 15 Number and percentage of subject's time spent with peer smokers

| Time spent with peer smokers | n | % |
|---|-----|-------|
| Having peer smokers | | |
| No | 0 | 0 |
| Yes | 463 | 100 |
| Number of days that subjects spent with peer smokers a week (days) (mean=4.46, SD=1.87) | | |
| 1 | 30 | 6.48 |
| 2 | 66 | 14.25 |
| 3 | 63 | 13.61 |
| 4 | 21 | 4.54 |
| 5 | 166 | 35.85 |
| 6 | 19 | 4.10 |
| 7 | 98 | 21.17 |
| Amount of times that subjects spent with peer smokers a day (minutes) (mean=309.03, SD=220.59) | | |
| 10-60 | 86 | 18.57 |
| 61-180 | 119 | 25.70 |
| 181-300 | 68 | 14.69 |
| 301-360 | 26 | 5.62 |
| 361-480 | 73 | 15.77 |
| 481-600 | 51 | 11.01 |
| 601-780 | 36 | 7.78 |
| 781-900 | 4 | 0.86 |

Table 15 Number and percentage of subject's time spent with peer smokers
(Continued)

| Time spent with peer smokers | n | % |
|--|----|-------|
| Amount of times that subjects spent with peer smokers a week (minutes) | | |
| 10-60 | 23 | 4.97 |
| 61-300 | 79 | 17.06 |
| 301-600 | 71 | 15.33 |
| 601-900 | 43 | 9.29 |
| 901-1200 | 37 | 7.99 |
| 1201-1500 | 31 | 6.70 |
| 1501-1800 | 25 | 5.40 |
| 1801-2100 | 19 | 4.10 |
| 2101-2400 | 37 | 7.99 |
| 2401-2700 | 10 | 2.16 |
| 2701-3000 | 24 | 5.18 |
| 3001-3300 | 0 | 0 |
| 3301-3600 | 21 | 4.54 |
| 3601-3900 | 2 | 0.43 |
| 3901-4200 | 15 | 3.24 |
| 4201-4500 | 6 | 1.30 |
| ≥4501-5880 | 20 | 4.32 |

In Table 15, all of the adolescents had peer smokers. They spent time with peer smokers ranging from 1 to 7 days per week, (mean=4.46, SD=1.87) and 10 to 900 minutes a day (mean=309.03, SD=220.59).

Table 16 Possible range, actual range, mean, standard deviation (SD), skewness, and kurtosis of nicotine dependence

| Variables | Possible range | Actual range | Mean | SD | Skewness (Z value) | Kurtosis (Z value) |
|---------------------|----------------|--------------|------|------|--------------------|--------------------|
| Nicotine dependence | 0-10 | 0-10 | 3.15 | 3.01 | 0.69 (0.11) | -0.70 (0.23) |

| Nicotine dependence score | n | % |
|---------------------------|-----|-------|
| 0 | 122 | 26.35 |
| 1 | 64 | 13.82 |
| 2 | 57 | 12.31 |
| 3 | 44 | 9.50 |
| 4 | 26 | 5.61 |
| 5 | 40 | 8.64 |
| 6 | 28 | 6.05 |
| 7 | 23 | 4.97 |
| 8 | 31 | 6.70 |
| 9 | 12 | 2.59 |
| 10 | 16 | 3.46 |

The total scores of nicotine dependence ranged from 0 to 10 points with a mean of 3.15 (SD=3.01). Most of subjects had HONCT score lower than 5 (76.23%). The nicotine dependence scores had a positive skewness value (0.69) and a negative kurtosis value (-0.70).

Table 17 Possible range, actual range, mean, standard deviation (SD), skewness, and kurtosis of self-efficacy to resist smoking

| Variables | Possible range | Actual range | Mean | SD | Skewness (Z value) | Kurtosis (Z value) | | | | | | | | | | | | | | | |
|--|----------------|--------------|------|------|--------------------|--------------------|---------------------|---|---|-----------|----|------|-----------|----|-------|-----------|-----|-------|-----------|-----|-------|
| Self-efficacy to resist smoking | 1-5 | 1-5 | 3.64 | 0.98 | -0.36 (0.11) | -0.35 (0.23) | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Self-efficacy score</th> <th>n</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>1.00-2.00</td> <td>29</td> <td>6.26</td> </tr> <tr> <td>2.01-3.00</td> <td>98</td> <td>21.17</td> </tr> <tr> <td>3.01-4.00</td> <td>181</td> <td>39.09</td> </tr> <tr> <td>4.01-5.00</td> <td>155</td> <td>33.48</td> </tr> </tbody> </table> | | | | | | | Self-efficacy score | n | % | 1.00-2.00 | 29 | 6.26 | 2.01-3.00 | 98 | 21.17 | 3.01-4.00 | 181 | 39.09 | 4.01-5.00 | 155 | 33.48 |
| Self-efficacy score | n | % | | | | | | | | | | | | | | | | | | | |
| 1.00-2.00 | 29 | 6.26 | | | | | | | | | | | | | | | | | | | |
| 2.01-3.00 | 98 | 21.17 | | | | | | | | | | | | | | | | | | | |
| 3.01-4.00 | 181 | 39.09 | | | | | | | | | | | | | | | | | | | |
| 4.01-5.00 | 155 | 33.48 | | | | | | | | | | | | | | | | | | | |

In Table 17, the total scores of the self-efficacy to resist smoking ranged from 1 to 5 point(s) with a mean of 3.64 (SD=0.97). Most of subjects had self-efficacy to resist smoking score higher than 3 (72.57%) The self-efficacy scores had a negative skewness and kurtosis value of -0.36 and 0.35, respectively.

Table 18 Possible range, actual range, mean, standard deviation (SD), skewness, and kurtosis of quit attempt

| Variables | Possible range | Actual range | Mean | SD | Skewness (Z value) | Kurtosis (Z value) |
|--------------|-----------------|--------------|----------------------|-------|--------------------|--------------------|
| Quit attempt | 0-30 (times) | 0-30 | 15.55 (Median=15) | 11.87 | 0.02 (0.11) | -1.66 (0.23) |

| Number of quit attempt | n | % |
|------------------------|-----|-------|
| 0 | 55 | 11.88 |
| 1-5 | 96 | 20.73 |
| 6-10 | 55 | 11.88 |
| 11-15 | 41 | 8.86 |
| 16-20 | 32 | 6.91 |
| 21-25 | 32 | 6.91 |
| 26-30 | 152 | 32.83 |

In this study, the number of quit attempts ranged from 0 to 30 times. Most of the subjects (88.12%) reported making a quit attempt at least 1 time during the past 30 days. One hundred and nineteen subjects (25.71%) were able to stop smoking for 30 days. Fifty-five adolescent smokers (11.88%) reported that they did not make any quit attempt in the past 30 days (Table 18).

Table 19 Possible range, actual range, mean, standard deviation (SD), skewness, and kurtosis of motivation to quit

| Variables | Possible range | Actual range | Mean | SD | Skewness (Z value) | Kurtosis (Z value) |
|--------------------|----------------|--------------|------|------|-----------------------|-----------------------|
| Motivation to quit | 1-5 | 2.25-5 | 3.88 | 0.63 | -0.14 (0.11) | -0.56 (0.23) |

| Motivation to quit score | n | % |
|--------------------------|-----|-------|
| 2.25-3.25 | 78 | 16.85 |
| 3.26-4.26 | 248 | 53.56 |
| 4.27-5.00 | 137 | 29.59 |

The total scores on the motivation to quit ranged from 1 to 5 points with a mean of 3.88 (SD=0.63). Most of subjects had motivation to quit score higher than 3.25 (83.15%). The nicotine dependence scores had a negative skewness and kurtosis value of -0.14 and -0.56, respectively.

Table 20 Possible range, actual range, mean, standard deviation (SD), skewness, and kurtosis of intensity of smoking cessation intervention

| Variables | Possible range | Actual range | Mean | SD | Skewness (Z value) | Kurtosis (Z value) |
|---|----------------|--------------|------|------|--------------------|--------------------|
| Intensity of smoking cessation intervention | 0-10 | 0-6 | 1.33 | 1.56 | 1.00 (0.11) | -0.02 (0.23) |

| Intensity of intervention score | n | % |
|---------------------------------|-----|-------|
| 0 | 206 | 44.49 |
| 1 | 83 | 17.93 |
| 2 | 72 | 15.55 |
| 3 | 45 | 9.72 |
| 4 | 31 | 6.70 |
| 5 | 23 | 4.97 |
| 6 | 3 | 0.65 |

The total scores of the intensity of smoking cessation intervention ranged from 0 to 6 points with a mean of 1.33 (SD=1.56). The intensity of smoking cessation intervention scores had a positive skewness value (1.00) and negative kurtosis value (-0.02). The highest score of intensity of smoking cessation intervention was 6, but the possible highest score was 10.

Table 21 Number and percentage of subject's intensity of smoking cessation intervention (n=463)

| Intensity of smoking cessation intervention | n | % |
|---|-----|-------|
| Receiving Counseling | | |
| No | 338 | 73.00 |
| 1 time | 91 | 19.65 |
| 2 times | 22 | 4.75 |
| 3 times | 12 | 2.60 |
| Average time of counseling (minutes) | | |
| No receive counseling | 338 | 73.00 |
| 3-5 | 10 | 2.15 |
| >5-10 | 31 | 6.70 |
| >10-15 | 10 | 2.15 |
| >15-20 | 6 | 1.30 |
| >20-30 | 56 | 12.10 |
| >30 | 12 | 2.60 |
| Receiving self-help materials | | |
| No | 283 | 61.12 |
| Yes | 180 | 38.88 |
| Receiving phone follow-up | | |
| No | 457 | 98.70 |
| Yes | 6 | 1.30 |
| Receiving home visit | | |
| No | 460 | 99.35 |
| Yes | 3 | 0.65 |
| Receiving hospital appointment | | |
| No | 461 | 99.57 |
| Yes | 2 | 0.43 |

In Table 21, it was showed that only 27% of the subjects received smoking cessation counseling from health professionals, and 38.88% of subjects received self-help materials from health professionals; about 70% of those that received materials read or used them. Only 2-6 subjects received follow-up services (0.43%-1.30%).

2. Statistical analysis to test the predictors of adolescents' quit attempt

To describe the predicting factors of the quit attempt on the part of Thai adolescent smokers, the correlation between the variables and the quit attempt was tested using bivariate correlation. The magnitude of the relationships was determined by the following criteria of the correlation coefficient (r): $r < .30$ = weak or low relationship, $.30 \geq r \leq .50$ = moderate relationship and $r > .50$ = strong or high relationship (Burns & Grove, 2009).

Table 22 Correlation matrix among the independent variables (n=463)

| Variables | Time | Nicotine | SE | QA | Motivation | Intensity |
|------------|--------|----------|-------|-------|------------|-----------|
| Time | 1 | | | | | |
| Nicotine | .24** | 1 | | | | |
| SE | -.30** | -.34** | 1 | | | |
| QA | -.46** | -.50** | .54** | 1 | | |
| Motivation | -.25** | -.23** | .43** | .48** | 1 | |
| Intensity | .01 | .38 | .03 | -.02 | .02 | 1 |

Note. ** $p < .01$, Time= Time spent with peer smokers, Nicotine= Nicotine dependence, SE= Self-efficacy to resist smoking, QA= Quit attempt, Motivation= Motivation to quit, Intensity= Intensity of smoking cessation intervention

The results showed that most of the variables had a moderate correlation, at the statistical significance level of .05 including time spent with peer smokers and nicotine dependence had a moderate negative correlation with quit attempt ($r = -.46$

and $r = -.50$). Self-efficacy to resist smoking had a moderated negative correlation with time spent with peer smokers and nicotine dependence ($r = -.30$ and $r = -.34$), respectively. Motivation to quit had a moderate positive correlation with the quit attempt and self-efficacy to resist smoking ($r = .48$ and $r = .43$). Self-efficacy to resist smoking had the highest positive relationship with the quit attempt ($r = .54$). In contrast, the intensity of smoking cessation intervention had non-significant correlation with time spent with peer smokers ($r = .01$) (Table 22).

In this study, the bivariate correlation showed that one variable (intensity of smoking cessation intervention) was not significantly related to the quit attempt. The literature indicates that non-significant variable in bivariate correlation is often eliminated (Shieh, 2006). However, some researchers have reported that bivariate results provide only partial information about the relationship between a predictor and an outcome variable, and are an improper method for selecting variables for multivariate analysis. The uncorrelated variable sometimes significantly improved the explained variance (Courville & Thompson, 2001; Shieh, 2006). Therefore, all possible five predictors were retained for use in the path analysis.

3. Hypotheses testing

In the present study, five statements of hypotheses were tested. Before testing those hypotheses, the identification of the path model was examined. The model was determined that whether the hypothesized path model (Figure 1) fit the data, the path coefficients and the variance of the model (R^2) were estimated. The effects of the independent variables (self-efficacy to resist smoking, motivation to quit, nicotine dependence, time spent with peer smokers, and intensity of smoking

cessation intervention) on the dependent variable (quit attempt) were determined in order to answer the hypotheses.

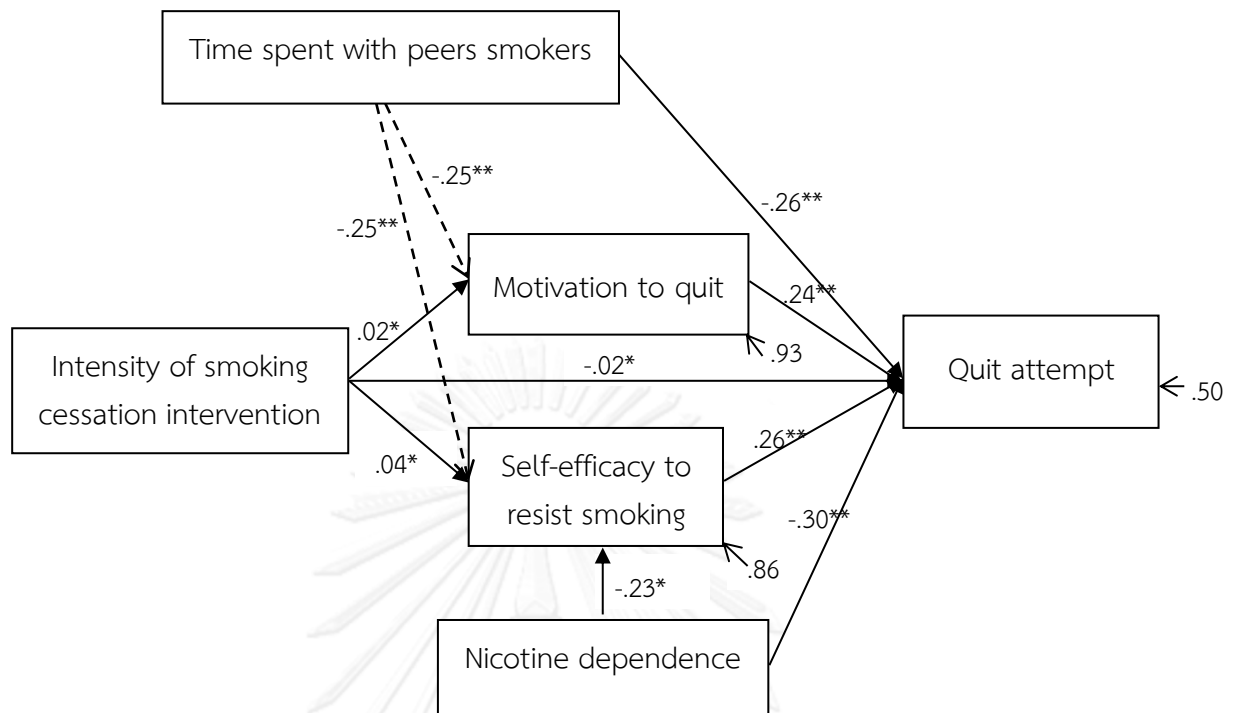
First, the researcher identified the hypothesized model by calculating the number of data points because the computer program will run when there is an over-identification model. The formula used is $\{p(p+1)\}/2$, where p equals the number of observed variables. There were six observed variables. So, the number of data points was 21 $[\{6(6+1)\}/2]$. According to Hair (2010), over-identification is the model that has more data points than free parameters. This study contains 14 free parameters, the number of data point more than free parameter. Thus, there is an over-identification model, which meant that it could be analyzed by path analysis.

Next, the hypothesized path model of the quit attempt (Figure 1) was tested. The results showed that the goodness-of-fit was rejected. The initial model explained 44% ($R^2=.44$) of the variance of the quit attempt. Then, the researcher applied modification indices to improve the model (Hooper, Coughlan, & Mullen, 2008) by fixing covariance matrix of exogenous variables (time spent with peer smokers, intensity of smoking cessation, and nicotine dependence), freeing error covariance matrix of endogenous variables (motivation to quit and self-efficacy to resist smoking), and freeing the pathways of intensity of smoking cessation intervention. The results shown that the final path model explained 50% ($R^2=.50$) of the variance of the quit attempt. The goodness-of-fit was in the acceptable range (χ^2 -test= 14.64, $\chi^2/df= 2.09$, p -value=0.05 GFI= 0.99, AGFI=0.97, CFI= 0.99, RMSEA .049) as shown in Table 23.

Table 23 Comparison of the goodness of fit statistics in the initially-path model and the final model of the quit attempt among Thai adolescent smokers

| Relative fit index | Initial model | Final model | Criterion of Goodness of fit |
|--------------------|-------------------|------------------|------------------------------|
| χ^2 - test | 135.4 (p =.00) | 14.64 (p=.05) | (p < .05) non significant |
| χ^2 / df | 135.4/5= 27.08 | 14.64/7=2.09 | < 3.00 |
| CFI | 0.82 | 0.99 | ≥ 0.95 |
| GFI | 0.91 | 0.99 | ≥ 0.95 |
| AGFI | 0.63 | 0.97 | ≥ 0.95 |
| RMSEA | 0.24 | 0.049 | < 0.05 |
| SRMR | 0.15 | 0.05 | < 0.05 |
| PGFI | 0.22 | 0.33 | < 0.50 |
| R^2 | .44 | .50 | > .50 |

Note. χ^2 = Chi-square, df = degree of freedom, CFI = Comparative Fit Index, GFI = Goodness of Fit Index, AGFI = Adjust Goodness of Fit Index, RMSEA = Root Mean Square Error of Approximation, SRMR = Standardized Root Mean Square Residual



Note. $*p < .05$, $**p < .01$, $n = 463$, χ^2 -test = 14.64, $\chi^2 / df = 2.09$, p-value = 0.05 GFI = 0.99, AGFI = 0.97, CFI = 0.99, RMSEA = .049, $R^2 = .50$

Figure 10 A path model of the quit attempt among Thai adolescent smokers

The criteria for retaining the variables in path model were the statistical significance level at .05, standardized path coefficient that range between -1 and +1, and the test statistic that generated from the output greater than ± 1.96 (Byrne, 1994; Jöreskog & Sörbom, 1996). The results showed that all factors significantly predict quit attempt at the statistical significance level of .05. As shown in Figure 10, two pathways were added based on the literatures support. Time spent with peer smokers had a negative indirect effect on the quit attempt through self-efficacy to resist smoking and motivation to quit. As for the path coefficients, it was found that all independence variables were significantly predicted quit attempt. The path coefficients of nicotine dependence had the most impact on the quit attempt

($\beta = -.30$), followed by self-efficacy to resist smoking and time spent with peer smokers ($\beta = .26$, and $\beta = -.26$).

4. Direct and indirect effects of influencing factors on quit attempt

The effects of the independent variables on attempt in Thai adolescent smokers were presented and the findings were described below.

1) Effect of self-efficacy to resist smoking on quit attempt

Self-efficacy to resist smoking had a significant positive direct effect ($\beta = .26$) on the quit attempt, at the statistical significance level of .05.

2) Effect of motivation to quit on quit attempt

Motivation to quit had a significant positive direct effect ($\beta = .24$) on the quit attempt, at the statistical significance level of .05.

3) Effect of nicotine dependence on quit attempt

Nicotine dependence had a significant negative direct effect ($\beta = -.30$) on the quit attempt, and it had a significant negative indirect effect ($\beta = -.23$) on the quit attempt through self-efficacy to resist smoking, at the statistical significance level of .05. The total effect of nicotine dependence on quit attempt and self-efficacy to resist smoking were $-.36$ and $-.23$, respectively.

4) Effect of time spent with peer smokers on the quit attempt

Time spent with peer smokers had a significant negative direct effect on the quit attempt ($\beta = -.26$), and it had a significant negative indirect effect on the quit attempt through self-efficacy to resist smoking ($\beta = -.25$) and motivation to quit ($\beta = -.25$), at the statistical significance level of .05. The total effect of time spent with peer smokers on quit attempt, motivation to quit, and self-efficacy to resist smoking were $-.39$, $-.25$, and $-.25$, respectively.

5) Effect of intensity of smoking cessation intervention on quit attempt

Intensity of smoking cessation intervention had a significant negative direct effect ($\beta = -.02$) on the quit attempt, and it had a significant indirect effect on the quit attempt through self-efficacy to resist smoking ($\beta = .04$) and motivation to quit ($\beta = .02$), at the statistical significance level of .05. The total effect of intensity of smoking cessation intervention on quit attempt, motivation to quit, and self-efficacy to resist smoking were -.004, .021, and .04, respectively.

Table 24 Summary of the total, direct, and indirect effects of the influencing variables on the affected variables (n=463)

| Endogenous Variables | R ² | Influencing Variables | TE | IE | DE |
|----------------------|----------------|---|--------|-------|--------|
| Quit attempt | .50 | Time spent with peer smokers | -0.39 | -0.13 | -0.26 |
| | | Motivation to quit | 0.24 | - | 0.24 |
| | | Self-efficacy to resist smoking | 0.26 | - | 0.26 |
| | | Nicotine dependence | -0.36 | -0.06 | -0.30 |
| | | Intensity of smoking cessation intervention | -0.004 | 0.015 | -0.019 |
| Motivation to quit | .06 | Intensity of smoking cessation intervention | 0.02 | - | 0.02 |
| | | Time spent with peer smokers | -0.25 | - | -0.25 |

Table 24 Summary of the total, direct, and indirect effects of the influencing variables on the affected variables (n=463) (Continued)

| Endogenous Variables | R ² | Influencing Variables | TE | IE | DE |
|----------------------------------|----------------|---|-------|----|-------|
| Self –efficacy to resist smoking | .14 | Intensity of smoking cessation intervention | 0.04 | - | 0.04 |
| | | Time spent with peer smokers | -0.25 | - | -0.25 |
| | | Nicotine dependence | -0.23 | - | -0.23 |

Note. TE= Total effect, IE= Indirect effect, DE= Direct effect

Finally, the study findings revealed that the path model fit the empirical data and could explain 50% ($R^2=.50$) of the variance of the quit attempt by self-efficacy to resist smoking, motivation to quit, nicotine dependence, time spent with peer smokers, and intensity of smoking cessation intervention. The model explained 6% ($R^2=.06$) of the variance of the motivation to quit and 14% ($R^2=.14$) of the variance of the self-efficacy to resist smoking.

Summary

The descriptive statistical characteristics of the variables investigated in this study have been explained. The assumptions of the path analysis were tested and the results were acceptable. The initial hypothesized path model of the quit attempt among Thai adolescent smokers was rejected. The modification indices were applied, and the model was meaningful and useful for explaining the factors influencing the quit attempt. Finally, all of the variables in the final model explained 50% of the variance in the quit attempt.

5. Additional Finding

Table 25 Characteristics of subjects who had no quit attempt, who had quit for 1-29 times, and who had quit for 30 times in the past 30 days (N=463)

| Characteristics of subjects | No quit attempt (n=55) | | 1-29 times quit attempt (n=289) | | 30 times quit attempt (n=119) | |
|-----------------------------|------------------------|-------|---------------------------------|-------|-------------------------------|-------|
| | n | % | n | % | n | % |
| Gender | | | | | | |
| Male | 52 | 94.55 | 270 | 93.43 | 114 | 95.79 |
| Female | 3 | 5.45 | 19 | 6.57 | 5 | 4.21 |
| Age | | | | | | |
| 12 | 0 | 0 | 1 | 0.35 | 1 | 0.84 |
| 13 | 2 | 3.64 | 23 | 7.96 | 21 | 17.65 |
| 14 | 10 | 18.18 | 73 | 25.26 | 32 | 26.89 |
| 15 | 15 | 27.27 | 76 | 26.30 | 25 | 21.01 |
| 16 | 10 | 18.18 | 56 | 19.38 | 22 | 18.48 |
| 17 | 11 | 20.00 | 45 | 15.56 | 16 | 13.45 |
| 18 | 7 | 12.73 | 15 | 5.19 | 2 | 1.68 |
| Level of education | | | | | | |
| Grade 7 | 2 | 3.64 | 15 | 5.19 | 15 | 12.61 |
| Grade 8 | 9 | 16.36 | 70 | 24.22 | 33 | 27.72 |
| Grade 9 | 17 | 30.91 | 87 | 30.10 | 28 | 23.53 |
| Grade 10 | 6 | 10.90 | 54 | 18.69 | 16 | 13.45 |
| Grade 11 | 13 | 23.64 | 50 | 17.30 | 26 | 21.85 |
| Grade 12 | 8 | 14.55 | 13 | 4.50 | 1 | 0.84 |

Table 25 Characteristics of subjects who had no quit attempt, who had quit for 1-29 times, and who had quit for 30 times in the past 30 days (N=463) (continued)

| Characteristics of subjects | No quit attempt (n=55) | | 1-29 times quit attempt (n=289) | | 30 times quit attempt (n=119) | |
|--------------------------------------|------------------------|-------|---------------------------------|-------|-------------------------------|-------|
| | n | % | n | % | n | % |
| Grades from previous semester | | | | | | |
| No response | 4 | 7.27 | 30 | 10.38 | 9 | 7.56 |
| < 1.00 | 1 | 1.82 | 5 | 1.73 | 0 | 0 |
| 1.00-1.50 | 11 | 20.00 | 35 | 12.11 | 8 | 6.72 |
| 1.51-2.00 | 13 | 23.64 | 53 | 18.35 | 19 | 15.97 |
| 2.01-2.50 | 14 | 25.44 | 86 | 29.76 | 40 | 33.62 |
| 2.51-3.00 | 8 | 14.55 | 54 | 18.68 | 28 | 23.53 |
| 3.01-3.50 | 2 | 3.64 | 17 | 5.88 | 12 | 10.08 |
| 3.51-4.00 | 2 | 3.64 | 9 | 3.11 | 3 | 2.52 |
| Religion | | | | | | |
| Buddhist | 51 | 92.73 | 275 | 95.16 | 116 | 97.48 |
| Muslim | 3 | 5.45 | 9 | 3.11 | 2 | 1.68 |
| Christian | 1 | 1.82 | 5 | 1.73 | 1 | 0.84 |
| Residing | | | | | | |
| Alone | 1 | 1.82 | 5 | 1.73 | 0 | 0 |
| Parents | 51 | 92.73 | 253 | 87.54 | 107 | 89.92 |
| Relative | 3 | 5.45 | 30 | 10.38 | 11 | 9.24 |
| Friend (Male) | 0 | 0 | 0 | 0 | 1 | 0.84 |
| Boy friend | 0 | 0 | 1 | 0.35 | 0 | 0 |

Table 25 Characteristics of subjects who had no quit attempt, who had quit for 1-29 times, and who had quit for 30 times in the past 30 days (N=463) (continued)

| Characteristics of subjects | No quit attempt (n=55) | | 1-29 times quit attempt (n=289) | | 30 times quit attempt (n=119) | |
|--|------------------------|-------|---------------------------------|-------|-------------------------------|-------|
| | n | % | n | % | n | % |
| Age when smoking began (years old) | | | | | | |
| 5-8 | 0 | 0 | 6 | 2.08 | 2 | 1.68 |
| 9-12 | 18 | 32.73 | 89 | 30.80 | 49 | 41.18 |
| 13-15 | 36 | 65.45 | 174 | 60.20 | 57 | 47.90 |
| 16-18 | 1 | 1.82 | 20 | 6.92 | 11 | 9.24 |
| Number of cigarettes smoked per day | | | | | | |
| 1-5 | 33 | 60.00 | 249 | 86.15 | 114 | 95.80 |
| 6-10 | 19 | 34.54 | 35 | 12.11 | 4 | 3.36 |
| 11-15 | 1 | 1.82 | 3 | 1.04 | 1 | 0.84 |
| 16-20 | 2 | 3.64 | 1 | 0.35 | 0 | 0 |
| >20 | 0 | 0 | 1 | 0.35 | 0 | 0 |

Gender

Most of adolescents who had no quit attempt, who made a quit attempt for 1-29 times, and who made a quit attempt for 30 times in the past thirty days were male (94.55%, 93.43%, and 95.79% respectively).

Age

A majority of subjects who had no quit attempt, and those who made a quit attempt for 1-29 times were 15 years old (27.27% and 26.30%, respectively). The

subjects who made a quit attempt for 30 times in the thirty days were 14 years old (26.89%).

Level of education

Most of subjects who had no quit attempt, who made quit attempt for 1-29 times, and who made quit attempt for 30 times in the past thirty days studied in grades 7 to 9, accounted for 50.91%, 59.51%, and 63.86% respectively.

Grades from the previous semester

The majority of the subjects in the three groups (those who had no quit attempt, those who made a quit attempt 1-29 times, and those who made a quit attempt 30 times during the past thirty days) had grades from the previous semester of 2.01-2.50 (25.44%, 29.76%, and 33.62% respectively). Only 7.28% of those who did not make quit attempt had grades higher than 3.00 compared with 12.60% of those who made a quit attempt 30 times during the past thirty days and 70.90% of subjects who did not make quit attempt had grade ≤ 2.50 , whereas 36.13% of those who succeed quitting in 30 days had grade > 2.50

Religion

Most of subjects in three groups were Buddhist (92.73% of those who had no quit attempt, 95.16% of those who made quit attempt for 1-29 times, and 97.48% of those who made quit attempt for 30 times in the past thirty days).

Residing

Most of subjects in three groups lived with parents (92.73% of those who had no quit attempt, 87.54% of those who made a quit attempt for 1-29 times, and 89.92% of those who made a quit attempt for 30 times in the past thirty days), and

10.38% of adolescents who made a quit attempt for 1-29 times lived with their relative.

Age when smoking began (years old)

Most of subjects in three groups started smoking before 16 years old (98.18% of those who had no quit attempt, 93.08% of those who made quit attempt for 1-29 times, and 90.76% of those who made quit attempt for 30 times in the past thirty days). Interestingly, 2.08% of those who made quit attempt for 1-29 times reported that the age of initiation of smoking was 5-8 years olds.

Number of cigarettes smoked per day

The majority of subjects had smoked 1-5 cigarettes/day (60.0% of those who did not make quit attempt, 86.15% of those who made quit attempt for 1-29 times, and 95.80% of those who made quit attempt for 30 times in the past thirty days). In addition, those who never-quit had smoked 6-10 cigarettes (34.54%) higher than those who quitted for 1-29 times (12.11%) and those who quitted for 30 times (3.36%).

CHAPTER V

DISCUSSION

This chapter presents 1) conclusion, 2) discussion, 3) implication for nursing knowledge and nursing practice, and 4) recommendations for future research.

Conclusion

This study was a correlational research design, aimed at examining the direct and indirect relationships of the predicting factors of the quit attempt by Thai adolescent smokers. Multi-stage random sampling was used to recruit the subjects. They were 463 adolescent smokers, grades 7 to 12 from 12 schools that belonged to the Teacher's Network against Tobacco (TNT) from all regions of Thailand and had attempted to quit smoking within the past three months. Data were gathered from October to December 2013.

The majority of the subjects were males (94.17%) that studied in grade 7-9 (59.61%). The age ranged from 12-18 years of age and majority of them were 15 years old (25.05%). Almost all of the subjects were Buddhist (95.46%) and lived with their parents (88.76%).

The research instruments used in this study were satisfactory validity and reliability. This study was approved by the Ethical Review Committee, Chulalongkorn University. Descriptive statistics, bivariate correlation, and path analysis (Lisrel 8.53) were used to analyze the data.

The findings of the path analysis revealed that all independent variables had significantly predicted quit attempt at the statistical significance level of .05. The path model of all variables accounted for 50% of the variance of the quit attempt.

Discussion

The discussion part of this study was based on the objective of the study as presented below.

1. To identify the predicting factors of quit attempt among Thai adolescent smokers

After entering influencing factors of quit attempt into path analysis. The results showed that all factors significantly predict quit attempt at the statistical significance level of .05 which includes self-efficacy to resist smoking, motivation to quit, nicotine dependence, time spent with peer smokers, and intensity of smoking cessation intervention.

Bandura's (1986) Social Cognitive Theory (SCT) stated that individual behaviors can be affected based on personal and environmental factors. The variables that significantly predict quit attempt are considered as personal and environmental factors. Congruent with the findings of previous studies which were found that self-efficacy to resist smoking (Solomon et al., 2006; Sterling et al., 2007), motivation to quit (Branstetter et al., 2009; Myers & MacPherson, 2008), nicotine dependence (Van Zunder et al., 2009), time spent with peer smokers (Jones, Schroeder, & Moolchan, 2004), and intensity of smoking cessation intervention (Rice, Hartmann-Boyce, & Stead, 2013; Villanti et al., 2010) could significantly predict quit attempt.

The group of these factors predict quit attempt of 50% in the path model. There is no study of the model of quit attempt specifically to adolescent smokers. Only that for adults was studied, for example, Fagan and colleagues (2007) indicated that employment status, the number of cigarettes smoked per day, having a usual type of cigarette, time to the first cigarette, and nicotine dependence were

significantly associated with quit attempt in the adjusted multivariate model. Another study, Zhou and colleagues (2009) found that the model of quit attempt among adult smokers in United State consisted of age, motivation to quit, intention to quit, previous quit attempt, and nicotine dependence. There are some different predictors between previous studies and the present study such as age, employment status, the number of cigarettes smoked per day, having a usual type of cigarette, and time to the first cigarette. These predictors are non-applicable for adolescent population. Since adults have characteristics, smoking patterns, lifestyles, and attitudes that differ from those of adolescents.

In addition, subject's characteristic was also interesting, particular, grades from previous semester. Most of subjects had grades from previous semester ≤ 2.50 (61.61%), which was quite low. This finding is parallel to a previous study in which the grade point average (GPA) was correlated with an earlier age of onset in smoking, where only 2.1% of Thai adolescent smokers had a high GPA (Vathesatogkit, 2009). Students with lower GPAs tend to initiate smoking earlier than other students with higher GPAs (Janet et al., 2004). Most of subjects who did not make quit attempt in the past 30 days had grades from previous semester ≤ 2.50 (77.17%). Congruent with previous study, adolescents who had poor grades reported difficulties in quitting smoking (Bryant, Schulenberg, Bachman, O'Malley, & Johnston, 2000). This suggests that academic performance may influence quit attempt in adolescents.

2. To examine direct and indirect relationships of influencing factors on quit attempt

2.1 Self-efficacy to resist smoking was found to have a positive direct relationship on the quit attempt. It was congruent with the hypothesis 1.

Bandura's (1986) Social Cognitive Theory (SCT) stated that individuals who possess weak efficacy expectations toward a behavior are less likely to invest time and effort at mastering the behavior in question. Self-efficacy is an individual's belief in his or her capabilities to organize and execute behavior (Bandura, 1997). With confidence in one's ability to change one's behavior, an individual can typically take control over his or her thoughts, feelings, behaviors and the environment (Brandon et al., 2004). As with persistent smoking, adolescent smokers who believe that they can avoid smoking in obstacle situations such as stress are more likely to make the quit attempt (Solomon et al., 2006). Previous studies reported that high self-efficacy to refrain from smoking was a strong predictor of the quit attempt and long-term abstinence (Chang et al., 2006; Woodruff et al., 2008; Yzer & van den Putte, 2006). In addition, Heale and Griffin (2009) found that self-efficacy have been identified as an important consideration in the approach of nurses to smoking cessation counseling with the adolescent clients. Self-efficacy was also significantly related with quit attempt in adult smokers (Diemert et al., 2013; Gwaltney et al., 2009). It was concluded that self-efficacy was found to have significantly predicted quit attempt in both Thai and Western adolescents, and also adult and adolescent smokers.

2.2 Motivation to quit was found to have a positive direct relationship with quit attempt. It was congruent with hypothesis 2. Behavior does not occur spontaneously but is induced by either internal motives or environmental incentive. Motivation is an individual's desire or need which inspires a certain behavior as originated from intrinsic and extrinsic forces. These forces occur from inside and outside of the individual (Deci & Ryan, 1985). Having motivation is necessary for changing behaviors, particularly quit attempt behavior (Borland et al.,

2010). Studies with adolescent smokers have shown consistently that those with higher levels of intrinsic motivation relative to extrinsic motivation are more likely to achieve the quit attempt (Riedel et al., 2002; Joseph et al., 2003). The evidence confirmed that adolescent smokers that are successful in the quit attempt were more likely to report being motivated by intrinsic and extrinsic motivation (Chu-iad, 2007; Hopkins et al., 2010; McCuller et al., 2006).

Motivation to quit among Thai adolescent smokers consisted of two dimensions: intrinsic and extrinsic motivation. This finding is parallel to previous studies in which adolescent smokers proved more likely to report being motivated to quit by intrinsic and extrinsic motivation (McCuller et al., 2006; Myers & MacPherson, 2008; Riedel et al., 2002). Motivation to quit was found to have significant relationship with quit attempt in adult as well (Zhou et al., 2009). Another study, Williams (2011) found that motivational factors influenced successful quit attempt among adult smokers in the Tampa, Florida area, including: health reasons, illness or death related to smoking of family members, peer pressure, and change in environment. It was concluded that motivation to quit was found to have significantly predicted quit attempt not only adolescents but also adult smokers as well.

2.3 Nicotine dependence was found to have a negative direct relationship with the quit attempt and it had a negative indirect relationship with the quit attempt through self-efficacy to resist smoking. These findings were congruent with hypothesis 3. Nicotine has an action inside the brain's pleasure center. It maintains the habit of cigarette smoking from adolescence into adulthood. Dependence on nicotine is an individual's difficulty to refrain from smoking. Smokers

must frequently smoke in order to experience the pleasure of cigarette use (Heikkinen et al., 2009). Adolescent smokers with high addiction demonstrated symptoms of withdrawal, and difficulty and discomfort in the process of quitting such as impaired control and cravings, diminished autonomy, which develop soon after the attempt of quitting (Gervais et al., 2006; Scragg et al., 2008; Van Zundert et al., 2009).

The mean of subjects' nicotine dependence score was 3.15 (SD=3.01). It seems to be low. This is consistent with adolescent smokers in Alabama, who had a mean score on the HONC of 3.22 (SD=3.01) (Vaid, 2008). Thai adolescents started or just wanted to experiment with smoking, they were low to moderately addicted to nicotine (Ruangkanchanasetr et al., 2005; Vichit-Vadakan et al., 2004). Majority of subjects who didn't make any quit attempt in the past 30 days reported that they smoke more than 6 cigarettes per day (40%), whereas 95.8% of the subjects who didn't smoke during the past 30 days report that they smoke 1-5 cigarettes per day in the past. Previous research showed that adolescent smokers with high levels of addiction were less likely to successfully quit attempt, and higher levels of cigarette consumption or addiction among adolescent smokers to be a negative predictor of smoking cessation (Van Zundert et al., 2009).

According to the SCT, people that do not consider themselves capable of interacting with their environment successfully will experience a great deal of stress and future efforts to change behavior will be undermined (Bandura, 1986). Previous research indicated that self-efficacy to resist smoking was a mediator between nicotine dependence and the quit attempt among adolescent smokers (Brandon et al., 2004; Fagan et al., 2003; John, Meyer, Rumpf, & Hapke, 2004; Vaid et

al., 2008). Self-efficacy plays a critical role in determining personal control over thoughts, feelings, behaviors, and the environment. This is important, as definition of nicotine dependence is the difficulty to refrain from smoking. Smokers who have high dependence on nicotine are more likely loss of feelings of personal control over cigarette use. When a person experiences the craving, his or her thought patterns about the ability to quit smoking will be influenced (Brandon et al., 2004).

Nicotine dependence was the highest impact factor influencing the quit attempt. Congruent with Fagan et al. (2007) indicated that nicotine dependence was significantly associated with quit attempt among young adult smokers aged 18 to 30 years. It was a good sound that Thai adolescent smokers were low addicted to nicotine. Healthcare professions need to detect and help adolescent smokers before they become a heavy-smoker. In an attempt to help adolescent smokers quit successfully, healthcare professions should focus on this factor to design smoking cessation programs that specifically target adolescents.

2.4 Time spent with peer smokers was found to have a negative direct relationship with the quit attempt. This finding was congruent with the hypothesis 4 and previous study (Jones et al., 2004). However, there is a little research on time spent with peer smokers influence quit attempt. Most studies focused on peer smokers' relationship which was a similar concept to the time spent with peer smokers in this study. During adolescence, peer relationships take on an important role in individuals' social lives. It is a developmental phase in which people set up an identity to escape identity diffusion and confusion. At this age, adolescents give much importance to their friends who have a power over them, and adolescents want to be accepted by their peers (Chambers, Taylor, & Potenza,

2003). Not only peers influence adolescents in school, but also in any other non-school activities.

All of the subjects had peer smokers. The literature indicates that adolescents are similar to their friends in terms of smoking behavior in order to gain acceptance. One previous study found that over 90% of students that smoke also have a friend that smokes, compared to 17% of non-smoking middle school students that reported having a friend who smoked (Simons-Morton & Farhat, 2010). Many adolescents start smoking because their friends smoke that can discourage quit attempt (Kobus & Henry, 2010; Okoli et al., 2009). Adolescent smokers reported that behaviors of peer smokers provided some difficulty for them to quit. Also, most of the adolescent smokers did not avoid other smokers during their quit attempt (McVea et al., 2009). Adolescent smokers are less likely to attempt to quit if they perceive a higher prevalence of smoking among peers (Homsin et al., 2009; Ruangkanchanasetr et al., 2005; Stanton et al., 2006; Tucker et al., 2005).

In addition, two pathways were added from the hypothesized path model; **time spent with peer smokers had a negative indirect effect on the quit attempt through self-efficacy to resist smoking, and motivation to quit.** Due to the lack of study specifically on time spent with peer smokers, the researcher could not find the evidence to draw the pathway from time spent with peer smokers to self-efficacy to resist smoking and motivation to quit in hypothesized path model. However, a plausible explanation of the findings is that the SCT indicated the importance of four sources of self-efficacy for achieving behavioral changes including physiological and affective states, vicarious experience, enactive mastery experience, and verbal persuasion (Bandura, 2001). Adolescent smokers who had peer smokers

were less likely to have these sources. Because of nonsmoking environment, they lacked opportunity to learn the self-efficacy through role model, personal experience or actual performance of quitting smoking with others and no one persuades them to quit (McVea et al., 2009).

The adolescent smokers in the study reported that it was difficult for them to quit when their peers engaged in harmful behaviors (e.g., smoking in front of them, teasing, and offering them cigarettes). As mentioned earlier, previous study revealed that peers are an important motivator to help adolescents stop smoking (McCuller et al., 2006). Adolescent smoker who spent more time with peer smokers lacked the desire from both inside and outside of the individual. The possibility also remains that spending more time with friends that smoke infers less time in non-smoking environment, resulting in lack of motivation to quit.

Interestingly, most of the subjects lived with their parents (88.76%). But the amount of times that they spent with peer smokers in 1 week was ranged from 10 to 5880 minutes (4 days and 2 hours). Since the parents are often required to work in order to finance the family's material needs, they have less relationship and time for their children, and the children sometimes have no direction in life and are easily influenced by their peers (Vathesatogkit, 2009). There is a dramatic increase in the amount of time that adolescent smokers spend with peers, and more time is spent socializing with friends than being engaged in non-school activities (i.e. studying, working, extra-curricular activities) (Brown, 2004). Previous study indicated that family relationship influence adolescents initial and quit smoking (Bricker et al., 2006).

2.5 Intensity of smoking cessation intervention was found to have a positive indirect relationship with the quit attempt through self-efficacy to resist smoking and the motivation to quit. These findings were congruent with hypothesis 5. As posited by Social Cognitive Theory, social environmental factors are also important factors that play in the development of human behavior and learning and the external stimuli produced human functioning (Bandura, 1986). Smoking cessation intervention was identified as environmental factors that influenced quit attempt. The more intense of smoking cessation resources related with quit attempt (Tobacco Use and Dependence Guideline Panel, 2008; Wu, Wilson, Dimoulas, & Mills, 2006). Most smoking cessation interventions focused on enhancing Thai adolescents' self-efficacy and motivation to quit (Chaiyaparn, 2009; Dumrongpiwat, 2009; Srimoragot, 2009). The mean self-efficacy to resist smoking scores of adolescent smokers that participated in those programs significantly improved at the end of the program. Caponnetto & Polosa (2008) demonstrated that motivation to quit can be increased by receiving advice from health professions through behavioral support. Therefore, receiving more counseling, self-help materials, and follow-ups related with the high self-efficacy and motivation to quit.

Intensity of smoking cessation intervention was found to have a negative direct relationship with the quit attempt. Contrary to expectations in hypothesis 5 (the intensity of smoking cessation intervention had a positive direct relationship on the quit attempt). One possibility is that adolescent smokers rarely used any materials, such as self-help books, free telephone lines, chat rooms on the Internet or teachers, smoking consultants or nurses to help them quit smoking (Chaiyapan, 2009; Gnich, Sheehy, Amos, Bitel, & Platt, 2008; Leatherdale & McDonald,

2007; Promnuch, 2006; Sirichotiratana et al., 2008). The study showed that only 27% of the subjects received smoking cessation counseling from healthcare professionals. Only 2-6 subjects received follow-up services. As reported in previous study, most young smokers often do not receive counseling and follow-up (Diemert et al., 2013). Adolescent smokers who received cessation services were referred by teachers or parents (Dumrongpiwat, 2009; Srimoragot, 2009). One barrier may be that adolescent smokers are reluctant to seek help from healthcare professionals if it requires revealing their smoking behavior to friends or parents (Gillespie, Stanton, Lowe, & Hunter, 1995). Adolescence is the period of identity development. If someone forces adolescents to do something with reluctance, they will resist (Erikson, 1968).

Although, the direct and indirect path coefficients of intensity of smoking cessation intervention had low relationships to quit attempt, according to Chin (1998), standardized paths should be at least 0.20. The researcher has been excluded this variable from the model but the goodness-of fit index was rejected. It was shown that intensity of smoking cessation intervention is the important predictor for quit attempt among Thai adolescents. Over the years, many studies have evaluated a variety of public and private multicomponent cessation programs such as, physician-directed counseling, community-based counseling, and school-based programs. However, the smoking cessation interventions for adolescents are not really effective, and how to promote adolescents participation in smoking cessation programs is still in doubt (Srimoragot, 2009; Termsirikulchai et al., 2008).

Majority of the current interventions for adolescents are plain (e.g., counseling, providing leaflet/book) which may not be effective for adolescent groups. Today, adolescents are exposed to social network. Media use among adolescents

continues to increase over time. Adolescents are active users of new technologies, including internet, cell phones, and video games (Danah, 2008). Technology and social media provide new ways for adolescents to create and navigate their social environment. The evidence showed that 60% of Thai adolescents spent their time with listening to music, playing computer games, and surfing the World Wide Web occupy (National Statistical Office, 2013). Therefore, social media is the interesting variable that needs to be studied or decided in smoking cessation program since it would fit the adolescents' interest.

Implications for nursing knowledge and nursing practice

To be effectiveness on adolescents' quit attempt and long-term smoking abstinence. Nurses should early prevent adolescents' cigarettes use and early intervene to help adolescent smokers perform the quit attempt before they are highly addicted to nicotine, which can result in difficulty to quit. The effectiveness of smoking cessation intervention should be provided as soon as possible by considering the factors that were found to predict quit attempt. Besides, nurses should work together with family and school to organize and manage an activities or projects for improving adolescent smoker's motivation and self-efficacy that can help them perform good habit, and distract them from peer smokers.

Recommendations for future research

Based on the findings of the present study, the following recommendations for future research can be made as follows.

1. Current smoking cessation interventions typically provide by counseling or giving self-help materials that found to have low and negative relationship to quit attempt. A new style or pattern of intervention to promote quit attempt in Thai

adolescents should be developed and tested its relationship on quit attempt such as social media interventions.

2. All predictors of the quit attempt among Thai adolescents were low to moderate relationships (path coefficient $< .60$). The other variables have high relationship to quit attempt and could explain 50%. Therefore, future research should investigate these other variables. Particularly, family relationship and academic performance are the interesting variables that need to study.

3. The Hook on Nicotine Checklist-Thai version (HONCT) should be tested criterion related validity. If it acceptable, HONCT can be used as a tool in clinical practice for assessing nicotine dependence of Thai adolescent smokers, instead of using biomarker tests such as saliva cotinine or urinary cotinine.

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APPENDICES

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

Appendix A Approval of dissertation proposal

| | |
|---|--|
| นิสิตผู้ทำวิจัยและอาจารย์ที่ปรึกษาคุณุณิพนธ์ | |
| รหัสนิสิต | 5277982636 |
| ชื่อ-นามสกุล | นางสาวสุวิมล โรจนาวี |
| สาขาวิชา | พยาบาลศาสตร์ (นานาชาติ) |
| อาจารย์ที่ปรึกษา | รองศาสตราจารย์ ดร. วราภรณ์ ชัยวัฒน์ |
| อาจารย์ที่ปรึกษาร่วม | รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์ |
| ประธานกรรมการสอบฯ | รองศาสตราจารย์ ร.ต.อ.หญิง ดร. ยูพิน อังสุโรจน์ |
| กรรมการสอบฯ | รองศาสตราจารย์ ดร. สุรพร ธนศิลป์ |
| กรรมการสอบฯ | รองศาสตราจารย์ ดร. สิริพันธุ์ สุวรรณมรรคา |
| กรรมการสอบฯ | Professor Dr Sophia Chan |
| ชื่อหัวข้อคุณุณิพนธ์ | ปัจจัยทำนายความพยายามเลิกบุหรี่ของวัยรุ่นไทย PREDICTING FACTORS OF QUIT ATTEMPT IN THAI ADOLESCENTS |
| ครั้งที่อนุมัติ | 3/2554 |
| ระดับ | ปริญญาเอก |
| นิสิตผู้ทำวิจัยและอาจารย์ที่ปรึกษาคุณุณิพนธ์ | |
| รหัสนิสิต | 5277977536 |
| ชื่อ-นามสกุล | เรืออากาศโทหญิง ฤทัยวรรณ นวมพันธ์ |
| สาขาวิชา | พยาบาลศาสตร์ (นานาชาติ) |
| อาจารย์ที่ปรึกษา | รองศาสตราจารย์ ดร. วราภรณ์ ชัยวัฒน์ |
| อาจารย์ที่ปรึกษาร่วม | รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์ |
| ประธานกรรมการสอบฯ | รองศาสตราจารย์ ร.ต.อ.หญิง ดร. ยูพิน อังสุโรจน์ |
| กรรมการสอบฯ | ผู้ช่วยศาสตราจารย์ ดร. ชนกพร จิตปัญญา |
| กรรมการสอบฯ | รองศาสตราจารย์ ดร. ชาย โพธิ์สิตา |
| กรรมการสอบฯ | ผู้ช่วยศาสตราจารย์ พญ. ปราณีย์ สุจริตจันทร์ |
| ชื่อหัวข้อคุณุณิพนธ์ | การจัดการการได้รับยาขับธาตุเหล็กชนิดฉีดเข้าชั้นใต้ผิวหนังของวัยรุ่นไทยโรคธาลัสซีเมียเมเจอร์ DEALING WITH SUBCUTANEOUS IRON CHELATION THERAPY IN THAI ADOLESCENTS WITH THALASSEMIA MAJOR |
| ครั้งที่อนุมัติ | 3/2554 |
| ระดับ | ปริญญาเอก |
| นิสิตผู้ทำวิจัยและอาจารย์ที่ปรึกษาคุณุณิพนธ์ | |
| รหัสนิสิต | 5277981036 |
| ชื่อ-นามสกุล | นางสาวเอกอุมา อิ่มคำ |
| สาขาวิชา | พยาบาลศาสตร์ (นานาชาติ) |
| อาจารย์ที่ปรึกษา | รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์ |
| อาจารย์ที่ปรึกษาร่วม | รองศาสตราจารย์ ดร. วราภรณ์ ชัยวัฒน์ |
| ประธานกรรมการสอบฯ | รองศาสตราจารย์ ร.ต.อ.หญิง ดร. ยูพิน อังสุโรจน์ |
| กรรมการสอบฯ | ผู้ช่วยศาสตราจารย์ ดร. สุนิตา ปรีชาวงษ์ |
| กรรมการสอบฯ | รองศาสตราจารย์ ดร. ศิริเดช สุชีวะ |
| กรรมการสอบฯ | รองศาสตราจารย์ ดร. ยาใจ สิทธิมงคล |
| ชื่อหัวข้อคุณุณิพนธ์ | การวิเคราะห์เส้นทางการความสัมพันธ์ของอาการทางจิตในผู้ที่เป็นโรคจิตเภทและการใช้เมทแอมเฟตามีน A PATH ANALYSIS OF PSYCHOTIC SYMPTOMS AMONG PERSONS WITH SCHIZOPHRENIA AND METHAMPHETAMINE MISUSE |
| ครั้งที่อนุมัติ | 3/2554 |
| ระดับ | ปริญญาเอก |

ยูพิน อังสุโรจน์
25 ตค 55

Appendix B Approval of ethical review committee

AF 02-12



**The Ethics Review Committee for Research Involving Human Research Subjects,
Health Science Group, Chulalongkorn University**
Institute Building 2, 4 Floor, Soi Chulalongkorn 62, Phayathai Rd., Bangkok 10330, Thailand,
Tel: 0-2218-8147 Fax: 0-2218-8147 E-mail: eccu@chula.ac.th

COA No. 131/2013

Certificate of Approval

Study Title No.070.1/56 : PREDICTING FACTORS OF QUIT ATTEMPT IN THAI ADOLESCENTS

Principal Investigator : MISS SUWIMON ROJNAWEE

Place of Proposed Study/Institution : Faculty of Nursing,
Chulalongkorn University

The Ethics Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University, Thailand, has approved constituted in accordance with the International Conference on Harmonization – Good Clinical Practice (ICH-GCP) and/or Code of Conduct in Animal Use of NRCT version 2000.

Signature: *Prida Tasanapradit* Signature: *Nuntaree Chaichanawongsaraj*
(Associate Professor Prida Tasanapradit, M.D.) (Assistant Professor Dr. Nuntaree Chaichanawongsaraj)
Chairman Secretary

Date of Approval : 25 July 2013 Approval Expire date : 24 July 2014

The approval documents including

- 1) Research proposal
- 2) Patient/Participant Information Sheet
- 3) Researcher
- 4) Questionnaire



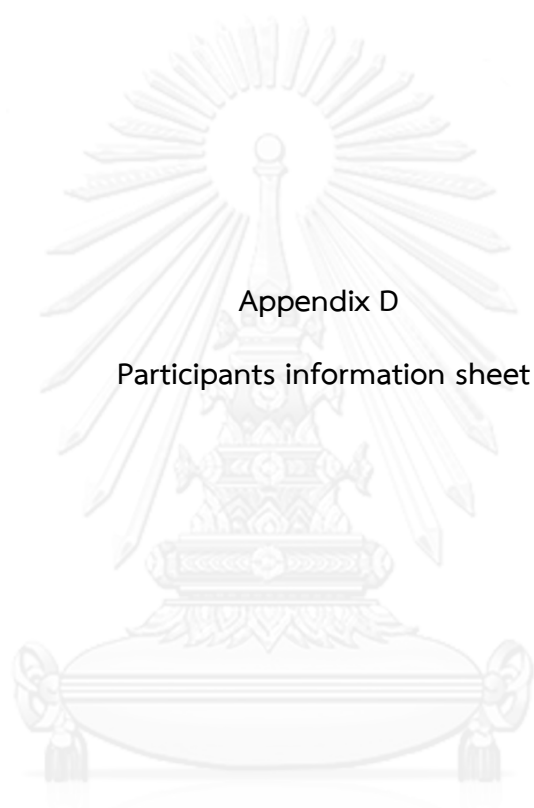
Protocol No. 070.1/56
Date of Approval 25 JUL 2013
Approval Expire Date 24 JUL 2014

The approved investigator must comply with the following conditions:

1. The research/project activities must end on the approval expired date of the Ethics Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University (ECCU). In case the research/project is unable to complete within that date, the project extension can be applied one month prior to the ECCU approval expired date.
2. Strictly conduct the research/project activities as written in the proposal.
3. Using only the documents that bearing the ECCU's seal of approval with the subjects/volunteers (including subject information sheet, consent form, invitation letter for project/research participation (if available)).
4. Report to the ECCU for any serious adverse events within 5 working days
5. Report to the ECCU for any change of the research/project activities prior to conduct the activities.
6. Final report (AF 03-12) and abstract is required for a one year (or less) research/project and report within 30 days after the completion of the research/project. For thesis, abstract is required and report within 30 days after the completion of the research/project.
7. Annual progress report is needed for a two-year (or more) research/project and submit the progress report before the expire date of certificate. After the completion of the research/project processes as No. 6.

Appendix C List of the experts

1. Associate Professor Dr. Chanchai Sittipunt
Faculty of Medicine, Chulalongkorn University
2. Assistant Professor Suthus Rungruanghiranya
Faculty of Medicine, Srinakharinwirot University,
3. Associate Professor Dr. Orasa Panpakdee
Faculty of Nursing, Mahidol University
4. Associate Professor Dr. Surintorn Kalampakorn
Faculty of Public Health, Mahidol University
5. Associate Professor Dr. Naowarut Charoenka
Faculty of Public Health, Mahidol University
6. Assistance Professor Dr. Aronrag Cooper Meeyai
Faculty of Public Health, Mahidol University
7. Waraporn Hongdilokkul
Rattanakosinsomphot Bangkhunthian School



Appendix D

Participants information sheet

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

ข้อมูลสำหรับผู้มีส่วนร่วมในการวิจัย

ชื่อโครงการวิจัย “ปัจจัยทำนายความพยายามเลิกบุหรี่ของวัยรุ่นไทย”

ชื่อผู้วิจัย นางสาว สุวิมล โรจนาวี ตำแหน่ง นิสิตคณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

สถานที่ติดต่อผู้วิจัย คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

หรือ 50/3 หมู่ 3 ต. เกาะเกิร์ต อ. ปากเกร็ด จ.นนทบุรี 11120

โทรศัพท์มือถือ 089-2473664

E-mail: sunmar-jung@hotmail.com

ข้าพเจ้า นางสาว สุวิมล โรจนาวี นิสิตปริญญาเอก คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย กำลังทำวิจัยเรื่องปัจจัยทำนายความพยายามเลิกบุหรี่ของวัยรุ่นไทย เนื่องจากความพยายามเลิกบุหรี่ เป็นจุดเริ่มต้นที่จะทำให้วัยรุ่นเลิกบุหรี่ได้สำเร็จ และยังช่วยทำให้สุขภาพของวัยรุ่นที่สูบบุหรี่ดีขึ้น สำหรับประเทศไทย ความรู้เรื่องความพยายามเลิกบุหรี่ในวัยรุ่นยังมีไม่มากนัก และยังไม่ทราบว่าปัจจัยใดบ้างที่จะนำไปสู่ความพยายามเลิกบุหรี่ในวัยรุ่น ด้วยเหตุนี้ผู้วิจัยจึงทำวิจัยเรื่องนี้ขึ้น

ก่อนที่ผู้มีส่วนร่วมในการวิจัยจะตัดสินใจเข้าร่วมในการวิจัยนี้ มีความจำเป็นที่จะต้องทราบว่างานวิจัยนี้ทำเพราะเหตุใด และเกี่ยวข้องกับอะไร ดังนั้นผู้วิจัยจึงจัดทำเอกสารฉบับนี้ขึ้น เพื่อบอกเล่าข้อมูลของผู้วิจัยและการดำเนินการวิจัย ซึ่งผู้มีส่วนร่วมในการวิจัยสามารถนำข้อมูลในเอกสารฉบับนี้ไปใช้ประกอบการตัดสินใจว่าจะเข้าร่วมหรือไม่เข้าร่วมในการวิจัยครั้งนี้ กรุณาอ่านข้อมูลต่อไปนี้อย่างละเอียด และสอบถามข้อมูลเพิ่มเติมหรือข้อมูลที่ไม้ชัดเจนจากผู้วิจัยได้ตลอดเวลา

(1) การวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยทำนายความพยายามเลิกบุหรี่ของวัยรุ่นไทย

(2) ประโยชน์ของการวิจัยนี้ ช่วยให้พยาบาลมีความเข้าใจปัจจัยที่มีอิทธิพลต่อความพยายามเลิกบุหรี่ของวัยรุ่นไทย โดยสามารถนำผลการศึกษาไปเป็นแนวทางในการวางแผนกิจกรรมการพยาบาล เพื่อส่งเสริมพฤติกรรมการเลิกบุหรี่ อันจะส่งผลให้วัยรุ่นไทยมีสุขภาพที่ดี ทั้งด้านร่างกาย จิตใจ และสังคม อีกทั้งยังเป็นการลดค่าใช้จ่ายทางด้านการรักษาของรัฐอีกด้วย

(3) ในการวิจัยครั้งนี้ ผู้มีส่วนร่วมในการวิจัยเป็นผู้ที่มีอายุ 12-18 ปี ซึ่งกำลังศึกษาในชั้นมัธยมศึกษาตอนต้นและตอนปลาย (ม.1-ม.6) ในโรงเรียนในเครือข่ายครุฑนครินทร์เพื่อการไม่สูบบุหรี่ เป็นผู้ที่เคยสูบบุหรี่ในอดีตหรือยังคงสูบบุหรี่ในปัจจุบัน ผู้มีส่วนร่วมในการวิจัยต้องมีสัญชาติ

ไทย มีสภาพร่างกายและจิตใจที่ปกติ และยินดีเข้าร่วมการวิจัย หากผู้มีส่วนร่วมในการวิจัยถอนตัวระหว่างตอบแบบสอบถาม จะถือว่าผู้นั้นไม่ได้เป็นผู้มีส่วนร่วมในการวิจัย

การเก็บข้อมูลทำเป็น 2 ช่วง ช่วงที่ 1 คือการพัฒนาเครื่องมือเพื่อใช้ในการวิจัย ใช้วิธีการเลือกกลุ่มตัวอย่างแบบสะดวก โดยแยกเก็บข้อมูล 2 ครั้ง (1. วิเคราะห์รายข้อคำถาม และ 2. ทดสอบคุณภาพของแบบสอบถาม) รวมจำนวนทั้งสิ้น 300 คน ช่วงที่ 2 เป็นการเก็บข้อมูลในขั้นสุดท้าย ใช้วิธีการสุ่มตัวอย่างแบบหลายขั้นตอน โดยทำการคำนวณหาขนาดกลุ่มตัวอย่างแบ่งเป็นภาคต่างๆ 5 ภาค ได้ขนาดกลุ่มตัวอย่างทั้งสิ้น 443 คน

หลังจากได้รับอนุมัติให้เก็บรวบรวมข้อมูลจากโรงเรียนต่างๆแล้ว ผู้วิจัยจะสอบถามรายชื่อผู้ที่สับสนหรือจากคุณครูที่ผ่านการอบรมผู้ให้คำปรึกษาเพื่อการเลิกบุหรี่ หลังจากนั้นผู้วิจัยจะให้คุณครูนัดผู้ที่จะมีส่วนร่วมในการวิจัยกับผู้วิจัยเป็นรายกลุ่ม ในห้องที่แยกเป็นส่วนตัวในโรงเรียน ผู้วิจัยจะสอบถามความสมัครใจและความยินยอมในการเข้าร่วมวิจัยด้วยวาจาก่อน หลังได้รับการยินยอมแล้ว ผู้วิจัยจึงจะให้ผู้มีส่วนร่วมในการวิจัยตอบแบบสอบถาม

(4) ผู้มีส่วนร่วมในการวิจัยจะได้รับการชี้แจงจากผู้วิจัยถึงวัตถุประสงค์ และกระบวนการเก็บรวบรวมข้อมูล เริ่มจากผู้มีส่วนร่วมในการวิจัยจะได้รับทราบว่า ข้อมูลที่จะตอบในแบบสอบถามจะเป็นความลับ จะไม่มีผู้ใดรู้ว่าแบบสอบถามนี้เป็นของใคร ผู้มีส่วนร่วมในการวิจัยไม่ต้องกรอกชื่อ-นามสกุล เมื่อทำเสร็จแล้วให้นำแบบสอบถามใส่ซองที่เตรียมไว้ให้ทันทีโดยไม่ให้ผู้ใดเห็นคำตอบในแบบสอบถาม และปิดผนึกให้เรียบร้อย นอกจากนี้ผู้มีส่วนร่วมในการวิจัยจะได้รับการแจ้งว่าการตอบคำถามแต่ละข้อ ไม่มีข้อใดถูกหรือผิด คำตอบจะเป็นเพียงความคิดเห็น และพฤติกรรมของผู้มีส่วนร่วมในการวิจัยเท่านั้น จะไม่มีผลต่อคะแนนใดๆทั้งสิ้น แบบสอบถามมีทั้งหมด 7 ชุดคำถาม ประกอบไปด้วย 1.แบบสอบถามพฤติกรรม การสูบบุหรี่และการใช้เวลาอยู่กับเพื่อนที่สูบบุหรี่ จำนวน 6 ข้อ 2.แบบสอบถามระดับความเข้มข้นของบริการช่วยเลิกบุหรี่ จำนวน 10 ข้อ 3.แบบสอบถามการติดยาเสพติด จำนวน 10 ข้อ 4. แบบสอบถามความเชื่อในสมรรถนะแห่งตนที่จะไม่สูบบุหรี่ จำนวน 6 ข้อ 5.แบบสอบถามแรงจูงใจในการเลิกบุหรี่ จำนวน 36 ข้อ 6.แบบสอบถามความพยายามเลิกบุหรี่ จำนวน 1 ข้อ และ 7. แบบสอบถามข้อมูลทั่วไป จำนวน 7 ข้อ รวมทั้งสิ้น 76 ข้อ ซึ่งจะใช้เวลาในการตอบแบบสอบถามประมาณ 45 นาที หลังจากนั้นผู้วิจัยจะแนะนำบริการ

ช่วยเลิกบุหรี่ (เช่น คลินิกเลิกบุหรี่ในโรงพยาบาล เว็บไซต์เพื่อการเลิกบุหรี่ และ 1600 สายเลิกบุหรี่ เป็นต้น) ให้กับผู้มีส่วนร่วมในการวิจัย เพื่อช่วยให้ผู้มีส่วนร่วมในการวิจัยเลิกบุหรี่ได้สำเร็จ ทั้งนี้ กระบวนการเก็บข้อมูลทั้งหมดจะดำเนินการในห้องที่แยกเป็นส่วนตัวในโรงเรียน โดยมีเพียงผู้วิจัยและผู้มีส่วนร่วมในการวิจัยเท่านั้น

(5) การเข้าร่วมในการวิจัยของผู้มีส่วนร่วมในการวิจัยเป็นโดย**สมัครใจ** และมีสิทธิในการ**ปฏิเสธ**หรือสามารถ**ถอนตัว**จากการศึกษาได้ตลอดเวลา ทั้งนี้การปฏิเสธหรือถอนตัวจะไม่มีผลกระทบต่อผู้มีส่วนร่วมในการวิจัย และจะไม่มีผลต่อสิทธิประโยชน์ทางการศึกษาใดๆทั้งสิ้น

(6) หากผู้มีส่วนร่วมในการวิจัยมีข้อสงสัยให้สอบถามเพิ่มเติมได้จากผู้วิจัย โดยสามารถติดต่อผู้วิจัยได้ตลอดเวลาที่ **นางสาว สุวิมล โรจนาวี คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย** หรือทางโทรศัพท์ 089-247-3664 และหากผู้วิจัยมีข้อมูลเพิ่มเติมที่เป็นประโยชน์หรือโทษ เกี่ยวกับการวิจัย ผู้วิจัยจะแจ้งให้ผู้มีส่วนร่วมในการวิจัยทราบอย่างรวดเร็ว เพื่อให้ผู้มีส่วนร่วมในการวิจัยทบทวนว่ายังสมัครใจที่จะเป็นผู้มีส่วนร่วมในการวิจัยต่อไปหรือไม่

(7) ข้อมูลที่ได้จากการตอบแบบสอบถามของผู้มีส่วนร่วมในการวิจัยจะถูกนำไปรวมกับข้อมูลของคนอื่นๆ โดยข้อมูลจะถูกเก็บเป็นความลับและผู้วิจัยจะใช้รหัสแทนชื่อ-นามสกุลในแบบบันทึกข้อมูล หากผู้วิจัยตีพิมพ์ผลการศึกษา ผู้วิจัยจะไม่มีภาระระบุชื่อของผู้มีส่วนร่วมในการวิจัย

(8) การวิจัยครั้งนี้มีการมอบปากกา 1 ด้าม และสมุดบันทึก 1 เล่มเป็นของที่ระลึกแก่ผู้มีส่วนร่วมในการวิจัยเมื่อสิ้นสุดการตอบแบบสอบถาม หรือเมื่อผู้มีส่วนร่วมในการวิจัยถอนตัว

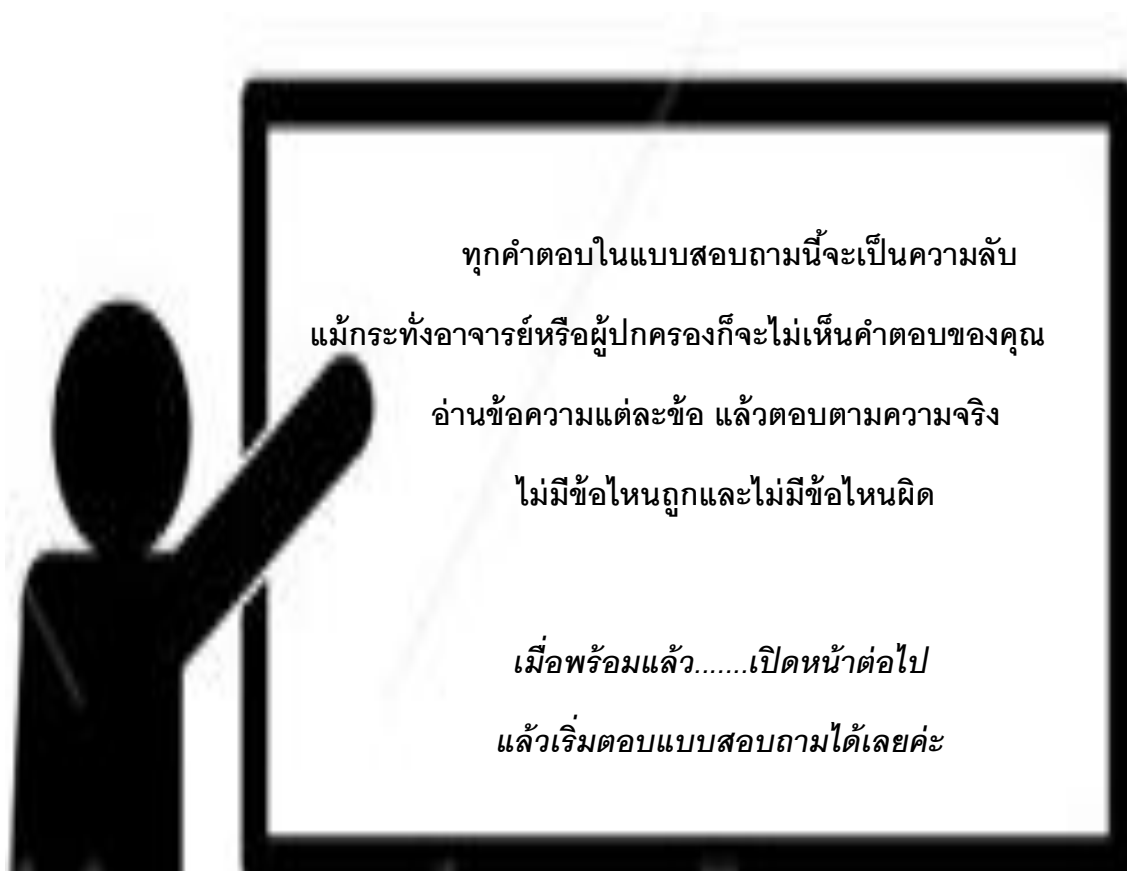
(9) หากผู้มีส่วนร่วมในการวิจัยไม่ได้รับการปฏิบัติตามข้อมูลดังกล่าว สามารถร้องเรียนได้ที่ คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย ชั้น 4 อาคารสถาบัน 2 ซอยจุฬาลงกรณ์ 62 ถนนพญาไท เขตปทุมวัน กรุงเทพฯ 10330 โทรศัพท์ 0-2218-8147 หรือ 0-2218-8141 โทรสาร 0-2218-8147 E-mail: eccu@chula.ac.th



Appendix E

Research instruments

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY



ตัวอย่างแบบสอบถามการใช้เวลาอยู่กับเพื่อนที่สูบบุหรี่

คำชี้แจง: กรุณาทำเครื่องหมาย ✓ ลงใน O และเติมข้อมูลที่เป็นจริงลงในช่องว่าง

ต่อไปนี้เป็นคำถามเกี่ยวกับตัวคุณและสิ่งที่คุณทำ ในช่วง 3 เดือนที่ผ่านมา

1. คุณมีเพื่อนที่สูบบุหรี่ไหม

มี ไม่มี (ถ้าไม่มี...ข้ามไปแบบสอบถามหน้าถัดไป)

| | | | | | | |
|---|---|---|---|---|---|---|
| : | : | : | : | : | : | : |
| : | : | : | : | : | : | : |
| : | : | : | : | : | : | : |
| : | : | : | : | : | : | : |
| : | : | : | : | : | : | : |
| : | : | : | : | : | : | : |

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

ตัวอย่างแบบสอบถามการตัดสินใจ

คำชี้แจง อ่านข้อความแต่ละข้อ แล้วเลือกคำตอบที่ตรงกับความคิดหรือความรู้สึกของคุณมากที่สุดโดยทำเครื่องหมาย ✓ ลงใน O ได้ตัวเลือกนั้น

ต่อไปนี้เป็นคำถามเกี่ยวกับสิ่งที่คุณทำหรือรู้สึก ในช่วง 3 เดือนที่ผ่านมา

| | ใช่ | ไม่ใช่ |
|--|-----------------------|-----------------------|
| 1. คุณเคยพยายามที่จะเลิกสูบบุหรี่แต่ทำไม่ได้ | <input type="radio"/> | <input type="radio"/> |
| 2. คุณสูบบุหรี่เพราะมันเลิกยาก | <input type="radio"/> | <input type="radio"/> |
| 3. คุณเคยรู้สึกว่าคุณเองติดบุหรี่ | <input type="radio"/> | <input type="radio"/> |
| : : : : : : : : : : : : : : : : | <input type="radio"/> | <input type="radio"/> |
| : : : : : : : : : : : : : : : : | <input type="radio"/> | <input type="radio"/> |
| : : : : : : : : : : : : : : : : | <input type="radio"/> | <input type="radio"/> |
| : : : : : : : : : : : : : : : : | <input type="radio"/> | <input type="radio"/> |
| : : : : : : : : : : : : : : : : | <input type="radio"/> | <input type="radio"/> |
| : : : : : : : : : : : : : : : : | <input type="radio"/> | <input type="radio"/> |

ตัวอย่างแบบสอบถามความเชื่อในสมรรถนะแห่งตนที่จะไม่สูบบุหรี่

ต่อไปนี้เป็นคำถามเกี่ยวกับความเชื่อในความสามารถของคุณที่จะไม่สูบบุหรี่ในสถานการณ์ต่าง ๆ

ในช่วง 3 เดือนที่ผ่านมา

| คุณเชื่อว่าจะสามารถไม่สูบบุหรี่ | ทำได้ แน่นอน | ทำได้ | น่าจะ ทำได้ | ทำไม่ได้ | ทำไม่ได้ แน่นอน |
|---------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 1. อยู่ที่บ้าน | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 2. อยู่ที่บ้านเพื่อน | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 3. อยู่ทำงานเลี้ยง | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| : : : : : : : : | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| : : : : : : : : | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| : : : : : : : : | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

แบบสอบถามความพยายามเลิกบุหรี่

คำชี้แจง: ต่อไปนี้เป็นคำถามเกี่ยวกับความพยายามเลิกบุหรี่ของคุณ ใน 30 วันที่ผ่านมา

โปรดเติมข้อมูลที่เป็นจริงลงในช่องว่าง

1. ใน 30 วันที่ผ่านมา คุณหยุดสูบบุหรี่ต่อเนื่องกัน 24 ชั่วโมง ได้กี่ครั้ง

.....ครั้ง

ตัวอย่างแบบสอบถามความเข้มข้นของบริการช่วยเหลือหูหึ่ง

ต่อไปนี้เป็นคำถามเกี่ยวกับบริการช่วยเหลือหูหึ่งที่คุณได้รับ ในช่วง 3 เดือนที่ผ่านมา

1. คุณเคยได้รับคำแนะนำหรือคำปรึกษาเรื่องการเลิกบุหรี่ จากบุคลากรด้านสุขภาพ (เช่น แพทย์ พยาบาล นักจิตวิทยา หรือทันตแพทย์) ในช่วง 3 เดือนที่ผ่านมา หรือไม่

ไม่ได้

ได้

หากตอบ “ได้” กรุณาระบุว่า ทั้งหมดกี่ครั้ง.....ครั้ง

เฉลี่ยครั้งละกี่นาที.....นาที

ครั้งที่ยาวที่สุดกี่นาที.....นาที

2. คุณเคยได้รับใบปลิวเรื่องการเลิกบุหรี่ ที่ให้โดยบุคลากรด้านสุขภาพ (เช่น แพทย์ พยาบาล นักจิตวิทยา หรือทันตแพทย์) ในช่วง 3 เดือนที่ผ่านมา หรือไม่

ไม่ได้

ได้

หากตอบ “ได้” คุณเคยอ่านหรือไม่

ไม่เคยอ่าน

เคยอ่าน ทั้งหมดกี่ครั้ง.....ครั้ง

3. คุณเคยได้รับแผ่นพับเรื่องการเลิกบุหรี่ ที่ให้โดยบุคลากรด้านสุขภาพ (เช่น แพทย์ พยาบาล นักจิตวิทยา หรือทันตแพทย์) ในช่วง 3 เดือนที่ผ่านมา หรือไม่

ไม่ได้

ได้

หากตอบ “ได้” คุณเคยอ่านหรือไม่

ไม่เคยอ่าน

เคยอ่าน ทั้งหมดกี่ครั้ง.....ครั้ง

จุฬาลงกรณ์มหาวิทยาลัย

CHULALONGKORN UNIVERSITY

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ตัวอย่างแบบสอบถามข้อมูลทั่วไป

ใกล้จบแล้วค่ะ.....ต่อไปเป็นคำถามง่ายๆเกี่ยวกับตัวคุณ

กรุณาทำเครื่องหมาย ✓ ลงใน O และเติมข้อมูลที่จริงลงในช่องว่าง

1. วัน/เดือน/ปี เกิด/...../.....
2. เพศ ชาย หญิง
3. ศาสนา พุทธ อิสลาม คริสต์ อื่นๆ (ระบุ).....

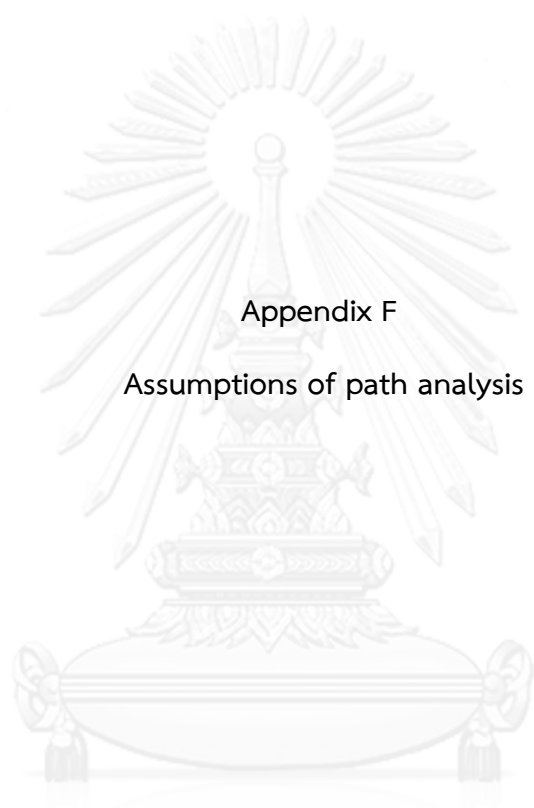
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เสร็จแล้วค่ะ กรุณาพับใส่ซองและส่งที่ผู้วิจัยโดยตรง

ไม่ต้องให้ผู้ใดเห็นคำตอบของคุณ ข้อมูลของคุณจะเป็นความลับค่ะ

ขอบคุณมากที่ให้ความร่วมมือในการตอบแบบสอบถาม



Appendix F

Assumptions of path analysis

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Assumptions testing

Before the analysis using the path analysis was conducted, normality, linearity, homoscedasticity, and multicollinearity were tested in order to ensure that there was no violation of the underlying assumption. The results of normality, linearity, homoscedasticity, and multicollinearity testing are presented below.

Normality testing

The assessment of normality of the metric variables involves both empirical measures of a distributions shape characteristics (skewness and kurtosis) and the normal probability plots. The empirical measures provide a guide as to the variables with significant deviations from normality, and normal probability plots provide a visual portrayal of the shape of the distribution (Hair, 2010). The skewness of the influencing variables ranged from -0.36 to 1.02, and the kurtosis of variables ranged from -1.66 to 0.20. According to Hair (2010), the z value of skewness and kurtosis not exceeding ± 1.96 which corresponds to a .05 level or ± 2.58 at the .01 probability level reflects a normal distribution. As for the influencing variables, the z value of skewness = 0.11 and kurtosis = 0.23 and were within the normal curve. Additionally, the Kolmogorov-Smirnov test and Q-Q plot indicated that the six major variables were normally distributed (Figure 11).

Linearity Testing

Path analysis requires linear correlations between variables. Because correlations represent only the linear association between variables, nonlinear effect will not be represented in the correlation value. The most common way to assess linearity is to examine scatterplots of the variables and to identify any nonlinear

patterns in the data (Hair, 2010). In the current study, the scatter plot between the independent and dependent variables showed such a linear relationship (Figure 11).

Homoscedasticity testing

Homoscedasticity refers to the assumption that dependent variable(s) exhibit equal levels of variance across the range of predictor variable(s) (Hair, 2010). This assumption can be tested by a visual examination of the plot of the regression of the standardized predicted dependent variable against the regression standardized residual. Homoscedasticity is indicated when the residual plots are randomly scattered around zero (in the horizontal line). As shown in Figure 11, the residual pattern did not deviate from a horizontal band; the spread was equivalent across the zero axis within ± 2 standard deviations, which indicated a homoscedasticity and linear relationship. This assumption was therefore reasonably accepted.

Multicollinearity testing

Multicollinearity is the extent to which a variable can be explained by the other variables in the analysis. This assumption was examined by using two common criteria: 1) Pearson's correlation coefficients and 2) tolerance values and variance inflation factor (VIF). The correlation of two variables that does not exceed ± 0.9 indicates that there is no multicollinearity (Hair, 2010). In the current study, the correlation coefficients among the six major variables ranged from -0.50 to 0.54 (Table 22). Thus, the variables were not multicollinear. In addition, the suggested cutoff for the tolerance value is 0.10 (or a corresponding VIF of 10.00). When values at this level are encountered, multicollinearity problems are almost certain. In the current study, the tolerance values ranged from 0.73 to 0.99 (not approaching 0) and the VIF

ranged from 1.00 to 1.38 (not greater than 10). Thus, these results confirmed no violation for multicollinearity.

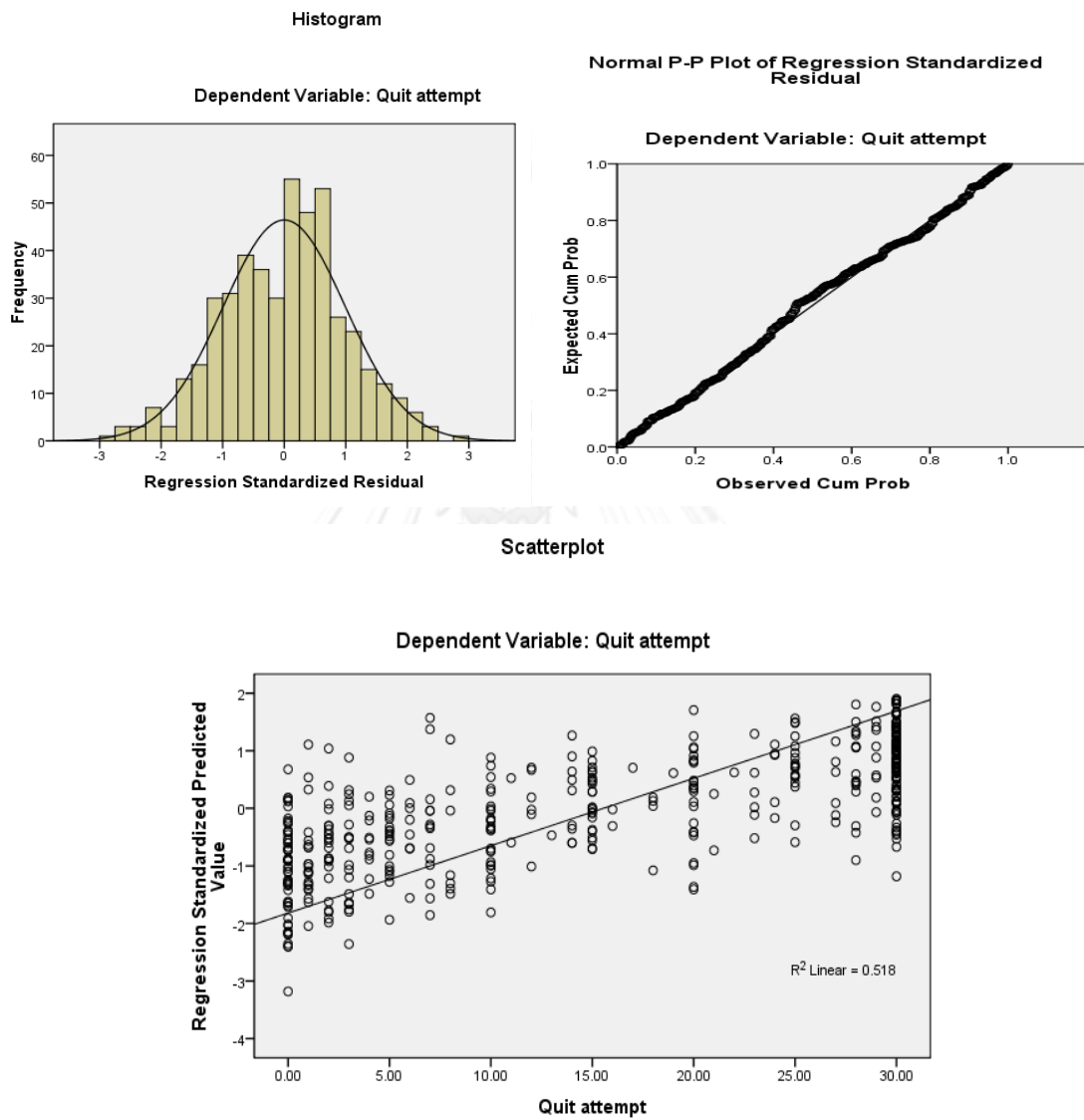


Figure 11 Assumption of normality, linearity, and homoscedasticity

VITA

Suwimon Rojnawee was born in 1985 at Kanchanaburi province. She received a Bachelor of Nursing Science from Boromrajonani College of Nursing Nopparat Vajira in 2007. She had 1 year of clinical experience in coronary care unit at Piyavate Hospital and 1 year of working as pediatric nurse in pediatric ward at Paolo Memorial Hospital. She had received the scholarship for Ph.D. study from the Health Development Center for Persons with Chronic Health Problem of Faculty of Nursing, Chulalongkorn University since 2008-2013.

