THE EFFECT OF THE PALMSS ALCOHOL PREVENTION PROGRAM ON MAINTAINING OF LOW-RISK DRINKING LEVEL AMONG LOW-RISK DRINKERS IN HIGH SCHOOL

Mrs. Donnapa Hongthong

A Dissertation Submitted in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy Program in Public Health
College of Public Health Sciences
Chulalongkorn University
Academic Year 2013

ผลของการใช้โปรแกรมพีเอแอลเอ็มเอสเอสเพื่อป้องกันการดื่มเครื่องดื่มแอลกอฮอล์ในการรักษาระดับการดื่มแบบเสี่ยงต่ำของนักเรียนมัธยมศึกษาที่มีพฤติกรรมการดื่มแบบเสี่ยงต่ำ

นางดลนภา หงษ์ทอง

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรดุษฎีบัณฑิต
สาขาวิชาสาธารณสุขศาสตร์
วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2556

Thesis Title	THE EFFECT OF THE PALMSS ALCOHOL PREVENTION PROGRAM ON MAINTAINING OF LOW-RISK DRINKING LEVEL AMONG LOW-RISK DRINKERS IN HIGH SCHOOL
By	Mrs. Donnapa Hongthong
Field of Study	Public Health
Thesis Advisor	Chitlada Areesantichai, Ph.D.

Accepted by the College of Public Health Sciences, Chulalongkorn University in Partial Fulfillment of the Requirements for the Doctoral Degree

…….. Dean of the College of Public Health Sciences
(Professor Surasak Taneepanichskul, M.D., M.Med.)

THESIS COMMITTEE

…….. Chairman
(Professor Surasak Taneepanichskul, M.D., M.Med.)

……. Thesis Advisor
(Chitlada Areesantichai, Ph.D.)

…….. Examiner
(Associate Professor Somrat Lertmaharit, M.Sc., M. Med Stat.)

…….. Examiner
(Alessio Panza, M.D., M.Com.H, DTM&H)

…….. External Examiner
(Nanta Auamkul, M.D., M.P.H.)

ดลนภา หงษ์ทอง : ผลของการใช้โปรแกรมพีเอแอลเอ็มเอสเอสเพื่อป้องกันการดื่มเครื่องดื่มแอลกอฮอล์ในการรักษาระดับการดื่มแบบเสี่ยงต่ำของนักเรียนมัธยมศึกษาที่มีพฤติกรรมการดื่มแบบเสี่ยงต่ำ. (THE EFFECT OF THE PALMSS ALCOHOL PREVENTION PROGRAM ON MAINTAINING OF LOW-RISK DRINKING LEVEL AMONG LOW-RISK DRINKERS IN HIGH SCHOOL) อ. ที่ปรึกษาวิทยานิพนธ์หลัก : อ.ดร.จิตรลดา อารีย์สันติชัย, 134 หน้า.

โปรแกรมพีเอแอลเอ็มเอสเอส (PALMSS) เป็นโปรแกรมให้ความรู้เรื่องเครื่องดื่มแอลกอฮอล์ ซึ่งมีเนื้อหาเพิ่มเติมจากหลักสูตรการเรียน ออกแบบเป็นคอมพิวเตอร์ช่วยสอนใช้ CD เป็นสื่อในการเรียน โปรแกรมนี้ถูกออกแบบสำหรับนักเรียนมัธยมศึกษาตอนปลายที่มีพฤติกรรมการดื่มแบบเสี่ยงต่ำ PALMSS เป็นชื่อย่อของโปรแกรมมาจากเนื้อหาหลักของโปรแกรม 6 เนื้อหา คือ P = เพื่อน, A = ความรู้เรื่องเครื่องดื่มแอลกอฮอล์, L = การดื่มแบบเสี่ยงต่ำ, M = อิทธิพลของสื่อต่อการดื่มเครื่องดื่มแอลกอฮอล์, S = การดื่มเพื่อเข้าสังคม และ S = ความเชื่อมั่นในตนเอง การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อทดสอบผลของโปรแกรมในการเพิ่มความรู้เรื่องเครื่องดื่มแอลกอฮอล์ จำกัดการดื่มให้อยู่ในระดับเสี่ยงต่ำ และลดการบริโภคเครื่องดื่มแอลกอฮอล์ ในนักเรียนมัธยมศึกษาชั้นปีที่ห้าในจังหวัดพะเยาในสังกัดสำนักงานคณะกรรมการศึกษาขั้นพื้นฐาน กระทรวงศึกษาธิการ เนื่องจากเป็นชั้นปีที่มีสถิติการดื่มเครื่องดื่มแอลกอฮอล์สูง การวิจัยเป็นแบบกึ่งทดลองทำในโรงเรียนมัธยมศึกษา 2 แห่ง กลุ่มตัวอย่างคือนักเรียนที่มีพฤติกรรมการดื่มแบบเสี่ยงต่ำจำนวนทั้งสิ้น 150 คน (กลุ่มทดลอง 75 คน กลุ่มควบคุม 75) ใช้การสัมภาษณ์ในการประเมินกลุ่มตัวอย่างจำนวน 5 ครั้งคือก่อนเรียนบทเรียน หลังเรียนทันที, 1, 3 และ 6 เดือน วิเคราะห์ข้อมูลโดยใช้สถิติ Exact test, Mann-Whitney test, Wilcoxon signed-rank test, independent t-test และ repeated measures ANOVA ผลการศึกษาพบว่า หลังจากควบคุมตัวแปร เกรดเฉลี่ย และ การดื่มของเพื่อน พบว่าโปรแกรมพีเอแอลเอ็มเอสเอส (PALMSS) มีผลในการเพิ่มความรู้เรื่องเครื่องดื่มแอลกอฮอล์ ($p < 0.001$) เมื่อสิ้นสุดการเรียนจนถึง 6 เดือน, สามารถจำกัดการดื่มของนักเรียนให้อยู่ในระดับเสี่ยงต่ำ ($p = 0.008$) และลดการบริโภคเครื่องดื่มแอลกอฮอล์ ($p = 0.026$) เมื่อติดตามผลหลังเรียน 6 เดือน ข้อเสนอแนะในการวิจัยคือ โปรแกรมพีเอแอลเอ็มเอสเอส (PALMSS) มีความเหมาะสมในการสอนให้ความรู้แก่กลุ่มนักเรียนที่มีพฤติกรรมการดื่มแบบเสี่ยงต่ำ ดังนั้นโรงเรียนอื่นๆ ควรได้นำไปใช้ให้ความรู้แก่นักเรียน เพื่อการป้องกันปัญหาการดื่มหนักในกลุ่มวัยรุ่น

สาขาวิชา สาธารณสุขศาสตร์ ลายมือชื่อนิสิต .....

ปีการศึกษา 2556 ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์หลัก .....

5379207453: MAJOR PUBLIC HEALTH
KEYWORDS : THE PALMSS / ALCOHOL PREVENTION PROGRAM / LOW-RISK / HIGH SCHOOL

DONNAPA HONGTHONG : THE EFFECT OF THE PALMSS ALCOHOL PREVENTION PROGRAM ON MAINTAINING OF LOW-RISK DRINKING LEVEL AMONG LOW-RISK DRINKERS IN HIGH SCHOOL. ADVISOR : CHITLADA AREESANTICHAI, Ph.D., 134 pp.

The PALMSS (P = peer, A = alcohol knowledge, L = low-risk drinking, M = media-influence, S = social drinking and S = self-efficacy) alcohol prevention program is an extra-curricular alcohol educational program delivered via CD-ROM, designed for senior high school students who are low-risk drinkers. This study aimed to demonstrate the effect of the PALMSS alcohol prevention program on increasing alcohol knowledge, maintaining low-risk drinking limits and reducing alcohol consumption among grade-11th senior students in Phayao province since they had high prevalence of alcohol consumption. A quasi-experiment was implemented in two high schools with 150 low-risk drinkers voluntarily participating in the program (Intervention, n=75; Control, n=75). Assessment was conducted by interview at baseline, exit point (4 weeks after baseline),1, 3 and 6 months post intervention. Data were analyzed using Exact test, Mann-Whitney test, Wilcoxon signed-rank test, independent t-test and repeated measures ANOVA. The findings revealed that after adjusting for Grade Point Average and peer drinking, there was a positive effect of the PALMSS alcohol prevention program on the increase of alcohol knowledge after implementing the program until at 6-month follow-up ($p < 0.001$), maintaining low-risk drinking limits ($p = 0.008$) and reduction alcohol consumption at 6-month follow-up ($p = 0.026$). Research suggests that the PALMSS alcohol prevention program is appropriate in educating senior high school students who are low-risk drinkers in order to prevent excessive alcohol consumption in high school children.

Field of Study : Public Health Student's Signature .....

Academic Year : 2013 Advisor's Signature .....

ACKNOWLEDGEMENTS

I would like to give my deepest respect, appreciation and gratitude to my adviser, Dr. Chitlada Areesantichai, for supporting me through all the steps of the research process as well as setting the quality of this study.

I would like to give my deepest respect and gratitude to Associate Professor Somrat Lertmaharit for her supporting through process of data analysis.

I would like to express my deepest gratitude to my entire family for their support and patience through the three years of my study.

I would like to give special thanks to my friends who supported me through the difficult times of my study. I am also grateful for the support of Boromarajonnani College of Nursing, Phayao, my workplace, and colleagues for sharing their time during my interview process.

This study was made possible only through the generous financial support of the Centre of Alcohol Studies (CAS), Thailand and the 90th Anniversary of Chulalongkorn University Fund (Ratchadaphiseksomphot Endowment Fund).

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LIST OF ABBREVIATIONS

SCT	Social Cognitive Theory
AUDIT	The Alcohol Use Disorder Identification Test
MAST	The Michigan Screening Test
TLFB	The Timeline Follow Back
DRSEQ-R	Drinking Refusal Self-Efficacy Questionnaire-Revised
GPA	Grade Point Average

CHAPTER I
INTRODUCTION

1.1. Background and Rationale

Alcohol consumption has been increasing among adolescents worldwide. The Global Survey on Alcohol and Health (World Health Organization, 2008) reported the five-year trend of underage drinking from 73 responding countries that majority of them (72%) indicated an increase, 4% was decreased, 8% were stable and 16% showed the inconclusive trends. Moreover, hazardous and harmful drinking patterns, such as drinking to intoxication and binge drinking were on the rise among adolescents and young adults (McAllister, 2003; The Lancet, 2008; World Health Organization, 2007).

Prevalence of alcohol consumption among senior high school students was high. Over three-quarters of senior high school students reported having consumed alcohol in their lifetime (Johnston, O'Malley, Bachman, & Schulenberg, 2005). Over 55% of senior high school students reported having been drunk at least once in their lifetime (Bandy & Moore, 2008; Johnston, O'Malley, Bachman, & Schulenberg, 2009). In addition, over 90% of 15-16 year students in northern Europe had drunk alcohol at some point of their lives (Anderson & Baumberg, 2006).

Alcohol consumption among adolescents in Thailand has increased. The Centre for Alcohol Studies, Thailand reported that alcohol consumption among adolescents who were regular drinkers has increased from 4.7 % in 1996 to 8.0% in 2007 (Sorapaisarn, Kaewmonkol, & Wattanaporn, 2010). A Thailand national school survey reported prevalence of last-year drinking, last-month binge drinking, and drinking until intoxication to be at 25.5%, 9.5%, and 17.3% in boys and 14.5%, 3.7%, and 7.2% in girls, respectively (Assanangkornchai, Mukthong, & Intanont, 2009).

More specifically, the Centre for Alcohol Studies in Thailand identified Phayao province, located in the northern part of Thailand, had the highest prevalence of alcohol consumption (30.4%) among adolescents aged 15-19 years (Chaisong, Pakdeesetakul, & Thummarungsri, 2013). Moreover, the research among 1,151 senior

high school students in the same province revealed that over a half (58.8%) of senior high school students reported ever drinking in the previous year. The majority of these students were low-risk drinkers (65.3%), followed by hazardous drinkers, suspected dependent and harmful drinkers at 24.1%, 5.5% ,and 5.1% respectively (Hongthong, Areesantichai, Kaunkaew, Chinnawattanad, & Nuddakul, 2012).

Alcohol consumption among high school students is recognized as a public health issue (Chassin, et al., 2004; Johnston, et al., 2005; Kuntsche, Rehm, & Gmel, 2004) and is associated with numerous serious health risks. Consequences may include immediate and tragic events, such as drunk driving fatalities (U.S. Department of Transportation & Administration, 2002), as well as long-term negative effects, such as alterations in brain development (Spear, 2000) and development of alcohol abuse and dependence. In addition, alcohol use has also been seen to reach its peak level during and immediately following the time of high school graduation, and remain at its level at ages between 18 and 25 years old (Johnston, et al., 2005). Thus, the senior year of high school is a critical point at which it is important to understand the motives and to establish healthier alcohol use behavior (Coffman, Patrick, Palen, Rhoades, & Ventura, 2007).

Universal programs, which include all individuals in a particular population, were the most widely used form of preventive intervention for underage drinking in the school setting. The most common programs include classroom curriculum administered to students within the school settings, which were supported with change components such as parent programs, mass media program and community-wide intervention (Windle & Zucker, 2010). However, not all universal programs were found to be effective. According to Spoth et al. (2009), only 41 of 127 alcohol interventions demonstrated some positive changes of alcohol use behavior. Moreover, a research study reviewed the 53 well-design experimental studies which examined the effectiveness of school-based universal program, and found that the most positive effect across program were applicable only on drunkenness and binge drinking (Foxcroft & Tsertsvadze, 2011).

Low-risk drinkers were vulnerable groups due to the limitations of school-based programs targeting this subgroup. Although a low-risk drinker tends to drink a limited amount of alcohol and their drinking patterns were unlikely to cause harm to

oneself or others (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), they may increase their consumption in the future as most people consuming alcohol vary over time (Babor & Higgins-Biddle, 2001a).

Research, for example, indicated that more than half of Thai drinkers in all age groups could be classified as moderate to high-risk drinkers. Moreover, the occasional heavy drinking pattern occurred mostly in the youngest age group which tended to drink large amounts of alcohol in a single drinking occasion (Sorapaisarn, et al., 2010). Furthermore, the curriculum for senior high school students in Thailand does not provide students specific alcohol contents, but generally focuses on addictive substances (The Ministry of Education Thailand, 2008). Hence, an alcohol prevention program specific to students who are low-risk drinkers is vital.

The PALMSS alcohol prevention program was designed for low-risk drinkers who were attending Grade 11 in Phayao province-as having a higher level of alcohol consumption than 10^{th} grade students (Hongthong & Areesantichai, 2011). The PALMSS was aimed to enhance alcohol knowledge, maintain low-risk drinking limits, and reduce alcohol consumption among students. PALMSS is the abbreviation of the six core components of the program: P = peer, A = alcohol knowledge, L = low-risk drinking, M = media-influence, S = social drinking and S = self-efficacy. It was a selective preventive and extra-curricular program delivered via CD-ROM which offered more comfortable learning since it allowed users to navigate through the contents at their own pace (Schinke, Schwinn, & Fang, 2010) and, at the same time, enjoy the learning process through audio, animation, graphic and video interfaces. Over and above enhancing alcohol knowledge, the PALMSS alcohol prevention program sought to promote students' self-efficacy by enhancing their perceived confidence with their ability to be stable at low-risk drinking level. Moreover, the program helped to provide students social skills such as social drinking, media influence and peer influence which made this program be a feasible and effective solution to low-risk drinkers.

The PALMSS alcohol prevention program was designed according to the National Institute on Drug Abuse (2011) recommendation which had four modules designed with the same core components, but differing in the complexity of each level from Basic, Intermediate I, Intermediate II to the Advanced module. This was

consistent with the recommendations of the National Institute on Drug Abuse (2011) where the principle of prevention programs for high school students aimed to increase academic and social competence with seven skills, specifically, (1) study habits and academic support, (2) communication, (3) peer relationship, (4) self-efficacy and assertiveness, (5) drug resistance skills, (6) reinforcement of anti-drug attitudes, and (7) strengthening of personal commitments against drug abuse (Botvin, Baker, Dusenbury, Botvin, & Diaz, 1995; Eisen, Zellman, & Murray, 2003; Ellickson, McCaffrey, Ghosh-Dastidar, & Longshore, 2003; Haggerty, Skinner, MacKenzie, & Catalano, 2007; Scheier, Botvin, Diaz, & Griffin, 1999).

This study, therefore, aimed to test the effect of the PALMSS alcohol prevention program on the increase of alcohol knowledge, maintaining a drinking risk level at a low-risk drinking limit, and reducing alcohol consumption among senior students who are low-risk drinkers, and attending senior high school (Grade 11) in Phayao province, Thailand.

1.2. Research objective:

To evaluate and compare the effect of the PALMSS alcohol prevention program between the intervention and the control school on:

1. Increasing alcohol knowledge,
2. Maintaining the level of alcohol drinking risk in low- risk limits, and
3. Reducing alcohol consumption.

1.3. Research question:

Did the PALMSS alcohol prevention program affect alcohol knowledge, drinking risk level, and alcohol consumption?

1.4. Research hypothesis:

1. There was a difference in alcohol knowledge between the intervention and the control school.

2. There was a difference in the number of student who maintained at low-risk drinking limits between the intervention and the control school.

3. There was a difference in alcohol consumption between the intervention and the control school.

1.5. Operational definitions

The PALMSS alcohol prevention program is a selective and extra-curricular alcohol prevention program. PALMSS is the abbreviation of the six core components of the program: P = peer, A = alcohol knowledge, L = low-risk drinking, M = media-influence, S = social drinking and S = self-efficacy. There are four 50-minute modules designed with the same core contents, but differing in the complexity of each level (Basic, Intermediate I, Intermediate II to the Advanced module). The program is delivered via CD-ROM and is designed in educating senior high school students who are low-risk drinkers to sustain their drinking levels at low-risk drinking limits.

The effect of the PALM alcohol prevention program is defined as the outcome of the program that after the program is completed, there are three main outcomes, namely, (1) increase in alcohol knowledge, (2) maintenance of the level of drinking risk at low-risk limits, and (3) reduction alcohol consumption.

The Alcohol Use Disorders Identification Test (AUDIT) is a standard screening tool used to identify excessive drinking. The conceptual domains and its content consist of 10 questions about recent alcohol use, alcohol dependence symptoms, and alcohol-related problems. It was developed by the World Health Organization (WHO). The AUDIT will be used to identify whether the person has abstinence (0 score), low-risk drinking (1-7 scores), hazardous drinking (8-15 scores), harmful drinking (16-19 scores), and alcohol dependence (20-40 scores).

Low-risk drinking is defined as limiting alcohol drinking to amounts and patterns that are unlikely to cause harm to oneself or others. The low-risk drinking level is classified by using the Alcohol Use Disorders Identification Test (AUDIT) with scores ranging from 1 to 7.

Alcohol knowledge is the alcohol related knowledge. The conceptual domains consist of 4 components: alcohol consequences, low-risk drinking, law and drinking and myth about alcohol. It is assessed by using the alcohol knowledge test which was modified from the "knowledge about alcohol" used in the School Health and Alcohol Harm Reduction Project (SHAHRP) among Australian high school students.

Alcohol consumption is the intake of beverages containing ethyl alcohol examples of which are spirits, beer and wines. Alcohol consumption is measured by total intake in gram of absolute ethanol in the previous month.

Drinking risk level is the level of risk after drinking. There are four levels of drinking risk according to the AUDIT classification: (1) low-risk drinking, (2) hazardous drinking, (3) harmful drinking, and (4) alcohol dependence.

Standard drink is any drink that contains about 10 grams of absolute alcohol which is equal to one standard drink in Australia or New Zealand (Babor, et al., 2001).

Senior high school students are students in Mathayomsuksa (high school) level five (equivalent to grade 11 of the international education) and are attending two high schools in Phayao province.

Intervention group is a group of students from a high school in Muang disctrict, Phayao province, who are the recipients of the PALMSS alcohol prevention program.

Control group is a group of students from a high school in Chun district, Phayao province with comparable prevalence of alcohol consumption, environment and the number of students as that of the intervention school. Students from this school receive an alcohol educational program through their school.

CHAPTER II
LITERATURE REVIEW

This study aimed to test the effect of the PALMSS alcohol prevention program on senior high school students who are low-risk drinkers. The theories and relevant research were reviewed as follows:

2.1 Alcohol
- 2.1.1 Definition of alcohol
- 2.1.2 Types of alcohol beverages
- 2.1.3 Alcohol consumption assessment
- 2.1.4 Alcohol and its negative consequences

2.2 Adolescents
- 2.2.1 Definition of adolescent
- 2.2.2 Adolescent development

2.3 Low-risk drinking
- 2.3.1 Meaning of low-risk drinking
- 2.3.2 Education for low-risk drinkers

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2.1. Alcohol

2.1.1. Definition of alcohol

According to the World Health Organization (WHO) (World Health Organization, 2006), alcohol is a generic term for many different chemical compounds. Ethyl alcohol or ethanol is the type of alcohol consumed by human. It is produced by a chemical reaction called fermentation wherein yeast feeds on sugar or starch in certain plants, such as barley or grapes, and produces alcohol along with carbon dioxide. Ethanol has various colors, tastes, potencies and flavors depending on the fruits or vegetables used in its manufacture. Alcohol may also mean pure spirit of wine, pure or highly rectified spirit (called also ethyl alcohol), the spirituous or intoxicating element of fermented or distilled liquors, or more loosely, a liquid containing it in considerable quantity. It is extracted by simple distillation from various vegetable juices and infusions of saccharine nature, which have undergone vinous fermentation (Accurate & Reliable Dictionary, 2010).

In this study alcohol refers to the alcohol beverage containing ethanol for drinking. It is produced through the fermentation of yeast on sugar or starch in certain plants and produces alcohol along with carbon dioxide. Some examples are wines, beers and spirits.

2.1.2. Types of alcoholic beverages

According to WHO (Desai, Nawamongkolwattana, Ranaweera, Shrestha, & Sobhan, 2003), there are 7 main type of alcohol beverages:

1. Wines are made from a variety of fruits, such as grapes, peaches, plums or apricots. Grapes are the most common raw material used to produce for wines. The soil in which the grapes are grown and the weather conditions in the growing season determines the quality and taste of the grapes which in turn affect the taste and quality of wines. When ripe, the grapes are crushed and fermented in large vats to produce wine.

2. Beer is also made by the process of fermentation. A liquid mix, called wort, is prepared by combining yeast and malted cereal, such as corn, rye, wheat or barley. Fermentation of this liquid mix produces alcohol and carbon dioxide.

The process of fermentation is stopped before it is completed to limit the alcohol content. The finished product is called beer. It contains 4 to 8 percent of alcohol.

3. Whiskey is made by distilling the fermented juice of cereal grains such as corn, rye or barley. Scotch whisky is originally made in Scotland. The word "Scotch" has become almost synonymous with whiskey of good quality.

4. Rum is a distilled beverage made from fermented molasses or sugarcane juice and is aged for at least three years. Caramel is sometimes used for coloring.

5. Brandy is distilled from fermented fruit juices. Brandy is usually aged in oak barrels. The color of brandy comes either from the oak barrel or from caramel.

6. Gin is a distilled beverage. It is a combination of alcohol, water and various flavors. Gin does not improve with age, so it is not stored in wooden casks.

7. Liqueurs are made by adding sugar and flavoring such as fruits, herbs or flowers to brandy or to a combination of alcohol and water. Most liqueurs contain 20 to 65 percent alcohol. They are usually consumed in small quantities after dinner.

The difference types of alcohol beverages and their alcohol content in percentage is shown below:

Beverage	**Source**	**Alcohol content (percent)**
Brandy	Fruit juices	40-50
Whisky	Cereal grains	40-55
Rum	Molasses / sugar cane	40-55
Wines (Port, Sherry, Champagne, etc)	Grapes (also other fruits)	10-22
Beer	Cereals	4-8

Source: (Desai, et al., 2003)

The traditional alcoholic beverages in Thailand are Ou, Krachae, Namtanmao, Sartoh and Waark (Desai, et al., 2003). Satoh production is carried out by using kind of rice: white sticky rice, red sticky rice and non-polished rice, yielding 29% ethanol within nine days at room temperature (Moonmangmee, Taloadtaisong, Saowaro, Moonmangmee, & Tangsupawat, 2004). Other traditional alcoholic

beverages are Lao Khao, Lao-Lao and Lao-Hai. Lao-Lao is a homemade rice whiskey and Lao-Hai is alcohol drink made from sticky rice (World Health Organization, 2004). Lao Khao is a potent alcoholic beverage made from rice which is widely distilled and sold in villages (Kazmin, 2002). Lao Khao is commissioned by the Thai government and could be represented as a subsidized general anesthetic for the pain of the working poor and tends to be stronger in the North and North-Eastern regions of Thailand (Cummings, 2000). It is sold in 750 ml bottles with a rather crude label bearing Thai script and drawing of rice ears. Lao Khao is 35% alcohol. Another beverage, Lao Yahh Dawng (herbal liquor) is Lao Khao with added herbs, roots, seeds, fruit or bark, and allowed to steep for a few days or weeks, to become Lao Yaa Dawng (pickled herb liquor). The Yaa Dawng additives can enhance the flavor and color of Lao Khao. Many of the Lao Yaa Dawng preparations are found to have specific health-enhancing qualities (Cummings, 2000).

2.1.3. Alcohol consumption assessment

2.1.3.1. Drinking pattern

Drinking pattern means the regularity in the frequency, amount and type of alcohol consumed over a period of time (Babor, et al., 2010). Drinking patterns are important because they have a direct effect on the drinker's blood alcohol level and other aspects of a person's drinking that are likely to lead to harm. The drinking pattern will be determined to calculate the total volume of ethanol consumption.

The Centre for Alcohol Studies (Sorapaisarn, et al., 2010) reported that the pattern of alcohol consumption among Thai current drinkers was that their average daily intake was about 10 gm or one standard drink for men and less than half of the standard drink for women, which is considered to be quite low. However, the median drinking intensity of five standard drinks in men and 2.5 standard drinks in a day among women, which is considered to be relatively high. No substantial difference alcohol consumption was found across age groups. Drinking frequency increased by age in both males and females wherein the rate of drinking of at least three days per week was highest among men and women aged 45 to 65 years. Using recommended cut-off points (World Health Organization, 2000), more than half of Thais in all age groups could be classified as drinking at levels associated with moderate to very high

risk. The occasional heavy drinking pattern occurred mostly in the youngest age group while Thai underage drinkers tended to drink very high amounts of alcohol in a single drinking occasion. However, most of them tended to drink infrequently (Sorapaisarn, et al., 2010).

2.1.3.2. Types of Alcohol Use

Many different terms are used to describe drinking behavior, and no absolute consensus has been agreed upon on which ones to use. “Abstaining” usually refer to drinking no alcohol at all. However, in some studies, it can mean drinking 12 or fewer drinks per year or not drinking the maximum limits on daily or weekly basis. “Low-risk use” usually refers to drinking within recommended guidelines and is not likely to cause problems. The terms “risky use” and “harmful drinking” refer to drinking in amounts that increase the potential of causing serious problems and amounts that could actually cause serious problems. These problems include motor vehicle crashes, physical health and/or mental health problems, violence, injuries, unsafe sex, and serious issues in life such as work, school, family, social relationships, and finances. Some literature also use the term “hazardous drinking” to mean drinking that runs the risk of causing serious problems. “Alcohol dependence” means the person is physically dependent on alcohol. Diagnosis generally requires three or more of these symptoms within a 12-month period:

- A great deal of time spending in obtaining, using, or recovering from alcohol use
- Difficulty to control drinking, such as persistent desire to drink or unsuccessful attempts of cutting down on drinking
- Physical withdrawal symptoms when alcohol use is stopped or decreased, or drinking to relieve withdrawal symptoms
- Tolerance: increased amounts of alcohol are required to achieve the same effects

2.1.3.3. Equivalence of different beverages

The equivalence of different beverages is measured in terms of 'units' of alcohol. One unit is equal to approximately 10 grams of absolute alcohol which is

considered as one standard drink, since it is available as 30 ml (1 fluid ounce or small peg) of spirits like whiskey, rum or brandy. The same amount of alcohol, one unit, is also available from a glass of wine, which is generally 120 ml or half a pint or 285 ml of beer. In Thailand, the popular alcohol beverage and term of one standard drink is shown in the picture below (Babor & Higgins-Biddle, 2001b).

What is a standard drink? **1 standard drink is equal to:**	
A single short of spirits (whiskey, gin, vodka, etc.) (30 ml of 35% alcohol)	
A glass of wine (100 ml of 12% alcohol)	
A can of ordinary beer (330 ml of 5% alcohol)	
3 pegs (150 ml) of 10% alcohol of Ou, Krachae, or 4 pegs (200ml) of 6% of Namtanmao, Sartoh, local beverage (Lao Nam Khao)	

In this study, the types of alcoholic beverages considered to be popular among adolescents in Thailand are as follows: beer, wine coolers, frozen drinks, spirits, white spirits, ready-to-drink (RTD), local beverages (Lao Nam Khao), herbal liquors (Lao Yahh Dawng), Thai traditional rice wine (Satoh) and Japanese wine (Sake).

2.1.3.4. Total volume of ethanol consumption

Total volume of ethanol consumption is defined as a respondent's volume of ethanol intake over a specified reference period such as volume per week, month or

year (World Health Organization, 2000). Average intake per day (the total volume for the reference period divided by the number of days in the period) may be used to describe the volume of intake by an individual or average intake per drinking day (the total volume for the reference period divided by the number of days in which the respondent consumed alcohol) may be used to create categories of light, moderate and heavy drinking. Volume usually can be expressed in terms of grams, ounces, liters, milliliters or some other measures of ethanol, such as absolute alcohol.

There are two methods used to measure the amount of ethanol contained in an alcoholic beverage (World Health Organization, 2000). If beverage specific data is collected, the preferred approach is to ask for the total amount consumed for each type of beverage (i.e. number of 375 ml bottles of beer or 200 ml glasses of wines). This amount is then multiplied by the ethanol conversion factor (i.e. the proportion of alcohol in the beverage's total volume), and summed across beverage types. The amount of ethanol is usually expressed in grams or milliliters, where 1 milliliters of ethanol is equal to 0.79 grams of ethanol. The alternative approach is to define a 'standard drink', then ask the respondent to report their consumption in terms of standard drinks. The main advantage of using a pre-defined measure when asking about consumption of all types of alcoholic beverages combined is that it promotes comparability across respondents regardless of the mix of drinks they consumed. The disadvantage, however, is that it forces the respondents to convert actual drink sizes into standard. A better solution is to offer respondents a limited range of glass types and/or containers to indicate the kind they normally use for a particular beverage (World Health Organization, 2000).

In this study, the alcohol consumption will be assessed using a structured interview to ask frequency, amount and type of alcohol consumed over the previous 30 days, after which, alcohol consumption will be reported as the total monthly intake in gram of absolute ethanol.

2.1.4. Alcohol and its negative consequences

According to the National Institute on Alcohol Abuse and Alcoholism (NIAAA) (1997), the consequences of alcohol consumption among adolescents are as follows:

1. Drinking and driving: Nearly 8,000 drivers aged 15 to 20 in the United Stated of America were involved in fatal crashes in 1995 wherein 20 percent had blood alcohol concentrations above zero (National Highway Traffic Safety Administration (NHTSA), 1999).

2. Sexual behavior: Surveys among adolescents suggest that alcohol use was associated with risky sexual behavior and increased vulnerability to coercive sexual activity. Among adolescents surveyed in New Zealand, alcohol misuse was significantly associated with unprotected intercourse and sexual activity before the age of 16 (Fergusson & Lynskey, 1996). Forty-four percent of sexually active youth in Massachusetts said that they were more likely to have sexual intercourse if they had been drinking, and 17 percent said that they were less likely to use condoms after drinking (Strunin & Hingson, 1992).

3. Risky behavior and victimization: A national survey among a representative sample of 8th and 10th graders indicated that alcohol use was significantly associated with both risky behavior and victimization and that this relationship was strongest among the 8th-grade males, compared with other students (Windle, 1994).

4. Puberty and bone growth**:** High doses of alcohol have been implicated in the delay of puberty in female (Dees & Skelley, 1990) and male rats (Cicero, et al., 1990). Also, consumption of large quantities of alcohol by young rats slowed bone growth and resulted in weaker bones (Sampson, Gallager, Lange, Chondra, & Hogan, 1999). However, the implications of these findings on young people were not clear.

It can be seen that a lot of adolescents are affected by the numerous adverse consequences which include physical, mental and social health. The most serious of the consequences was death. Therefore, the need to develop effective programs was imperative in order to address alcohol problems among adolescents.

2.2. Adolescents

2.2.1. Adolescent definition

The word adolescent is derived from the Latin word “adolescere” which means to grow up into maturity (Muuss, 1990, p. 1). This condition is considered as a time of growing up, of moving from the immaturity of childhood into the maturity of adulthood.

The WHO (United Nations, 1998, p. 7) has defined adolescents as the age ranging between 10 and 19 years. It is considered as a critical and formative stage of the life cycle. During this phase of life, the development that occur involve the physical development, cognitive development, and psycho-social development (Ruffin, 2009).

2.2.2. Adolescent development

2.2.2.1 Physical Development

During the teen years, adolescents experience changes in their physical development at a rate of speed unparalleled since infancy. Physical developments include:

1. The rapid gain in height and weight. During a one-year growth spurt, boys and girls can gain an average of 4.1 inches and 3.5 inches in height, respectively (Steinberg, 2008). This spurt typically occurs two years earlier in girls than in boys. Weight gain usually results from increased muscle development in boys and body fat in girls.

2. The development of secondary sex characteristics. During puberty, changing hormonal levels play a role in activating the development of secondary sex characteristics. These include: (1) growth of pubic hair; (2) menarche (first menstrual period for girls) or penis growth (for boys); (3) voice changes (for boys); (4) growth of underarm hair; (5) facial hair growth (for boys); and (6) the increased production of oil, increased sweat gland activity, and the beginning of acne.

3. The continued brain development. Recent research suggests that the teens' brains are not completely developed until late in adolescence. Specifically,

studies suggest that the connections between neurons affecting emotional, physical and mental abilities are incomplete (Strauch, 2003). This could possibly explain be the reason why some teens seem to be inconsistent in controlling their emotions, impulses, and judgments.

2.2.2.2. Cognitive Development

Most adults recognize that teens have better thinking skills than younger youth. These advances in thinking can be divided into several areas:

1. Developing advanced reasoning skills. Advanced reasoning skills include the ability to think about multiple options and possibilities. It includes a more logical thought process and the ability to think about things hypothetically.

2. Developing abstract thinking skills. Abstract thinking means thinking about things that could not seen, heard, or touched. Examples include things like faith, trust, beliefs and spirituality.

3. Developing the ability to think about thinking involes a process known as "meta-cognition". Meta-cognition allows individuals to think about how they feel and what they think. It involves being able to think about how one is perceived by others. It can also be used to develop strategies, also known as mnemonic devices, to improve learning.

2.2.2.3. Psycho-Social Development

There are five recognized psychosocial issues that teens deal with during their adolescent years. These include:

1. Establishing an identity: This has been identified as one of the most important tasks among adolescents. Over the course of the adolescent years, teens begin to integrate the opinions of influential others (e.g. parents, other caring adults, friends) into their own likes and dislikes. The eventual outcome is a person who has a clear sense of his values and beliefs, occupational goals, and relationship expectations. People with secure identities know where they fit or where they do not want to fit in the world.

2. Establishing autonomy: Establishing autonomy during the teen years really means becoming an independent and self-governing person within

relationships. Autonomous teens have gained the ability to make and follow through with their own decisions, live by their own set of principles of right and wrong and become less emotionally-dependent on parents. Autonomy is a necessary achievement if the teen is to become self-sufficient in society

3. Establishing intimacy: Intimacy is usually first learned within the context of relationships with the same sex, friendships, then utilized in romantic relationships. Intimacy refers to close relationships in which people are open, honest, caring and trusting. Friendships provide the first setting in which young people can practice their social skills with those who are their equals. It is with friends that teens learn how to begin, maintain, and terminate relationships, practice social skills, and become intimate.

4. Becoming comfortable with one's sexuality: The teen years mark the first time where young people are both physically mature enough to reproduce and cognitively advanced enough to think about it. Given this, the teen years are the prime time for the development of sexuality. How teens are educated about and exposed to sexuality will largely determine whether or not they develop a healthy sexual identity. Just over one-third of high school students reported being sexually active; almost half (46 percent) reported ever having had sex (Centers for Disease Control, 2005).

5. Achievement: Our society tends to foster and value attitudes of competition and success. Because of cognitive advances, the teen years are a time when young people can begin to see the relationship between their current abilities and plans and their future vocational aspirations. They need to figure out what their achievement preferences are and what they are currently good at and areas in which they are willing to strive for success.

2.2.2.4. Influence of developmental factors on drinking.

Researchers investigated the complex relationship between developmental factors and alcohol use and found that:

1. Personality and behavior: Personalities, such as antisocial behavior, poor self- regulation, poor self-control, anxiety, a tendency toward depression, and shyness, may predict initiation of alcohol consumption in early adolescence, as well as future heavy use and alcohol use disorders (AUDs) (Caspi, et al., 2002; Mayzer,

Puttler, Wong, Fitzgerald, & Zucker, 2002). As Biglan et al. (2004) reported, individuals with the most persistent personality and behavior problems were those most likely to experience more chronic and severe forms of AUDs in adulthood.

2. Family dynamics: Family dynamics was identified as one of the risk factors for underage drinking. When parents respond well to their child's needs, that child was able to regulate better his or her emotions and behavior (Calkins, 1994). The most effective family environments are characterized by greater warmth, moderate discipline, and limited stress (Shedler & Block, 1990). However, Campbell et al. (2000) suggested that parents who are depressed, antisocial, or aggressive toward their children or who create a family atmosphere marked by conflict may hinder their child's ability to regulate and control his or her own behavior. Problems with behavioral control would increase the risk for alcohol and other drugs (AODs) use. Early exposure to AODs use by parents and siblings also increase the risk for underage drinking.

3. Peer relationships: Peer influence in adolescents can be seen in situations wherein peers who drink may encourage the experimental use of alcohol (Schulenberg & Maggs, 2002). As Maggs et al. (1995) reported, adolescent characteristic mark an important developmental progression in which individuals begin to form their own identities and develop strong bonds with peers.

4. Gene–environment interaction: Rutter and Silberg (2002) suggested that the interaction of inherited and environmental factors strongly influenced drinking behavior and that their relative influence varied across adolescence. The initiation of alcohol use, for example, is tied more to the environment than to genetic influences. On the other hand, across mid- to late adolescence, the relative influence of genetic factors on underage drinking increased, although there were important individual differences (Rose, Dick, Viken, & Kaprio, 2001). Some of the genetic factors which influenced problem drinking were specific to alcohol, while others influenced a range of behaviors that reflected a general lack of impulse control in late adolescence and early adulthood (Krueger, et al., 2002).

5. Adolescent brain development and gaps in maturity: The adolescent's brain does not mature at the same time or at the same pace. For example, a region deep within the brain that governs emotions and mediates fear and anxiety,

known as the limbic system, matures in early adolescence. Its development is believed to be triggered by the hormones that set puberty in motion. In contrast, the frontal cortex, the region responsible for self-regulation, decision-making, and behavioral control, develops more gradually as a result of age and experience. This creates a period of time during adolescence in which emotions are heightened. However, the ability to regulate these emotions and regulate one's behavior still is developing. Some researchers believe this differential maturation of brain regions may contribute to the increased risk-taking behavior common during adolescence (Dahl, 2004; Romer & Walker, 2007; Steinberg, et al., 2006).

6. Differences in sensitivity to alcohol: Research with animals suggested that adolescents were less sensitive to the negative effects of alcohol intoxication such as sedation, hangover, and loss of coordination, but were more sensitive to the way alcohol eases social situations (Spear & Varlinskaya, 2005). Because human adolescents may be less sensitive than adults to certain aversive effects of alcohol, they may be at higher risk for consuming more drinks per drinking occasion. This developmental phenomenon may help explain why adolescents are able to drink larger amounts of alcohol (as in binge drinking) without experiencing the same levels of physiological effects (such as sleepiness and poor coordination) as adults.

In conclusion, adolescence is the turning point in a person's life when he or she develops from a child into an adult. Growth during adolescence involves an interplay among the biological, social, and cognitive changes in individuals and the demands, constraints, and opportunities of their environments. They are a vulnerable group of alcohol drinkers due to their personality and behavior, family dynamics, peer relationships, gene–environment interaction, gap of maturity and brain development as well as decreased sensitivity to the negative effects of alcohol. The key to prevention efforts is to acknowledge the influence of these developmental factors on drinking and the risks for drinking. (Gunzerath, Hewitt, Li, & Warren, 2011). Alcohol use reach its peak level during and immediately following the time of high school graduation, and remain at its height between the ages of 18 and 25 (Johnston, et al., 2005). It is therefore important to consider the senior year of high school as a critical point to establish healthier alcohol use behavior.

2.3. Low risk drinking

2.3.1. Definition of low-risk drinking

Low-risk drinking is defined as the limitation of alcohol use in the amounts and patterns that are unlikely to cause harm to one self or others. As scientific evidence indicates the risk of harm increases significantly when people consume more than two standard drinks per day and more than five days per week (Babor, et al., 2001).

However, even smaller quantities of alcohol present risks in certain circumstances which increase the risks to health as well as the possibility to hurt someone in situations like driving or operating machinery, pregnancy or breastfeeding, taking medications that interact with alcohol, having medical conditions made worse by alcohol and inability to stop or control drinking (Babor & Higgins-Biddle, 2001b).

The WHO low-risk guideline expressed the low-risk limit as two standard drinks per day for no more than five days per week, wherein a "standard drink" is equivalent to 10 grams of ethanol (Babor & Higgins-Biddle, 2001b). The drinking guideline is different among countries. In Australia, the guideline is that no more than 2 standard drinks (20 g ethanol) on any day for both men and women while in the United States, consumption should not to exceed 4 units (56 g)/day for men, 3 units (42 g)/day for women. In France, the guideline is that intake should not exceed 30 g/day in both men and women. In Italy, on the other hand, consumption should be less than 40 g/day in both men and women (International Centre for Alcohol Policies (ICAP), 2010). However, there is no existing drinking guideline for Thai people, but only a National Dietary Guideline that stated "avoid or reduce the consumption of alcohol beverages" in 2004 (National Dietary Guidelines for Thailand, 2004).

According to the American Public Health Association (2008), the low-risk drinking guidelines are designed for adults. Teens who wish to drink should be careful and drink less than the recommended amounts. Similarly, the Australian government (Australian Government National Health and Medical Research Council (NHMRC), 2009) recommended the guideline for children and young people under 18 years of

age that: 1) not drinking alcohol is the safest option, 2) for young people aged 15 to 17 years, the safest option is to delay the initiation of drinking for as long as possible, and 3) if drinking does occur in this age group, it should be at a low-risk level and in a safe environment, supervised by adults.

It is a recognized fact that teenagers cannot handle alcohol as well as adults. They often weigh less and have less water in their bodies to dilute the alcohol. Also, compared to adults, young people have fewer of the enzymes that help the liver eliminate alcohol (American Public Health Association (APHA), 2008). Furthermore, the adolescent brain is more vulnerable to damage by alcohol. Studies in neuroscience and child psychiatry showed that the brain is not really fully developed until after the age of 20. Therefore, teens are at greater risk when they drink because alcohol can inhibit the development of some parts of the brain (Crews, He, & Hodge, 2007). Moreover, there is no risk-free level of alcohol consumption, and for many people consumption of two standard drinks a day can still be associated with significant risks (World Health Organization, 2010a).

2.3.2. Education for low-risk drinkers

According American Public Health Association (2008), educating low-risk drinkers about risky drinking behaviors is required to enhance their ability to maintain their drinking at a low-risk drinking level. Moreover, Coffman et al. (2007), pointed out that those students who experimented with alcohol in their lifetime were no longer considered as potential candidates for primary prevention program which are focused solely on delaying the initiation of alcohol use. The appropriate intervention for students who have already initiated use should address the existing motivations for drinking (Coffman, et al., 2007). Babor et al. (2001) recommended interventions designed specifically for each level of drinking risk classified according to AUDIT scores as illustrated in the table below:

Risk level	Intervention	AUDIT score
Zone I	Alcohol education	0-7
Zone II	Simple advice	8-15
Zone III	Simple advice plus brief counseling and continued monitoring	16-19
Zone IV	Referral to specialist for diagnosis evaluation and treatment	20-40

Source: (Babor, et al., 2001)

Whiteley et al. (2008) recommended a similar intervention wherein alcohol messages delivered to adolescents were classified according to the level of drinking risk as follows:

1) High risk drinkers: risk reduction message
2) Low risk drinkers: risk avoidance message
3) Non drinkers: postponement of risk exposure

However, the WHO (World Health Organization, 2010b) pointed out that clients whose scores fell within the lower risk range who did not need any intervention to change their substance use and treatment and could continue as usual. However, it was considered to be a good practice to reinforce that what they were doing was responsible and should encourage them to continue their current low-risk substance use patterns. Moreover, general information about alcohol and other drugs should be given to low-risk users may be appropriate and may serve four purposes (World Health Organization, 2010b):

1. increase the level of alcohol knowledge in the community,
2. act as a preventive measure by encouraging lower risk substance users to continue their low-risk substance use behavior,
3. remind clients with a past history of harmful or hazardous substance use about the risk of returning to harmful or hazardous substance use, and
4. information given may be passed onto friends or family who do have substance use issue

2.4. Alcohol prevention program in school

Prevention initiatives focusing on adolescents and school-based alcohol education programs have one or more goals. These are: 1) to increase knowledge about alcohol in adolescents (Cuijpers, 2003), 2) to change the adolescent's drinking beliefs, attitudes, and behaviors, 3) to modify factors such as general social skills and self-esteem that are assumed to underlie adolescents drinking (Paglia & Room, 1999), 4) to delay the onset of first use of alcohol and reduce the use of alcohol, 5) to reduce high-risk drinking, and 6) to minimize the harm caused by drinking (Cuijpers, 2003). During the 1960s to the early 1970s, school-based intervention popular during the 1970s and 1980s relied solely on informational approaches and often taught students about the dangers of drug use. However, such programs have been found to be ineffective in changing behavior (Botvin, et al., 1995; Hansen, 1994; Tobler, 1992). Some findings noted were that only knowledge increased and attitudes changed toward alcohol, tobacco, and drug use, but actual substance use remained largely unaffected (Babor, et al., 2010).

The second phase involved the so-called "affective educational programs" which focused not on alcohol or other drugs but on "broader issues of personal development such as decision-making, values classification and stress management" (Cuijpers, 2003, p. 10). Approaches that addressed values clarification, self-esteem, general social skills, and alternatives to drinking which provided activities assumed to be inconsistent with alcohol use (e.g. sports, etc.) were also assessed to be ineffective (Moskowitz, 1989).

During the third phrase, from the early 1980s onward, the Social Influence Model dominated school-based prevention programs (Cuijpers, 2003). To date, the social influence approach has been found to be the most effective school-based prevention programs (Botvin & Griffin, 2007; Cuijpers, 2002; Tobler, et al., 2000; Tobler & Stratton, 1997). These programs included three important components: 1) information, 2) normative education, and 3) drug refusal skills (Vogl, et al., 2009). These were sometimes combined with broader personal and social skills training and, at times, included emphasis on community-based aspects or family-based interventions (Murray & Belenko, 2005; Petrie, Bunn, & Byrne, 2007; Spoth, Redmond, & Lepper, 1999).

According to Hopson and Steiker (2010), the substance use prevention was appropriate for teens who have already initiated substance use and the distinguish programs were appropriate for populations with varying levels of risk. The Institute of Medicine (1999) classified prevention programs into three types, specifically, (1) universal, (2) selective, and (3) indicated programs. Universal prevention programs were those that focus on the general population and aim to deter or delay the onset of a condition or behavior. Selective prevention programs, on the other hand, target sub-sets of the population who are believed to be at high risk due to membership in a particular risk group. Lastly, indicated prevention programs were for those already showing early danger signs or engaging in related high-risk behavior. Thus, recruitment and participation in a selective intervention was based on subgroup membership, recruitment and participation while an indicated intervention was based on early warning signs demonstrated by an individual (Botvin & Griffin, 2007).

Universal programs, which included all individuals in a particular population such as all students in school, were the most widely used form of preventive intervention for underage drinking. The most common programs included classroom curriculum administered to students within the school settings, which may be supported with change components like parent programs, mass media program and community-wide intervention (Windle & Zucker, 2010). However, not all universal programs were effective. The review by Spoth et al. (2009) showed that only 41 of 127 interventions demonstrated some evidence of significant positive changes for alcohol use behavior. A review by Larimer and Cronce (2007) pointed out that providing information about the dangers of drinking was not sufficient to produce any appreciable change in students' drinking behavior.

In Thailand, Panyawan (2010) identified six main alcohol interventions used on people with alcohol problems in the educational system. They are as follows:

1. promoting skills and behavior such as life skill training (Katiya, 2005).

2. promoting alternative activities like alcohol-free activities in welcoming first year students, promoting music and sport and college alcohol free.

3. Enhancing cognition, attitude, emotions and behavior through, for example, counseling program, TO BE NUMBER ONE project, and friend corner.

4. Contributing leadership such as promoting leadership among friends which is part of TO BE NUMBER ONE project.

5. Developing organization system such as cultivating the thinking process among directors, fostering bonds between teachers and students and students' surveillance project.

6. Providing health education through including life skills in the school curriculum, delivering alcohol education through group discussion, brain storming, and utilizing the multimedia in preventing alcohol consumption (Kunchan, 2008).

However, there have been some problems during the implementation of alcohol interventions students identified to have alcohol problems in the Thai educational system. These were: 1) lack of participation from stake holder, 2) lack of action from the main organization, 3) inability of the program to solve the problem, 4) discontinuation of the activities, 5) limitation of knowledge and theory to solve the problem, and, 6) lack of evaluation process (Panyawan, 2010).

Similarly, Kaewmongkol et al. (2009) reviewed the studies relevant to alcohol in Thailand from 1950-2007. The data were collected from 34 websites and 35 libraries in Thailand. There were 825 topics relevant to alcohol issues of which 209 topics were thesis studies, 537 topics were descriptive research and 79 were books. The majority of the studies targeting adolescence mainly focused on descriptive alcohol research. There was also some effective alcohol interventions identified one of which was life skill training. At the end of the study, the researchers suggested that research areas should shift to qualitative research and interventions of alcohol consumption should be increased.

Many researchers also identified the key components and characteristics of successful drug prevention programs (Cuijpers, 2002; Dusenbury & Falco, 1995; Gottfredson & Wilson, 2003; McBride, 2003; Midford, Munro, McBride, Snow, & Ladzinski, 2002; Springer, et al., 2004). These were:

1. Guiding through a comprehensive theoretical framework that address multiple risk and protective factors,

2. Providing developmentally appropriate information relevant to the target age group and the important life transitions they face,

3. Including materials to help young people recognize and resist pressures to engage in drug use,

4. Including comprehensive personal and social skills training to build resilience and help participants navigate developmental tasks,

5. Providing accurate information regarding rates of drug use to reduce the perception that it is common and normative,

6. Delivery using interactive methods (e.g., facilitated discussion, structured small group activities, role-playing scenarios) to stimulate participation and promote the acquisition of skills,

7. Sensitivity to culture and inclusion of relevant language and audiovisual contents familiar to target audience

8. Inclusion of an adequate dosage to introduce and reinforce the material,

9. Providing comprehensive interactive training sessions, for providers to generate enthusiasm, increase implementation fidelity, and give providers a chance to learn and practice new instructional techniques.

The National Institute on Drug Abuse (2011), in a similar study, recommended the principles for prevention programs for high school students which emphasized that the programs should increase academic and social competence using seven skills (Botvin, et al., 1995; Eisen, et al., 2003; Ellickson, et al., 2003; Haggerty, et al., 2007; Scheier, et al., 1999). The seven skills identified were: 1) study habits and academic support, 2) communication, 3) peer relationship, 4) self-efficacy and assertiveness, 5) drug resistance skills, 6) reinforcement of anti-drug attitudes, and 7) strengthening of personal commitments against drug abuse.

2.5. Computer delivery alcohol program

Computer technology is one method used to deliver alcohol prevention programs. Computer-delivered alcohol prevention programs have successfully reduced alcohol and other substance use among adolescents and young adults (Duncan, Duncan, Beauchamp, Wells, & Ary, 2000; Elliott, Carey, & Bolles, 2008; Lord & D'Amante, 2007; Schinke, Schwinn, Di Noia, & Cole, 2004). The computer approach for alcohol prevention programs provided a number of benefits. One was that teenager were comfortable with computer learning that they preferred to receive health information from a computer rather than from face-to-face interactions (Paperny, 2004). Another was that computer programs allowed users to access and navigate the contents at their own pace (Schinke, et al., 2010). Computer delivered programs provided an interactive lesson and learners can enjoy from audio, animation, graphics, and video. Lastly, it was portable and easy to use (Schinke, et al., 2010).

There was some example of articles that cited the success of computer-delivered alcohol prevention program. Vogl et al. (2009) reported the effect of a computerized harm reduction prevention program for alcohol misuse and related harm among 1,466 students (13 years old) from 16 high schools in Australia. The CLIMATE alcohol program was delivered using the computer and a regular classroom teacher. The contents of the program were based on social influences which were: (1) alcohol law, (2) standard drinks, (3) low-risk limit, (4) alcohol-free social activities, (5) refusal skill, and (6) ways to minimize alcohol consumption. Classroom activities included role playing, small group discussion, decision-making, problem-solving activities. Findings showed change in knowledge, alcohol use, alcohol-related harm and alcohol expectancies. However, effectively in decreasing of alcohol consumption were seen only in females.

Schinke et al. (2010) reported the longitudinal outcomes of an alcohol abuse prevention program among the urban youth. Participants were assigned into three arms: (1) youth intervention delivered by CD-ROM (CD), (2) the same youth intervention plus parent intervention (CDP), and (3) the control. Those in the CD and CDP arms received a computerized 10-session alcohol abuse prevention program.

Parents of the youth in the CDP arm received supplemental materials to support and strengthen their children's learning. All youth completed the post-intervention and annual follow-up measures while CD- and CDP-arm participants received additional annual booster intervention sessions. Results showed that after seven years following the post-intervention testing and relative to control-arm youth, participants in CD and CDP arms reported less alcohol use, cigarette use, binge drinking, and peer pressure to drink, fewer drinking with friends, greater refusal of alcohol use opportunities and lower intentions to drink. No differences were observed between CD and CDP arms.

Similarly, this study tested the effect of the PALMSS alcohol prevention program which would be delivered by computer (CD-ROM). It offered the opportunity to expose a large population of students and would be interactive with a wide range of applications and processes designed to deliver instruction through electronic means.

2.6. Relevant theory

2.6.1 Social Cognitive Theory

Social Cognitive Theory (SCT) was developed by Albert Bandura in the 1970s. It is based on the concept of *reciprocal determinism,* which is defined as the dynamic interplay among personal factors (knowledge, skills, experience, culture, ect.), the environment and behavior (Bandura, 1997). The SCT (Bandura, 1977, 1986) has been one of the most popular theories which identified factors that may influence alcohol use behavior. According to Bandura (Bandura, 1977, 1986), certain behaviors may be explained by the reciprocal influence of the three sets of factors. Individual factors refer to the physical and psychological situations that are internal to the person, including cognitive factors. Environmental factors refer to situations that are external to the person, such as accessibility to services, culture, and social support. Since both individual and environmental factors play roles in behavior shaping, they also serve as mediators in programs aiming to change alcohol use behavior. That is, the program do not change alcohol use behavior directly but instead, enhance self-efficacy to promote more confidence to refuse alcohol drinking, gain more knowledge about alcohol and know how to deal with social risk factor such as social drinking,

peer and media-influence, which will help students to maintain their low-risk drinking level.

2.6.2 Self-efficacy

Self-efficacy is an offshoot of the Social Cognitive Theory (Hayden, 2009). Self-efficacy is defined as the belief or perceived confidence in one's ability to fulfill certain tasks. In other words, it is the person's confidence in specific situations. The basic premise is that people generally will only attempt things they believe they can accomplish and will not attempt things where they believe they will fail (Hayden, 2009). However, people with a strong sense of efficacy believe they can accomplish even difficult tasks. They see these as a challenge to be mastered rather than treats to be avoided (Bandura, 1994).

There are four factors influence to efficacy perceptions (Bandura, 1994, 1997; Pajares, 2002).

1. Mastery experience: Mastery experience will occur when we attempt to do something successfully. It is the most effective way to boost self-efficacy because people believe that they can do something new if it is similar to something they have already done well (Bandura, 1994). Mastery experience can be promoted via workshops, training programs, internships and clinical experiences (Hayden, 2009).

2. Vicarious experience: Vicarious experience is the observation of the successes and failures of others who are similar to one's self. This will be occurred through watching others in a training session, a class, or during role-playing. Observational experiences enhance self-efficacy, especially if the person performing or learning the behavior is similar to the observer.

3. Verbal persuasion: Verbal persuasion is otherwise known as social persuasion. When people are persuaded verbally that they can achieve a task, they are more likely to do a task. In contrast, when people are told they do not have the skill or ability to do something, they tend to give up quickly (Bandura, 1994).

4. Somatic and Emotional States: Somatic and emotional states are the physical and emotional states that occur when someone contemplates doing something which provide possible clues as to the likelihood of success or failure.

Stress, anxiety, worry, and fear all negatively affect self-efficacy and can lead to a self-fulfilling prophecy of failure (Pajares, 2002). Stressful situations create emotional arousal, which in turn affect a person's perceived self-efficacy in coping with the situation (Bandura, 1997). However, if the emotional state improves- that is emotional arousal or stress is reduced- a change in self-efficacy can be expected (Bandura, 1997).

In relation to drinking behavior, self-efficacy is the ability to refuse a drink in high-risk situations (Ellickson & Hays, 1991; Oei & Burrow, 2000; Young, Oei, & Crook, 1991). Research have shown that participants who reported higher drinking refusal self-efficacy also reported less consumption of alcohol (Hasking & Oei, 2002; Lee, Oei, & Greeley, 1999; Morawska & Oei, 2005). Applied in this study, self-efficacy will play a major role in providing students to have confidence in their ability to refuse excessive drinking of alcohol.

In conclusion, the Social Cognitive Theory (SCT) explains how people acquire and maintain certain behavioral patterns and changes depending on such factors as the environment, individual and behavior. In this program, students will be provided a general knowledge about alcohol, how to behave safely when drinking and how to deal with different social risk factors. Moreover, self-efficacy will enhance in students their belief that they have ability to refuse alcohol in high-risk situations. Therefore, the PALMSS alcohol prevention program has its foundation in the SCT in order to improve a student's ability to retain his drinking level at the low level.

2.7. Social influence

2.7.1. Social drinking

Social drinking is the consumption of alcohol without reaching the point of being drunk. It is drinking in a safe, legal, and responsible manner, allowing one to socialize. Three or less measured drinks (or a blood alcohol level of up to 0.05%) is considered to be within the social drinking range (Vaden Health Centre Stanford, 2011). However, it is no longer considered to be social drinking when people behave as follows: (1) drinking to get drunk, (2) drinking and driving, (3) binge drinking, (4)

drunken sex, (5) stumbling or slurring your speech, (6) blackouts, (7) vomiting, (8) alcohol poisoning and legal troubles.

There are three main reasons that people drink in a social situation (Vaden Health Centre Stanford, 2011).

1. Drinking is considered to be relaxing for many people.

2. Drinking alcohol is a social norm in our culture, and is considered acceptable in many situations.

3. Drinking is known as a "social lubricant," making people feel more at ease when meeting someone new.

Data from a preliminary survey among seniors from four high schools in Phayao province showed that the main reason for drinking was social drinking (Hongthong & Areesantichai, 2011). People in these communities considered alcohol drinking as a social norm in the Thai culture; therefore, it is but normal for adults to offer alcoholic beverages to adolescents. As a consequence, students must be taught about social drinking that will help them learn the appropriate behaviors when drinking.

Several tips were formulated by the Vaden Health Centre in Stanford (2011) when drinking socially. They are: How can students be a successful social drinking? (Vaden Health Centre Stanford, 2011)

1. Set limits before drinking.
2. Drink moderately (up to 2 drinks on one occasion).
3. Don't take multiple shots of hard alcohol.
4. Avoid drinking alone. Social drinking is with others.
5. Don't play drinking games.
6. Don’t go out with the intention to get drunk.
7. Don’t drink to the point of drunkenness: vomiting/stumbling, etc.
8. Intersperse non-alcoholic drinks with alcoholic drinks.

2.7.2. Media influence

Alcohol advertising is one important key factor that has the potential to encourage drinking among adolescents. For teens who have not started to drink, expectancies are influenced by normative assumptions about teenage drinking as well

as through the observation of drinking by parents, peers and models in the mass media (Anderson, de Bruijn, Angus, Gordon, & Hastings, 2009). Young people with more positive affective responses to alcohol advertising had more drinking expectancies, perceived greater social approval for drinking, believed drinking was more common among peers and adults, and intended to drink more as adults (Chen & Grube, 2002). Chen et al. (2005) demonstrated the link of specific elements featured in beer advertisements like humor, animation and popular music, to the overall likeability of these advertisements and, subsequently, to advertising effectiveness which were indicated by an intention to purchase the product and promote the brand through advertisements.

Applied to this study, the strategies to deal with media influence were important for students to sustain their drinking levels at low-risk. Students were provided with the knowledge regarding the techniques of alcohol advertisements and the influence of media to teenage drinking. They were also provided with the opportunities to recognize alcohol advertising techniques as seen through videos, and then eventually taught how to resist media influence.

2.7.3. Peer influence

Adolescents recognize the importance of peer relationships. Characteristics of adolescence marks an important developmental progression, as individuals begin to form their own identities and to develop strong bonds with peers (Maggs, et al., 1995). The influence of drinking by friends exert a strong effect on adolescent drinking since it has consistently been linked to alcohol use in a variety of adolescent samples as proven by a number of studies (Belcher & Shinitzky, 1998; Epstein, Botvin, Baker, & Diaz, 1999; Hawkins, Catalano, & Miller, 1992). Peers who drank may encourage experimentation with alcohol use (Schulenberg & Maggs, 2002). Moreover, exposure to alcohol use by peer groups seems likely to increase the risk by reducing drinking refusal self-efficacy (Connor, George, Gullo, Kelly, & Young, 2011).

Applied to this study, the strategies to deal with peer pressure was important for students to maintain their drinking levels at low-risk. Research among U.S. youth, emphasized that good communication and social skills played the key roles for handling substance offer from peers (Botvin & Botvin, 1992; Skara &

Sussman, 2003). Therefore, this alcohol prevention program will provide students with an understanding and knowledge about how peers influence alcohol use, assertive skills to use as well as opportunities for interactive practice to refuse alcohol offer by peers.

2.8. Instruments

2.8.1. Screening Instrument

2.8.1.1. The Alcohol Use Disorders Identification Test (AUDIT)

The AUDIT was developed by the World Health Organization (WHO) as a simple method of screening for excessive drinking and to assist during brief assessments (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). It can help identify excessive drinking as the cause of the presenting illness. It also provides a framework for intervention to help risky drinkers reduce or cease alcohol consumption and thereby avoid the harmful consequences of their drinking. The AUDIT also helps to identify alcohol dependence and some specific consequences of harmful drinking. It is particularly designed for healthcare practitioners in a range of health settings , and with suitable instructions, it can be self-administered or be used by non-health professionals (Babor, et al., 2001). The AUDIT also translated in Thai version which is already adapted to specific languages, cultures and standard drinks measuring in Thailand. (Babor & Higgins-Biddle, 2001b)

The AUDIT was developed and evaluated over a period of two decades and has been found to provide an accurate measure of risk across gender, age, and cultures (Allen, Litten, Fertig, & Babor, 1997; Saunders, et al., 1993). The conceptual domains and item content of the AUDIT consists of 10 questions about recent alcohol use, alcohol dependence symptoms, and alcohol-related problems as shown in the table below.

Domains	Question number	Item content
Hazardous alcohol use	1	Frequency of drinking
	2	Typical quantity
	3	Frequency of heavy drinking
Dependence symptoms	4	Impaired control over drinking
	5	Increased salience of drinking
	6	Morning drinking
Harmful alcohol use	7	Guilt after drinking
	8	Blackouts
	9	Alcohol-related injuries
	10	Others concerned about drinking

Source: (Babor, et al., 2001)

According to Babor et al. (2001), the AUDIT differed from other self-reported screening tests in that it was based on data collected from a large multinational sample, used an explicit conceptual statistical rationale for item selection, emphasized identification of hazardous drinking rather than long-term dependence and adverse drinking consequences, and focused primarily on symptoms occurring during the recent past rather than "ever." With the use the AUDIT total score, a simple way to provide each patient with an appropriate intervention can be done based on the level of risk. Four levels of risk are shown in the table below.

Risk level	Intervention	AUDIT score
Zone I	Alcohol education	0-7
Zone II	Simple advice	8-15
Zone III	Simple advice plus brief counseling and continued monitoring	16-19
Zone IV	Referral to specialist for diagnosis evaluation and treatment	20-40

Source: (Babor, et al., 2001)

2.8.1.2. The CAGE questionnaire

The CAGE questionnaire was developed by Dr.John Ewing, the founding director of the Bowles Center for Alcohol Studies, University of North Carolina at Chapel Hill. The CAGE questionnaire (Ewing, 1984) was popular for screening in the primary care setting because it was short, simple, easy to remember, and has been proven to be effective in detecting a range of alcohol problems. The questions were developed to be brief, easy to remember with the idea that physicians could use them as a brief screening tool in a clinical setting and can spend only 2 minutes to interview the patient (Ewing, 1984). CAGE is an internationally used assessment instrument for identifying problems with alcohol. 'CAGE' is an acronym formed from the italicized letters in the questionnaire (cut-annoyed-guilty-eye). The four questionnaires are:

1. Have you ever felt you should *cut* down on your drinking?
2. Have people *annoyed* you by criticizing your drinking?
3. Have you ever felt bad or *guilty* about your drinking?
4. Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover (*eye-opener*)?

The CAGE can be used to identify alcohol problems over the lifetime. Two positive responses are considered to be a positive result and indicate further assessment is warranted. The total possible score is 4 wherein a higher score indicates a greater risk for alcoholism.

The CAGE has been validated in both the US (Beresford, Low, Adducci, & Goggans, 1982) and the UK (King, 1986). Other researches using clinical samples have also indicated that the CAGE identified most alcoholics.

2.8.1.3. The Michigan Alcoholism Screening Test (MAST)

The MAST is a brief self-report questionnaire designed to detect alcoholism (Selzer, 1971). It is widely used in the clinical and research settings. The twenty-four (24) scored items assess symptoms and consequences of alcohol abuse, such as guilt about drinking, blackouts, delirium tremens, loss of control, family, social, employment, and legal problems following drinking bouts, and, help-seeking behaviors, such as attending alcoholic anonymous meetings or admission to a hospital because of drinking. Several shorter versions of the MAST have also been developed including the thirteen-item Short-MAST (Selzer, Vinokur, & van Rooijen, 1975) and

the ten-item Brief-MAST (Pokorny, Miller, & Kaplan, 1972). To complete the MAST, individuals are asked to answer either a yes or a no to each item. The items are weighed on a scale of 1 to 5, with items concerning prior alcohol-related treatment experiences and help-seeking behaviors receiving higher weights. The total MAST score (range of 0-53) can be derived by adding the weighted scores from all items that are endorsed. Studies indicated that the long version of the MAST possessed good internal consistency and reliability as indicated by Cronbach's alpha coefficients of 0.83 to 0.93 (Gibbs, 1983).

Selzer (1971) recommended adopting a cut-off score of 5 or higher for a diagnosis of alcoholism using the MAST. However, a cut-off score was shown to produce a relatively high percentage of false positives (Gibbs, 1983), Selzer et al. (1975) suggested the following cut-off points: 0 to 4 for not alcoholic, 5 to 6 for maybe alcoholic; 7 or more for alcoholic. Skinner (1982) recommended that scores of 7 to 24 be regarded as clear evidence of alcohol problems, and that scores of over 25 be considered evidence of substantial alcohol problems. As with any instrument that relied on the veracity of self-report information, the reliability and validity of the MAST is dependent on the willingness of the interviewee to answer the items truthfully. All the items possessed high face validity, which meant that it was relatively easy to answer them so as to appear non-alcoholic. The MAST may, therefore, not be a useful screening tool with individuals who are motivated to conceal their alcohol problems.

In conclusion, the CAGE questionnaire and MAST were mainly used for identifying alcoholics. It is therefore but appropriate to use the AUDIT as the screening tool for this study. The AUDIT will be used as a tool for screening students because this tool can be used a respondent who has the drinking risk level in zone I and an AUDIT score between 1 and 7.

2.8.2. Alcohol Assessment Instruments

2.8.2.1. Timeline Follow Back (TLFB)

The Timeline Follow Back (TLFB), (Sobell & Sobell, 1992) is an assessment interview developed to help individuals recall alcohol consumption over a previous time period, usually between one week and one year. Individuals receive a blank calendar and are instructed to indicate the days when they consumed alcohol as well as the number of drinks they consumed. Generally, an interviewer leads an individual participant through each day, cueing holidays, weekends, birthdays, etc., to aid memory for the number of days drank and the number of drinks consumed on each occasion. The TLFB displayed high reliability and validity when given in a face-to-face setting by an interviewer (Sobell & Sobell, 1992; Sobell, Sobell, Leo, & Cancilla, 1988). It was also found to be reliable when administered face-to-face initially and then over the telephone in the succeeding encounters (Cohen & Vinson, 1995; Sobell, Brown, Leo, & Sobell, 1996). Additionally, it has been found to have high reliability, $r > 0.85$ (Sobell, et al., 1996), and to be a valid assessment of alcohol use when participants were given assurance of confidentiality (Sobell & Sobell, 1992).

2.8.2.2. Blood Alcohol Concentration (BAC)

Blood Alcohol Concentration (BAC) is the amount of alcohol in the bloodstream. It is measured in percentage (%). For instance, a BAC of 0.10 % means that a person has 1 part alcohol per 1000 parts of blood in the body (Prevention Resource Guide: Impaired Driving, 1991). In studies of alcohol-related crashes, reaction time, tracking ability, concentrated attention ability, divided attention performance, information process capability, visual functions, perceptions, and psycho-motor performance, impairment in all these areas was significant at blood concentrations of 0.05 % (Prevention Resource Guide: Impaired Driving, 1991). BAC can be measured using the breath, blood, saliva or urine tests. Because of the finding that impairment of driving-related skills by alcohol began at BAC of 50 mg/dL or 0.05 percent (Howat, Sleet, & Smith, 1991), the permissible level of blood alcohol concentration under the traffic law 1994 of Thailand was set at 0.05 % or lower (Suriyawongpaisal, Plitapolkarnpim, & Tawonwanchai, 2002). In 2000, the US Department of Health and Human Services recommended that to have a BAC below

the 0.05 % limit, men should drink no more than 2 standard drinks in one hour, and women should drink no more than one standard drink in one hour (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2000).

In this study, the TLFB was used for the interview because it will help individuals recall alcohol consumption over a previous time period since it displayed high reliability and validity when given in a face-to-face setting by an interviewer (Sobell & Sobell, 1992; Sobell, et al., 1988). It will be used to assess alcohol consumption (type, frequency, and amount) in a previous month. However, the BAC will not be used in this study for measuring alcohol consumption because it is complicated and expensive to use compared to the TLFB. Moreover, students who are identified as low-risk drinkers may drink only a small amount of alcohol which will be undetectable using the BAC.

2.9. Relevant studies

deVisser and Birch (2011) assessed the knowledge regarding alcohol guidelines among 309 secondary school students aged 16 to 18, and 125 university students aged 18 to 25 in the UK. Finding showed that most of them lacked the knowledge and skills required to drink according to government guidelines. They usually drank more than one unit, and tended to underestimate the unit content of their drinks.

Phalasarn and Duangsong (2011) reported the effectiveness of health educational program by applying the theory of Planned Behavior and Social Support for the prevention of alcohol drinking among 82 senior high school students (grade 10th) in Thailand. There was a 12-week educational program which included role playing, video clips, group discussions, a handbook on alcohol prevention, an exchange of experiences, and social support from teacher and guardians. Findings revealed that the experimental group had a higher mean alcohol knowledge score, perceived benefits, perceived behavior control and intention of not drinking than before the intervention was done and was significantly higher than the comparison group ($p\text{-value} < 0.001$).

Caria et al. (2011) conducted the effects of the "Unplug Program", a school-based prevention program for 7,079 students aged 12 to 14 years from 143 schools in seven European countries. The program based on the social influence model, provided knowledge, social skills, normative education and intra-personal skills. Results showed that the program was more effective in reducing alcohol-related problem behaviors among boys than among girls.

Bingham et al. (2010) reported the efficacy of a web-based, tailored, alcohol prevention/intervention program for first year college students. A web-based brief motivational alcohol prevention called the Michigan Prevention and Alcohol Safety for Students (M-PASS) delivered four interactive online sessions designed to prevent/reduce alcohol-related risks. Findings showed high-risk intervention men reported lower quantities of drinking and less frequent episodes of binge drinking compared to the controls. Intervention women in the low-risk group reported fewer drinks per drinking day, and women in the high-risk group reported a lower quantity of drinking occasion compared to the control group.

Chaveepojnkamjorn and Pichainarong (2010) conducted a cross-sectional study among 5,184 male high school students in central Thailand in December 2007 to February 2008. Study revealed five factors were associated with alcohol consumption. These were: (1) the educational level, (2) co-habitants, (3) having a job and earning money, (4) having family members with alcohol/drug problem, and, (5) grade point average (GPA). It was found that 35% of students drank more than 4 drinks each time, 60% experienced binge drinking, and 43% experience drunkenness. Research suggested education regarding the disadvantages of alcohol to risk groups could reduce the proportion of new and current drinkers.

Hopson and Steiker (2010) examined the effectiveness of adapted versions of an evidence-based prevention program in reducing alcohol use among 70 alternative high school students aged 14 to 19 years in the United State of America. "Keep in it REAL (KiR)" was a substance abuse prevention program composed of six 60-90 minute weekly sessions using videos and scenarios that students created. The curriculum taught students four strategies for resisting drug use, namely, refuse, explain, avoid and leave. Findings showed that younger students reported significant

reduction in alcohol use and intentions to accept alcohol while older students did not reduce their alcohol use.

Will and Sabo (2010) examined the Reinforcing Alcohol Prevention (RAP) program among underage drinkers from grade 8th, 9th and 10th grades (age 13-16 years) in southeastern Virginia. The program was delivered through a short 5-minute video of a crash victim or a convicted at-fault driver who discussed the personal impact of alcohol-impaired driving had on his or her life. Then, one or two interactive activities were done that educated students through the on-line learning and, finally, a reinforcement of the alcohol prevention messages made. Findings showed that there was a significant improvement in the students' knowledge and awareness of alcohol's harmful effects.

Unin (2009) explored patterns of drinking, attitude, opportunities to drink, and the effects of alcohol on health and family among 41 teenagers (13 to 19 years) in Thailand. The results found were: 1) teenagers lacked confidence to deny an offer to drink because they had positive attitudes and outcome expectations from drinking, 2) enabling factors for alcohol drinking were the presence of stores in the community that sold alcoholic beverages and the absence of a local organization responsible for controlling underage drinking, and, 3) reinforcing factors were peer drinking, influence from adult drinking, norm of drinking in the community, and guardians' acceptance of drinking especially during festivals. Furthermore, it was found that teenagers drank considerable amounts during festivals like, for example, the Songkran Festival, New Years, large group gatherings parties, and special events. White liquors mixed with sweet water or mixed with energy drinks, cheap beers were the popular drinks.

The Child Can Change Organization (2009) reported the participatory action research of the project, "alcohol-free school program", which aimed to prevent the presence of new drinkers in the school setting in Thailand. School provided alcohol policies, alcohol knowledge, alcohol prevention activities such as those integrated in the teaching curriculum, life skill training, school campaigns for preventing alcohol drinking as well as collaboration with the community and parents to reduce alcohol consumption. Findings showed that the participation of the school

and community were the only positive progress in preventing the initiation of drinking.

Kunchan (2008) reported the effectiveness of a health education program among 60 senior high school students in grade 10 (15 to 16 years) in Thailand. Applied Protection Motivation Theory and Social Support on Behavioral Modification were delivered to students in an experimental group where a guide book for preventing alcohol drinking was given to students. Group discussions, counseling, multimedia and paper recording were also done with the support of their parents. Results showed that the experimental group had a mean score of susceptibility severity, self-efficacy expectancy, response efficacy and behavior that was significantly higher by 0.001 before intervention was done compared to the control group

Branstorm et al. (2007) examined the associations between risks and protective factors and adolescents' use of alcohol and drugs. Random sampling was used to select 4,800 adolescents (a total of 9,600) in Sweden in May 2003 to May 2004. The findings revealed that about 44% of the adolescents in grade 9 (15 to 16 years of age) had been drunk on at least one occasion. Strong associations were found between elevated individual, family, school and community risk factors and use of alcohol and drug. Conversely, protective factors were negatively related to the use of alcohol and drug.

Bersamin et al. (2007) revealed the effectiveness of a web-based alcohol misuse and harm-prevention course among high- and low-risk in-coming college freshmen at a northern California public university who reported alcohol use in the past 30 days before the beginning of the semester and who did not use alcohol. The College Alc Online course, a web-based alcohol misuse and harm prevention course, for college students contained information related to college alcohol use, social norms, consequences, harm prevention and treatments. Finding showed that among regular drinker, College Alc reduced the frequency of heavy drinking, drunkenness and negative alcohol consequences. Conversely, the program was not affected by unreported alcohol use in the past 30 days.

Werch et al. (2005) investigated the effect of a multi-health behavior intervention which integrated physical activity and substance use prevention among

604 high school students from a suburban in the northeast Florida. Researchers provided a brief, 12-minute one-on-one consultation which integrated alcohol avoidance messages with those promoting fitness and other positive health behavior, along with a mailed flyer recapping key messages, holding a promise for reducing alcohol consumption and cigarette use. Findings showed positive effects at 3-months post-intervention for alcohol consumption, alcohol initiation behavior, alcohol use risk and protective factors, drug use behaviors, and exercise habits then for alcohol use, risk and protective factors, cigarette use and cigarette initiation at 12-months post-intervention.

Katiya (2005) examined the results of group processes for promoting self-protection skill during drinking occasions among 30 junior high school students (14 to 15 years) who were identified as alcohol-risk students. The activities included games, communication skills, life skill education and group counseling. Result showed that group processes could develop learning behaviors among students. Students established their self-protection skills like self-awareness and sympathy for other people, self-congratulation, public-minded, interpersonal relationship and communication skill, emotion and stress-coping ability and analytical and creative thinking ability.

From the review above, senior high school students are adolescents who are at the turning point in their lives where he or she develops from a child into an adult. Growth during adolescent involves an interplay between the biological, social, and cognitive changes in individuals and the demands, constraints, and opportunities of their environments. Consequence of their growth development may force them to use alcohol.

The senior high school students were no longer candidates for primary prevention because majority of them already experimented with alcohol in the lifetime (Johnston, et al., 2005). Meanwhile, majority of school-based alcohol program for underage drinking in the school setting seemed ineffective to all sub-groups, but was most positive effect for drunkenness and binge drinking (Foxcroft & Tsertsvadze, 2011). Therefore, low-risk drinkers were identified as the vulnerable groups because of the limitation of school-based program target this sub-group.

Although low-risk drinkers tended to drink a limited amount of alcohol and their drinking patterns were unlikely to cause harm to oneself or others (Babor, et al., 2001), they may increase consumption in the future because alcohol intake may vary over time (Babor & Higgins-Biddle, 2001a). Also, the curriculum for senior high school students in Thailand do not include contents specific alcohol, but instead, generally focus on addictive substances (The Ministry of Education Thailand, 2008).

The PALMSS alcohol prevention program was designed for low-risk drinkers who were attending 11th Grade in Phayao province. The PALMSS aimed to enhance alcohol knowledge, maintain drinking risk level at the low-risk limit, and reduce alcohol consumption among students. PALMSS is the acronym for the six core component of the program: P = peer, A = alcohol knowledge, L = low-risk drinking, M = media-influence, S = social drinking and S = self-efficacy.

It was a selective preventive and extra-curricular alcohol educational program delivered via CD-ROM which offered more comfortable learning since it allowed users to navigate through the contents at their own pace (Schinke, et al., 2010) and, at the same time, enjoy the learning process through audio, animation, graphic and video interfaces. Over and above enhancing alcohol knowledge, the PALMSS alcohol prevention program sought to promote students' self-efficacy by enhancing their perceived confidence with their ability to maintain their low-risk drinking level. Moreover, the program helped to provide students social skills such as social drinking, media influence and peer influence which made this program to be a feasible and effective solution to low-risk drinkers.

Moreover, it was designed according to the National Institute on Drug Abuse (2011) recommendation that the principle of prevention programs for high school students should increase academic and social competence with use of seven skills: 1) study habits and academic support, 2) communication, 3) peer relationship, 4) self-efficacy and assertiveness, 5) drug resistance skills, 6) reinforcement of anti-drug attitudes, and 7) strengthening of personal commitment against drug abuse (Botvin, et al., 1995; Eisen, et al., 2003; Ellickson, et al., 2003; Haggerty, et al., 2007; Scheier, et al., 1999). The program was based on the Social Cognitive Theory (SCT), developed by Albert Bandura in the 1970s, which is, itself, based on the concept of *reciprocal determinism* - the dynamic interplay between personal factors (knowledge,

skills, experience, culture, etc.), the environment and behavior (Bandura, 1997). Finally, it is expected this program will be a feasible and effective solution to low-risk drinkers.

2.10. Conceptual Framework

The PALMSS alcohol prevention program is a selective and extra-curricular program aimed to address the knowledge and skills for senior high students who are low-risk drinkers needed to control and manage their alcohol consumption. There were four 50-minute modules designed with the same core components, but differing in the complexity of each level from Basic, Intermediate I, Intermediate II to the Advanced module. The program is delivered via CD-ROM. Based on Social Cognitive Theory, the six core components of the program were: alcohol knowledge, low-risk drinking, social drinking, media–influence, resisting peer pressure and self-efficacy. The conceptual framework of this research is illustrated in the figure 1 below:

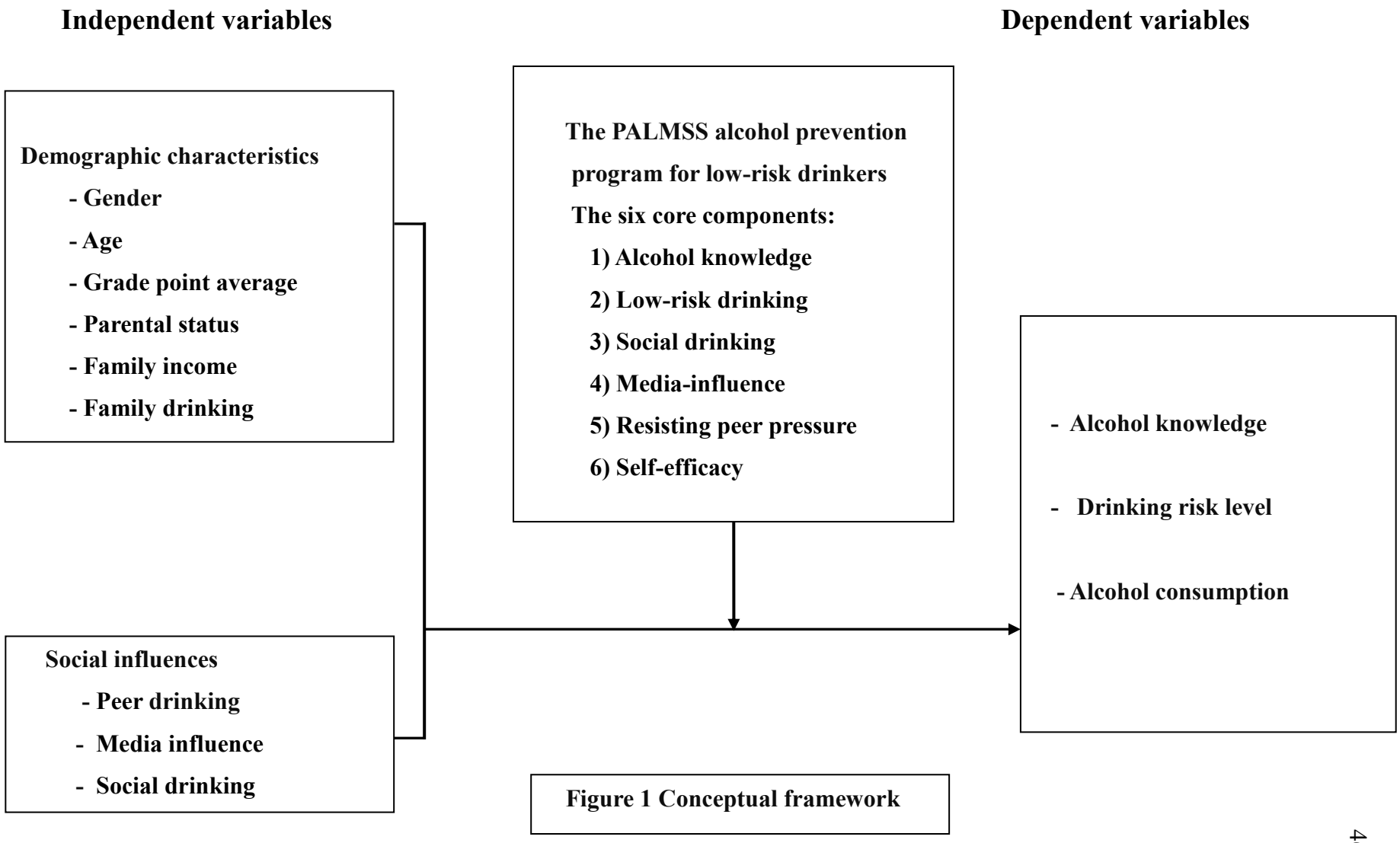


Figure 1 Conceptual framework

CHAPTER III
METHODOLOGY

This study aimed to demonstrate the effect of the PALMSS alcohol prevention program on increasing alcohol knowledge, maintaining of low-risk drinking limits and reducing of alcohol consumption among students.

3.1. Research design

The research design was a quasi-experiment which consisted of two groups wherein one group, the intervention group, was where the PALMSS alcohol prevention program was implemented in and the other group, the control group, was where the program was not implemented. Assessment was conducted at baseline, at the end of the program (4 weeks after baseline) and 1-, 3- and 6-months post intervention.

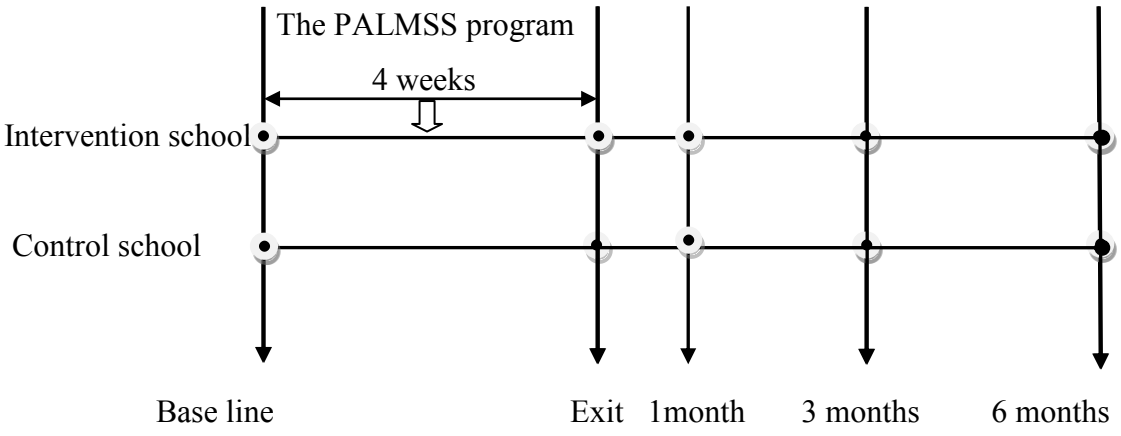


Figure 2: The Research Design

3.2. Sample and sampling method

3.2.1. Study area

There were 18 government high schools in Phayao province, and had 4 groups of school classified according to the number of students as follows:

1. Largest school size (≥2,500 students) : 2 schools
2. Large school size (1,500-2,499 students) : 3 schools
3. Medium school size (500-1,499 students) : 10 schools
4. Small school size (≤499 students) : 3 schools

The researcher selected the medium-sized schools (500-1,499 students) because there are more medium-sized schools than others high school sizes in Phayao province. There are 10 medium-sized schools; however, research was only feasibly in four of these schools. Therefore, two of the four schools were randomly chosen and then were randomly assigned at the intervention or control school. Two schools were approximately 40 kilometers apart which prevented contamination between these two schools. The schools' profile as shown in the table 1 below.

Table 1: Proportion of alcohol consumption in the intervention and the control school

School	**Location District**	**Number (students)**	**Proportion of alcohol consumption (%)***		
			Lifetime	**Last year**	**Last month**
Intervention	Muang	1,091	63.7	58.2	33.8
Control	Chun	1,112	62.3	56.5	32.6

* data from school alcohol survey among students Matthayomsuksa 4-5 in 2011

3.2.2. Study population

Participants for this study were senior high school students in Phayao province. They were 16 to 18 years of age, studying Mathayomsuksa five (Grade-11th) and who met the screening criterion for "low-risk drinkers" according to the Alcohol Use Disorder Identification Test (AUDIT), which was a 1-7 score.

3.2.3. Inclusion criteria

1. Male and female.
2. Students who were low-risk drinkers based on the screening tool (AUDIT = 1-7 scores).
3. Students who were studying Mathayomsuksa five (Grade-11th).
4. Students who voluntarily participated in the study.

3.2.4 Exclusion criteria

1. Students who had the mental problem diagnosed by doctor.
2. Students who plan to move to another school during the academic year 2012.

3.2.5 Sample & sample size

The formula used for the calculation sample size (Overall & Doyle, 1994) was:

$$n = 2(Z\alpha + Z\beta)^2 / \Delta^2$$

where:

n	=	the sample size in each group
$Z\alpha$	=	the Z score beyond which the smaller area under the normal curve is equal to $\alpha/2$ for a two-sided test = 1.96
$Z\beta$	=	the Z score corresponding to a larger area under the curve is equal to the power 0.9 = 1.282
Δ	=	In the case of repeated measurements, the effect size Δ is defined in terms of the mean difference and within-groups standard deviation for the particular combination or contrast among the multiple measurements that is to be tested for significance; $\Delta = (\overline{X1}-\overline{X2})/SD)$

When the significance level of alpha was chosen at 0.05, the $Z\alpha$ value used was 1.96. Using the desired exponential power of 0.9, the $Z\beta$ value used was 1.282. The values used for the computation of the sample size were derived from the findings of McBride et al. (McBride, Farringdon, Midford, Meuleners, & Phillips, 2004), which was evaluated using the SHAHRP program, with a standard of 2.516 for standard drinks. Furthermore, the CLIMATE program, a program similar to the SHAHRP program, demonstrated the significant difference between the intervention and the control group with a value of 1.359 for standard drinks (Vogl, et al., 2009).

Substituting the values mentioned above into the formula yielded:

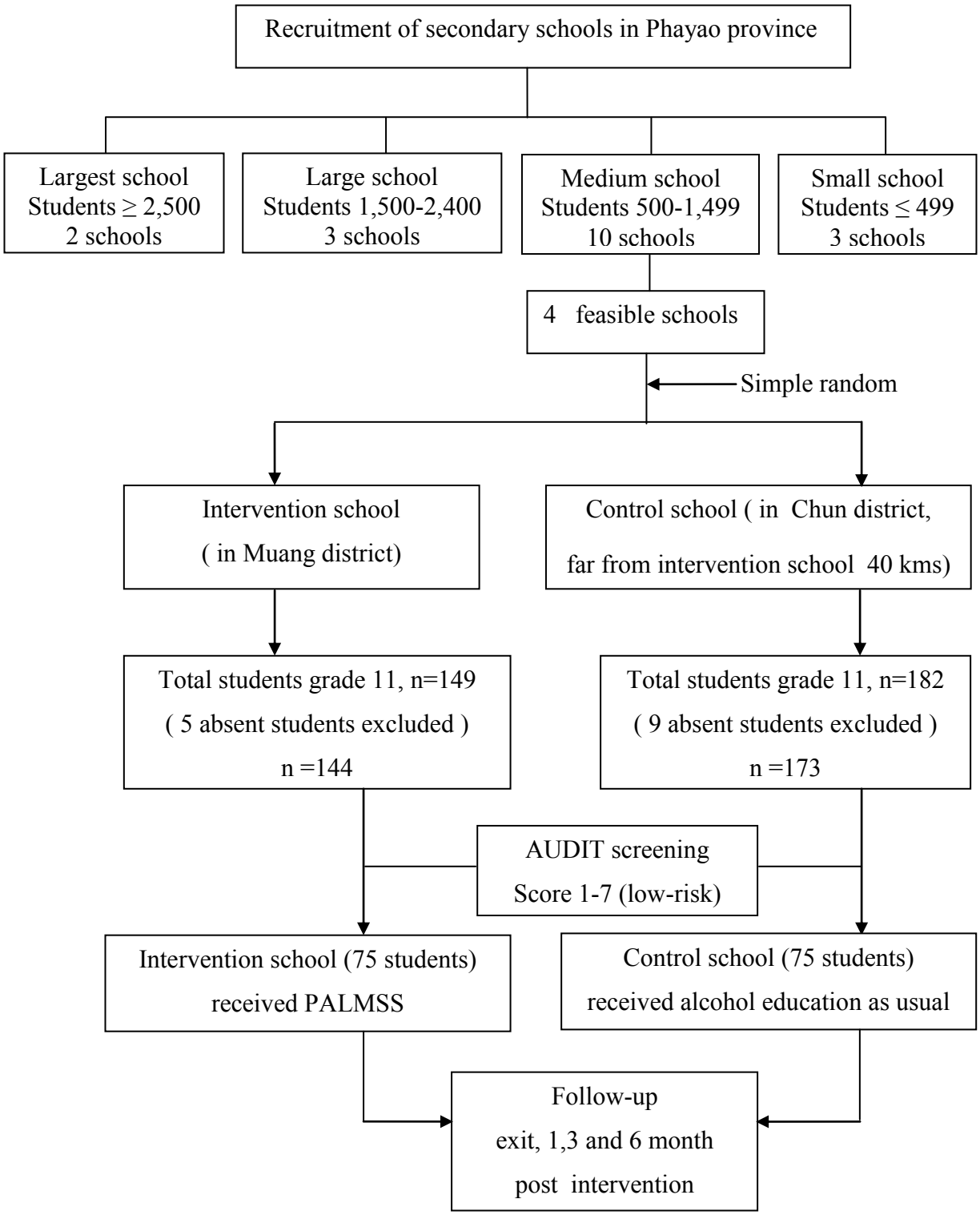
$2 \times (1.96 + 1.282)^2 / (1.359/2.516) = 72.05$

The minimal sample size per arm was 72.05. After recruitment, 75 students per group were enlisted to participate in the research.

3.2.6 Consort flow chart of study recruitment

The consort flow chart of study recruitment is illustrated in Figure 3.

Figure 3: Consort flow chart of study recruitment



3.3. Study procedures

3.3.1 Phase I: program development

The Phase I (program development) aimed to develop an appropriate component of the PALMSS alcohol prevention program specifically for senior high school students who were low-risk drinkers. There were six steps in developing the PALMSS alcohol prevention program based on intervention mapping (IM) protocol (Bartholomew, Parce, & Kok, 1998) as follows:

3.3.1.1. Performing a needs assessment

Focus group discussion (FGD) was used to gather information from students and teachers by using a guideline for the FGD. Two sets of the guidelines were delivered to students and teachers (Appendix C) where students were asked about existing alcohol education program in school, their current knowledge about alcohol, their need for an appropriate alcohol educational program and their preferred studying method. Teachers, on the other hand, were asked about the existing alcohol education program in school, the opinion toward an appropriate alcohol educational program for senior high school students, and their experience of teaching about alcohol education. A researcher was the moderator of FGD while a trained research assistant, a nursing instructor, facilitated the activities, took notes and recorded the discussion on tape. It took approximately 40 to 60 minutes to complete a focus group discussion per group. Data from focus group discussion were analyzed using content analysis for evaluate the need for an alcohol educational program (appendix C).

Three target groups were used for focus group discussion: 10 boys, 10 girls and 10 teachers. Purposive sampling was used to select the participants. The inclusion criteria for students were: (1) they should be studying at an intervention school, (2) they should be studying Mathayomsuksa four (10th grade) during the focus group time period and will be attending 11^{th} grade in the following semester, (3) they should classified as low-risk drinkers based on the screening tool (AUDIT scores of 1 and 7) and (4) should voluntarily participate in the study. Teachers who participated in focus group, on the other hand, must be involved in the learning and

teaching process for senior high school students for at least one year.

3.3.1.2. Defining suitable program objectives

The performance objectives were formulated based on the need of the target groups. Therefore, this study aimed to test the effect of the PALMSS alcohol prevention program on: (1) increasing alcohol knowledge, (2) maintaining the level of alcohol drinking risk in low-risk limits, and (3) reducing alcohol consumption.

3.3.1.3. Selecting theory-based intervention methods

Social Cognitive Theory (SCT) was used in this program. SCT is based on the concept of *reciprocal determinism,* where there is a dynamic interaction of personal factors (knowledge, skills, experience, culture, etc.), the environment and behavior (Bandura, 1997).

3.3.1.4. Producing program components and materials

The researcher reviewed relevant literature related to school-based alcohol prevention program and designed the components of the PALMSS alcohol prevention program according step 1 to 3. Based on Social Cognitive Theory, the six core components of program were: alcohol knowledge, low-risk drinking, social drinking, media-influence, resisting peer pressure and self-efficacy as shown in Table 2. The PALMSS alcohol prevention program was divided into four modules, with the six core contents, but differed in the degree of complexity of each level (Basic, Intermediate I, Intermediate II and Advanced module). The duration of each module was approximately 50 minutes as shown in Table 3.

After the approval of the components of program by five alcohol experts, the researcher contracted the services of a computer programmer to develop program which could be run using a CD. The program was then delivered via an interactive CD-ROM with video streaming clips and graphics which made it more available and entertaining to a large number of students. The PALMSS alcohol prevention program was pilot-tested using 30 students who had similar characteristic

with the study sampling students after which the program was improved using students' suggestions and recommendations.

3.3.1.5. Designing an implementation plan

For the intervention school, the researcher coordinated with the principal and teachers to plan activities and schedule the program in the activity hours so as not to disrupt regular classes. The control school, on the other hand, was contacted to inform them of the objectives of the study and the plan to utilize the school as a source of research data.

3.3.1.6. Designing an evaluation plan

The measurement tools were used to collect data to evaluate the effect of program at baseline, program exit, 1-, 3- and 6- months post-intervention. Schedules were arranged by the teachers to avoid conflicts with school time.

Table 2: The six core components of the PALMSS alcohol prevention program

Topic	Content
1. Alcohol knowledge	1.1 What is alcohol? 1.2 Type and degree of alcohol. 1.3 What is standard drinking? 1.4 Why are teenagers at a higher risk of alcohol misuse? 1.5 How to calculate the content of alcohol in a drink. 1.6 Identifying the number of units in alcoholic beverages. 1.7 Blood Alcohol Concentration (BAC). 1.8 The law and underage drinking. 1.9 The effect of alcohol on the body. 1.10 The effect of alcohol on health problems. 1.11 Myths about alcohol.
2.Low-risk drinking	2.1 The drinkers' pyramid (AUDIT and type of drinker) 2.2 What is low-risk drinking? 2.3 Low-risk drinking and adolescents. 2.4 Good reasons for drinking less. 2.5 Low-risk strategies.
3. Social drinking	3.1 What is social drinking? 3.2 Why do people drink in a social situation? 3.3 Myths about social drinking. 3.4 How can students be successful social drinkers? 3.5 Alcohol-free social activities.
4. Media-influence	4.1 Impact of alcohol advertising. 4.2 Media exposure on adolescent alcohol use. 4.3 Analyzing alcohol advertising (VDO) to recognize the techniques utilized. 4.4 Resisting media influences.

Table 2: The six core components of the PALMSS alcohol prevention program (continued)

Topic	Content
5. Resisting peer pressure	5.1 How does peer influence affect alcohol consumption? 5.2 What is assertive skill? 5.3 Techniques for applying assertive skills in peer situations. 5.4 Interactive practice of being assertive when faced with friends' persuasiveness.
6. Self-efficacy	6.1 Pros and Cons of low-risk drinking and excessive drinking. 6.2 Students rate their confidence in limiting their drinking in high-risk situations. 6.3 Alcohol refusal skills and tips to increase confidence while using refusal skills. 6.4 Set their goals of low-risk drinking limits. 6.5 Creating student plans for maintaining a low-risk drinking level.

Table 3: Four module of the PALMSS alcohol prevention program

Content	Basic level	Intermediate-I level	Intermediate-II level	Advance level
1. Alcohol knowledge	1.1 What is alcohol? 1.2 Type and degree of alcohol. 1.3 What is standard drink?	1.4 Why are teenagers at a higher risk of alcohol misuse? 1.5 How to calculate content of alcohol in a drink. 1.6 Identifying the number of units in alcohol beverages.	1.7 Blood Alcohol Concentration (BAC) 1.8 The law and underage drinking. 1.9 The effect of alcohol on the body.	1.10 The effect of alcohol on health problems. 1.11 Myths about alcohol.
2. Low-risk Drinking	2.1 The drinkers' pyramid (AUDIT and type of drinker) 2.2 What is low-risk drinking?	2.3 Low-risk drinking and adolescents.	2.4 Good reasons for drinking less.	2.5 Low-risk strategies
3. Social drinking	3.1 What is social drinking? 3.2. Why do people drink in a social situation?	3.3 Myths about social drinking.	3.4 How can students be successful social drinker?	3.5 Alcohol-free social activities.

Table 3: Four module of the PALMSS alcohol prevention program (continue)

Content	Basic level	Intermediate-I level	Intermediate-II level	Advance level
4. Media-Influence	4.1 Impact of alcohol advertising.	4.2 Media exposure on adolescent alcohol use.	4.3 Analyzing alcohol advertising (VDO) to recognize the techniques utilized.	4.4 Resisting media influences.
5. Resisting peer pressure	5.1 How does peer influence affect to alcohol consumption?	5.2 What is assertive skill?	5.3 Techniques for applying assertive skills in peer situation.	5.4 Interactive practice of being assertive when faced with friends' persuasiveness.
6. Self-efficacy	6.1 Pro and Con of low-risk drinking and excessive drinking. 6.2 Students rate their confidence in limiting their drinking in high risk situations.	6.3 Alcohol refusal skills and tips to increase confidence while using refusal skills.	6.4 Set their goals of low-risk drinking limits.	6.5 Creating student plans for maintaining a low-risk drinking level.

3.3.2. Phase II: Intervention phrase

The phase II (intervention phrase), aimed to test the effect of the program on increasing alcohol knowledge, maintaining of low-risk drinking limits and reducing of alcohol consumption among students. This phase was composed of two steps as follows:

3.3.2.1. Preparation for the intervention phase

For the intervention school, the researcher coordinated with the principal and teachers to plan activities and schedule the program during the activity hours to avoid conflicts with the regular classes. The control school, on the other hand, was contacted to inform them about the objectives of the study and be utilized as a source of data for the research.

A 1-day training for five interviewers was conducted on how to administer a structured interview questionnaire. The interviewers were nursing instructors from Phayao Nursing College and had relevant experience on how to conduct interviews.

Study recruitment started by initially obtaining an official list of students in the year 2011 from the databases of the two schools. Students who were in the 11^{th} grade and had voluntarily participated in the study were interviewed using the AUDIT. The AUDIT can usually be completed in two to four minutes and scored in a few seconds (World Health Organization, 2001). To increase the student's receptivity to the questions and the accuracy of the respond, interviewers established rapport by being friendly and non-threatening to students prior the interview proper. Also, to ensure the confidentiality of the interview, the interviewers interviewed students individually.

Students who met the screening criteria with AUDIT score of 1 to 7 were invited by to researcher to enroll in the study. If more students were willing to voluntarily participate in the study than the minimum sample size, the program was also made available to them to provide the opportunity to be exposed to the program since it was delivered via CD-ROM. In order to maintain confidentiality, students were provided with number cards bearing the same number as that of the

questionnaire. These numbers were subsequently used to refer to the students who participated in the study.

An informed consent was provided to the students and their parents. The goals of the study were explained through a letter sent parents wherein they were also informed of their right to refuse the participation of their child in the study. A possible risk identified was that a conflict between the students and their parents may develop in case their parents learned about their drinking behavior. As a consequence, a thorough explanation was provided to the students about what low-risk drinkers meant, suggested a way to communicate with their parents about their drinking behavior, the benefits that can be gained from participation in the study and their right to refuse the study.

3.3.2.2. Implementation step

The implementation phase involved the actual delivery process of the program to students which also included the evaluation procedure. The PALMSS program was delivered to 11^{th} grade students classified as low-risk drinkers based on the screening tool (AUDIT = 1 to7 scores) during an activity hour for four times (one hour a week) since the program aimed to add the regular school curriculum. The students learned the program using computer via the CD-ROM individually which allow them to access and navigate the content by themselves. The students took a period of one month to study the PALMSS alcohol prevention program after which evaluation of the effects of the program was made through an interview schedule used to collect data at baseline, at the end of the program (4 weeks after baseline), then 1-, 3- and 6-months post-intervention.

3.4. Measurement instruments

The questionnaire was divided into three parts.

1. Part I: Socio-demographic characteristics, consisting of gender, age, GPA, parental status, family income, family drinking, alcohol advertising exposure and age of first drinking.

2. Part II: Alcohol knowledge test comprised 20 items assessing alcohol knowledge. This was modified from the “knowledge about alcohol” used in the School Health and Alcohol Harm Reduction Project (SHAHRP) among Australian high school students. Its internal consistency = 0.73 (McBride, et al., 2004).

3. Part III: Alcohol consumption records consisting of four sessions: 1) Age of initiated drinking, 2) Type of beverage ever consumed in lifetime, last year and last month, 3) Timeline Follow Back (TLFB) was an assessment tool developed to help individuals recall alcohol consumption over a previous time period. It was used in interview as regards alcohol consumption (type, frequency, and amount) in the previous month. The TLFB has been found to have high reliability, $r > .85$ (Sobell, et al., 1996), and to be a valid assessment of alcohol use when participants are given assurance of confidentiality (Sobell & Sobell, 1992), 4) The Alcohol Use Disorders Identification Test (AUDIT), Thai translated version, is a standard screening tool to identify excessive drinking developed by the World Health Organization (WHO).

3.5. Instrument evaluation

3.5.1. The instrument for data collection was assessed 2 issues:

3.5.1.1 Content validity: The questionnaire was validated by five experts: a health educator, a high school lecturer, a computer graphic expert, and two alcohol experts. The experts’ opinions yielded a high congruence with IOC value of 0.89. Revisions were then made based on the recommendations of the experts.

3.5.1.2 Back translation: A researcher interpreted the alcohol knowledge test from English language to Thai language. Then, the U.S. professor who knew the Thai language well translated it back to the original language. The alcohol knowledge in Thai language was revised according to the difference in the meaning between the back translation data and the original data. Finally, the revision test was approved by the professor.

3.5.1.3 Reliability: The questionnaires were tested by 30 senior high school students who were studying in other schools in Phayao province who had characteristics similar to the students studying in the intervention school.

The Kuder-Richardson (KR-20) method was used to assess the reliability of the alcohol knowledge test. The internal consistency was found to be 0.73 (Appendix B).

3.5.2 The experimental instrument

After the experimental instrument was revised based on the experts' recommendation, the CD-PALMSS alcohol prevention program was tested by 30 students from another school who had similar characteristics with the sample students. Satisfaction was then assessed after which the experimental instrument (CD-program) was revised according to the recommendation of students.

3.6. Data analysis

The data were analyzed as follow:

1. Descriptive statistics such as percentage, frequency, mean, and standard deviation were used to describe socio-demographic characteristics and pattern of alcohol consumption.

2. Chi-square and independent t-test were used to compare the difference of demographic data between the intervention and control schools.

3. Independent t-test was used to compare the difference in alcohol knowledge between the intervention and control schools.

4. Exact-test was used to compare the difference in drinking risk level between the intervention and control schools (non-normally distributed data).

5. Mann-Whitney test was used to compare the difference in alcohol consumption between the intervention and control schools (non-normally distributed data).

6. Wilcoxon signed-ranks test was used to compare the difference in alcohol consumption at before and after intervention in intervention and control group schools (non-normally distributed data).

7. Repeated measures ANOVA was performed to test the overall change in alcohol knowledge after implementing the program.

3.7. Ethical consideration

The study was ethically approved by the Ethics Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University, Thailand.

CHAPTER IV
RESULT

This study aimed to demonstrate the effect of the PALMSS alcohol prevention program on increasing alcohol knowledge, maintaining of low-risk drinking limits and reducing alcohol consumption among students. The study group in this study were 11th grade senior high school students from two high schools in Phayao province. Two schools had a total of 317 students (Intervention n=144; Control n=173). After AUDIT was used to screen, only 152 eligible students met the criteria for low-risk drinkers at baseline (Intervention n=76; Control n=76). All students and parents gave consent to participate in the study. However, two students were lost at follow-up (one student for each school) due to their transfer to another school at exit point. At the end of the study in August 2012, only 150 participants were left. All the 150 participants were present at 1-, 3- and 6-months follow-up in September, November 2012 and in February 2013. Therefore, this study show the data obtained from 150 completed cases.

There are two sections of this chapter. The first section gives the information of sample demographic data at baseline point. The second section presents hypothesis testing composed of the effect of program on increasing alcohol knowledge, maintaining the level of alcohol drinking risk in low-risk limits and reducing alcohol consumption.

4.1. Characteristic data of sample

There were total 317 students (Intervention n=144; Control n=173) gathered at baseline in June 2012. Similarities were seen between the intervention and control schools. To name a few, (1) both schools had bigger population of girls compared to boys with ages averaging at 16 years old. (2) a big proportion of the students had fathers who drank over the mothers (3) both groups had a relatively low alcohol regarding knowledge estimated at around 35%, (4) the average age at which they started drinking was around 14 years, (5) the number of previous year drinking in

each school was approximately 40%, and lastly, (6) majority of students in both schools were identified as low-risk drinkers. However, differences were also observed between the two schools. Three variables identified were (1) GPA, (2) peer drinking and (3) alcohol consumption in life time and in the previous month. Student in the intervention school had a significantly higher GPA than the control group. Students in intervention school also had a significantly higher number of peers drinking compared to that of the control school. Finally, the number of students who never consumed alcohol in life time in the intervention school had significantly lower than the control school; conversely, alcohol consumption in the previous month among students in the intervention school had significantly higher than the control school as shown in Table 4.

Table 4: Baseline characteristics of the study sample (*n*=317)

Characteristics	**Intervention (*n*=144)**	**Control (*n*=173)**	***p*-value**
Gender (n, %)			0.165 (a)
Boys	53 (36.81)	77 (44.51)	
Girls	91 (63.19)	96 (55.49)	
Parental status (n, %)			0.810 (a)
Together	99 (68.75)	113 (65.32)	
Divorced / Separated	26 (18.06)	35 (20.23)	
Father/Mother deceased	19 (13.19)	25 (14.45)	
Father drinking (n, %)			0.524 (a)
No	29 (20.14)	30 (17.34)	
Yes	115 (79.86)	143 (82.66)	
Mother drinking (n, %)			0.063 (a)
No	75 (52.08)	72 (41.62)	
Yes	69 (47.92)	101 (58.38)	
Peer drinking (n, %)			<0.001* (a)
No	53 (36.81)	105 (60.69)	
Yes	91 (63.19)	68 (39.31)	

*Significant at *p*-value < 0.05, (a)= Chi-square

Table 4: Baseline characteristics of the study sample (*n*=317) (continued)

Characteristics	Intervention (*n*=144)	Control (*n*=173)	*p*-value
Media exposure (TV), (n, %)			0.889 (a)
1 day per week	17 (11.81)	23 (13.29)	
2 - 4 day per week	69 (47.92)	84 (48.56)	
5 - 7 day per week	58 (40.27)	66 (38.15)	
Alcohol consumption (n, %)			0.037*(a)
Never consumed	39 (27.08)	66 (38.15)	
Has consumed	105 (72.92)	107 (61.85)	
AUDIT classification			0.458 (a)
- abstainers (0)	11 (10.47)	15 (14.02)	
- low risk (1-7)	76 (72.38)	76 (71.03)	
- hazardous (8-15)	16 (15.24)	16 (14.95)	
- harmful (16-20)	2 (1.91)	0 (0)	
Age (years), mean ±SD	16.55 ± 0.58	16.45 ± 0.51	0.095 (b)
GPA, mean ±SD	3.05 ± 0.57	2.62 ± 0.65	<0.001*(b)
Alcohol knowledge (scores), mean ±SD	7.79 ± 2.28	7.34 ± 2.22	0.072 (b)
Age of first drinking (years), mean ±SD	14.41 ± 1.47	14.31 ± 1.53	0.623 (b)
Alcohol consumption (grams/ month), mean ±SD	24.77 ± 7.26	8.57 ± 3.47	0.042*(c)
Median (IQR)	0 (0 - 0)	0 (0 - 0)	
Min - Max	0 - 439.20	0 - 327.40	
Family income			0.508 (c)
(Baht), mean ±SE	8780.36 ± 577.09	12405.20 ± 558.62	
Median (IQR)	7000 (5000-9875)	7000 (5000-14500)	
Min - Max	2000-60000	1500-200000	

*Significant at *p*-value < 0.05, (a)= Chi-square, (b)= t-test, (c)=Mann-Whitney test

After the Alcohol Use Disorders Identification Test (AUDIT) was used to screen 317 students, only 150 eligible students met the criteria for low-risk drinkers at baseline (Intervention n=75; Control n=75). Similar to the characteristics of the 317 students at the beginning, most socio-demographic variables among the eligible students were comparable between the intervention school and the control school. Both schools had a bigger population of girls compared to boys whose ages averaged around 16 years old. Most had fathers who drank over their mothers. Both groups also had a relatively knowledge of alcohol approximated at around 40%. The average age at which they start drinking was around 15 years old. Their mean AUDIT scores was 3 which can be classified as low-risk drinkers. Mean alcohol consumption in a typical month was comparable estimated at 7 to 9 grams of ethanol. However, only two variables, GPA and peer drinking, were significantly different between the two groups. Student in the intervention school had significantly higher GPA than the control group. Also, the GPA T-scores, standardized GPA scores, significantly differed between both schools. In addition, students from the intervention school had significantly higher number of peer drinking compared to the control school (Table 5). In order to prevent the confounding from the unbalanced GPA and peer drinking on the findings of the study, two variables were adjusted by using repeated measures ANOVA when testing the effect of the PALMSS alcohol prevention program.

Table 5: Characteristics of the eligible students who are low-risk drinkers in the intervention school (n=75) and in the control school (n=75)

Characteristics	**Intervention (*n*=75)**	**Control (*n*=75)**	***p*-value**
Gender (n, %)			0.502 (a)
Boys	27 (36.00)	31 (41.33)	
Girls	48 (64.00)	44 (58.67)	
Parental status (n, %)			0.484 (a)
Together	50 (66.67)	43 (57.33)	
Divorced / Separated	14 (18.67)	19 (25.33)	
Father/Mother deceased	11 (14.66)	13 (17.34)	
Father drinking (n, %)			0.832 (a)
No	14 (18.67)	13 (17.33)	
Yes	61 (81.33)	62 (82.67)	
Mother drinking (n, %)			0.410 (a)
No	35 (46.67)	30 (40.00)	
Yes	40 (53.33)	45 (60.00)	
Peer drinking (n, %)			<0.001* (a)
No	19 (25.33)	40 (53.33)	
Yes	56 (74.67)	35 (46.67)	
Media exposure (TV), (n, %)			0.859 (a)
1 day per week	7 (9.33)	9 (12.00)	
2 - 4 day per week	38 (50.67)	36 (48.00)	
5 - 7 day per week	30 (40.00)	30 (40.00)	
Age (years), mean ±SD	16.57 ± 0.57	16.45 ± 0.50	0.175 (b)
GPA, mean ±SD	3.01 ± 0.52	2.53 ± 0.71	< 0.001*(b)
GPA T-score, mean ±SD	53.58 ± 7.83	42.42 ± 10.69	< 0.001*(b)
Alcohol knowledge (scores), mean ±SD	8.35 ± 2.11	7.76 ± 2.16	0.095 (b)

*Significant at *p*-value < 0.05

(a) = Chi-square, (b) = t-test

Table 5: Characteristics of the eligible students who are low-risk drinkers in the intervention school (n=75) and in the control school (n=75)

Characteristics	Intervention (*n*=75)	Control (*n*=75)	*p*-value
Age of first drinking			0.604 (b)
(years), mean ±SD	14.7 ± 11.21	14.60 ± 1.31	
Alcohol consumption			0.977 (c)
(grams per month),mean ±SD	9.49 ± 2.33	7.39 ± 2.37	
Median (IQR)	0 (0 - 0)	0 (0 - 0)	
Min - Max	0 - 118.50	0 - 180.00	
Family income			0.136 (c)
(Baht), mean ±SE	9593.63(995.24)	10112.00(1391.58)	
Median (IQR)	7000 (5000-13000)	5000 (3000-10000)	
Min - Max	2000-60000	1500-75000	

*Significant at *p*-value < 0.05

(a)= Chi-square, (b) = t-test, (c) = Mann-Whitney test

4.2 Testing the effect of the PALMSS alcohol prevention program

4.2.1. The effect of program on alcohol knowledge

4.2.1.1. Alcohol knowledge in the intervention school

After students in the intervention group received the PALMSS alcohol prevention program, general alcohol knowledge at 4 time-points post-intervention was higher than baseline. There was an approximate 60% increase in alcohol knowledge score from baseline to exit point, then a 3.34% increase from exit point to 1-month follow-up. After that, it remained relatively constant from 1- to 6-month follow-up with values at 14.23, 14.25 and 14.04 score at 1-, 3- and 6-month follow-up respectively as shown in Table 6.

Table 6: Average alcohol knowledge score in the intervention school at baseline, exit, 1-, 3- and 6-months post intervention (n=75)

Time of data collection	Alcohol knowledge (score), mean ± SD.	95% CI
Baseline	8.35 ± 2.11	7.86 - 8.83
Exit point	13.77 ± 2.65	13.16 - 14.38
1-month follow-up	14.23 ± 2.47	13.66 - 14.79
3- month follow-up	14.25 ± 2.01	13.79 - 14.72
6- month follow up	14.04 ± 2.42	13.48 - 14.59

4.2.1.2. Alcohol knowledge in the control school

Alcohol knowledge in control school did not significantly change at 5 time-points. There was only a 13.92% increase in alcohol knowledge from baseline to the exit point then a downward trend was observed from exit point until 6-month follow-up with values at 8.84, 8.60, 8.61 and 8.20 score at, exit point, 1-, 3- and 6-month follow-up respectively as shown in table 7.

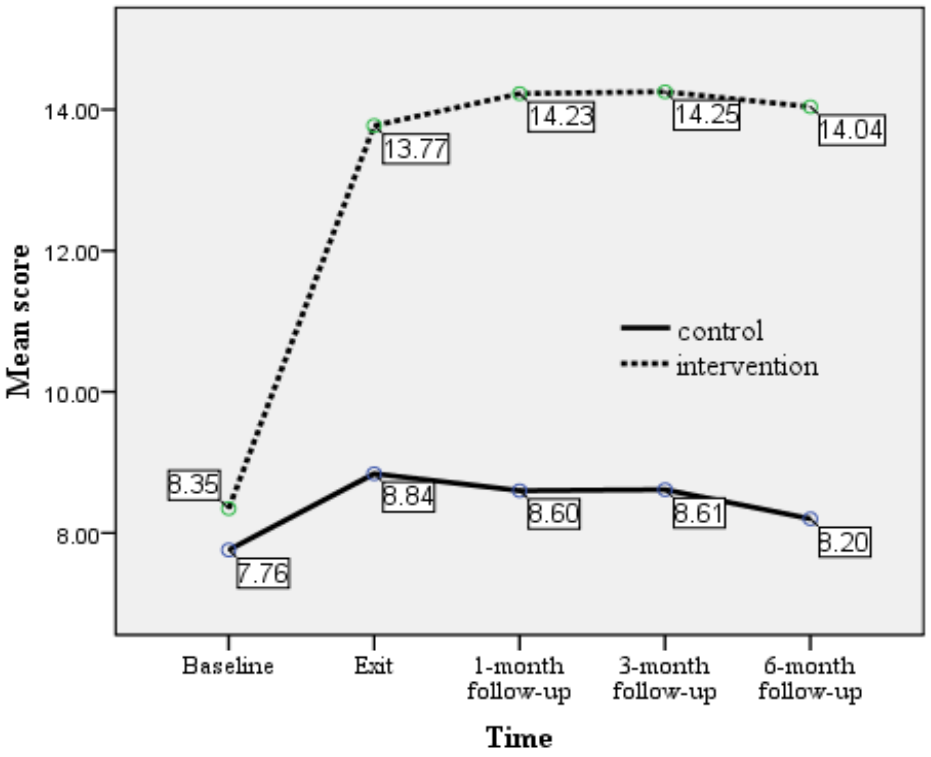
Table 7: Average alcohol knowledge score in the control school at baseline, exit point, 1-, 3- and 6- months post intervention (n=75)

Time of data collection	Alcohol knowledge (score), mean ± SD.	95% CI
Baseline	7.76 ± 2.16	7.26 - 8.26
Exit point	8.84 ± 2.65	8.23 - 9.45
1-month follow-up	8.60 ± 2.89	7.94 - 9.26
3- month follow-up	8.61 ± 2.93	7.94 - 9.29
6- month follow-up	8.20 ± 2.80	7.55 - 8.85

4.2.1.3. Comparison of alcohol knowledge score between the intervention school and the control school

At the baseline point, alcohol knowledge in both schools were similar however there was a difference from the exit point to 6-month follow-up. In the intervention group, alcohol knowledge dramatically increased from baseline to exit point remained constant until 6-month follow-up. However, in the control school, a slight increase was noted from baseline to exit point, and then was followed by a steady decline from exit point to 6-month follow-up. The trends clearly showed that there was a significant difference of alcohol knowledge between both groups from the exit point until 6-month follow-up as presented in Figure 4.

Figure 4: Comparison of alcohol knowledge scores between the intervention school and the control school



4.2.1.4. Testing the difference of alcohol knowledge score between the two groups at baseline, exit, and at 1-, 3- and 6-month follow-up.

At the baseline point, there was no difference of alcohol knowledge scores between the two groups (t=1.643, p =0.103). However, scores from the exit point to 6-month follow-up, differed significantly in the two groups. At the exit point (t=11.401, p <0.001), at 1- month follow-up (t=12.832, p< 0.001), at 3-month follow-up (t=13.749, p < 0.001) and at 6-month follow-up (t=13.657, p <0.001) as can be seen Table 8.

Table 8: Comparison of alcohol knowledge scores between the intervention school (n=75) and the control school (n=75) at baseline, exit and at 1-, 3-, 6-month follow-up

Time of data collection	**Average alcohol knowledge (score)**		**95% CI**
	Intervention mean ± SD.	**Control mean ± SD.**	
Baseline	8.35 ± 2.11	7.76 ± 2.16	-0.10 - 1.28
Exit point	13.77 ± 2.65	8.84 ± 2.65	4.08 - 5.79**
1-month follow-up	14.23 ± 2.47	8.60 ± 2.89	4.76 - 6.49**
3-month follow-up	14.25 ± 2.01	8.61 ± 2.93	4.83 - 6.45**
6-month follow-up	14.04 ± 2.42	8.20 ± 2.80	4.99 - 6.69**

** Significant at p-value < 0.001, using independent t-test

4.2.1.5. Testing the effect of the PALMSS alcohol prevention program on changes over time in the mean alcohol knowledge scores between and within groups.

After adjusting for GPA and peer drinking, alcohol knowledge scores from the exit point to 6-month follow-up, differed significantly between two groups (F(1,146) = 199.11, p-value = < 0.001). However, within-subject testing showed there was no effect of the PALMSS alcohol prevention program on changes in mean alcohol knowledge scores over the four time points,(F(3,438) = 1.87, p-value = 0.13) as can be seen from Table 9 and Figure 5.

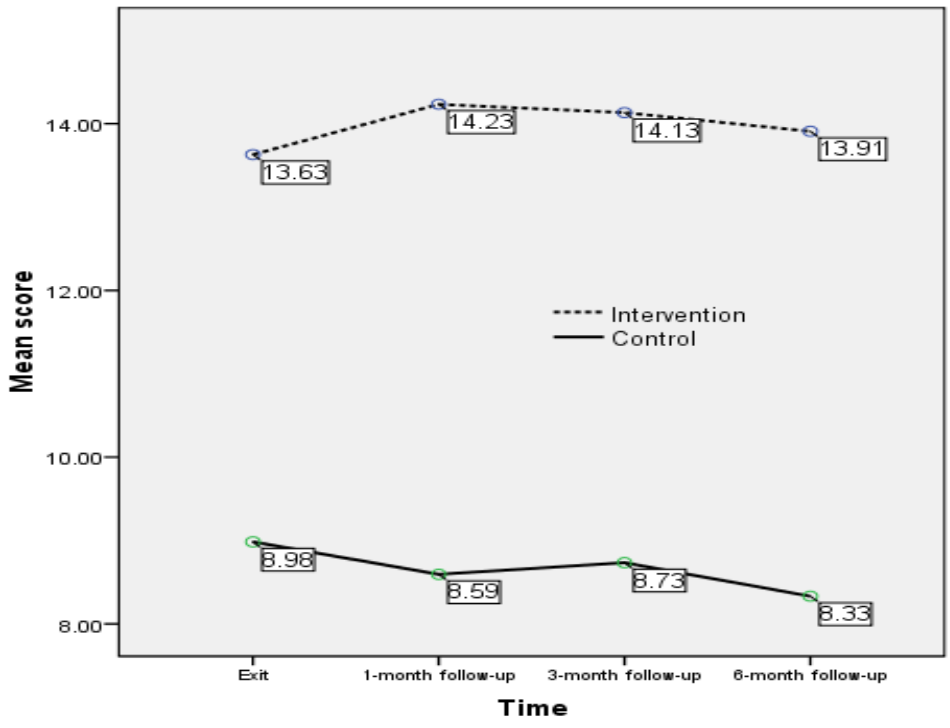
Table 9: Comparison of alcohol knowledge after implementing the PALMSS alcohol prevention program and at follow-up after adjusting GPA and peer drinking using repeated measures ANOVA (n=150).

Source	SS	df	MS	F	*p*-value
Between subjects					
Intervention	820.59	1	820.59	199.11	< 0.001**
Error	601.69	146	4.12		
Within subjects (s)					
Time	12.04	3	4.01	1.23	0.29
Intervention x time	18.27	3	6.09	1.87	0.13
Error	1423.97	438	3.25		

(s) = Sphericity Assumed

** Significant at *p*-value < 0.001

Figure 5: Comparison of alcohol knowledge after implementing the PALMSS alcohol prevention program and at follow-up (1-,3- and 6-month follow-up) after adjusting GPA and peer drinking



4.2.2. The effect of program on maintaining of low-risk drinking limits

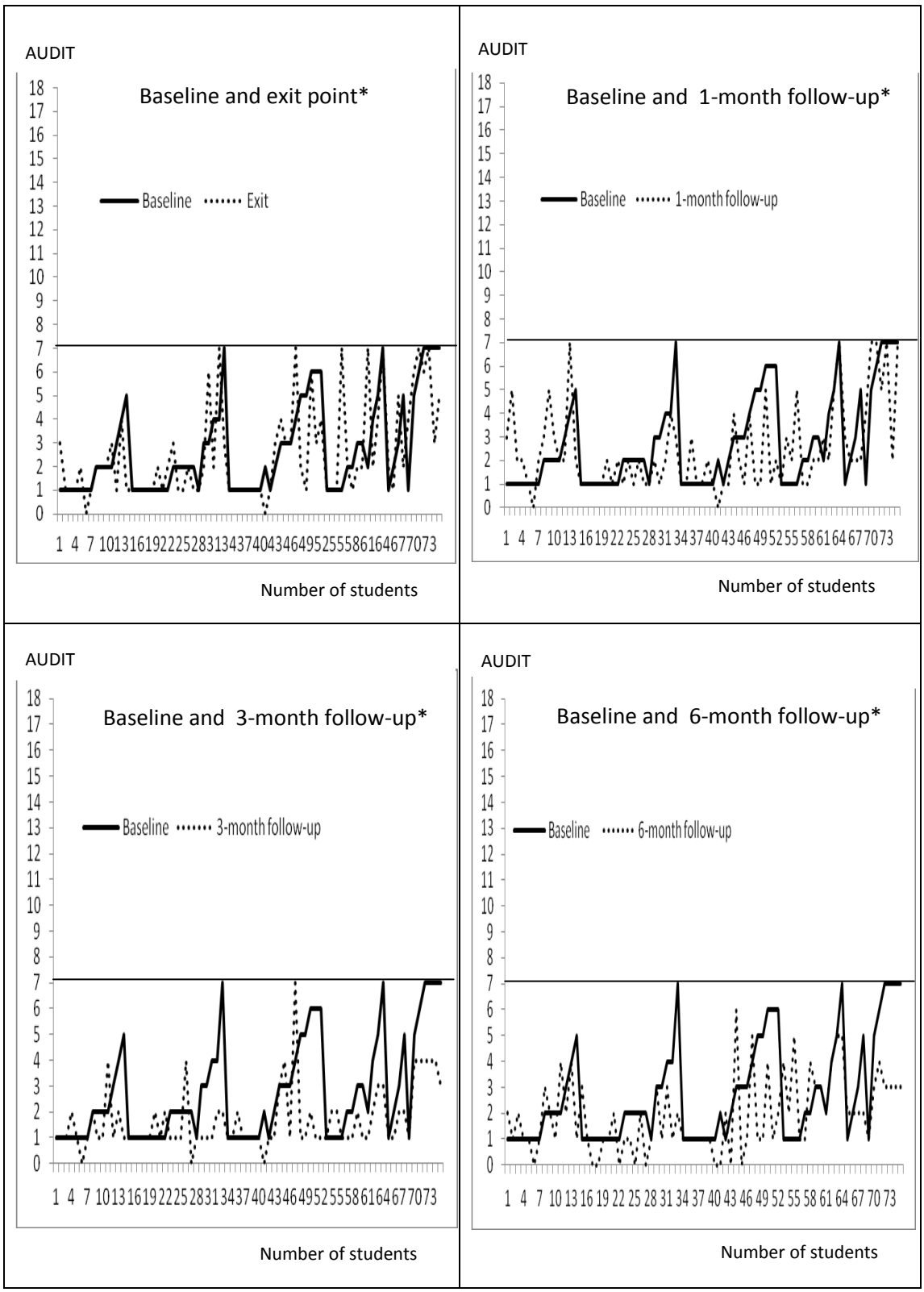
4.2.2.1. AUDIT score in the intervention school

In the intervention school, when the individual AUDIT scores were studied at baseline and at four time-points post-intervention (exit, 1-month, 3-month and 6-month follow-up), it was found that all of the students still retained their AUDIT score not higher than the score of 7 which was considered as low-risk drinker score. Moreover, some students had score of 0, which was considered as the score of abstainers (Figure 6).

4.2.2.2. AUDIT score in the control school

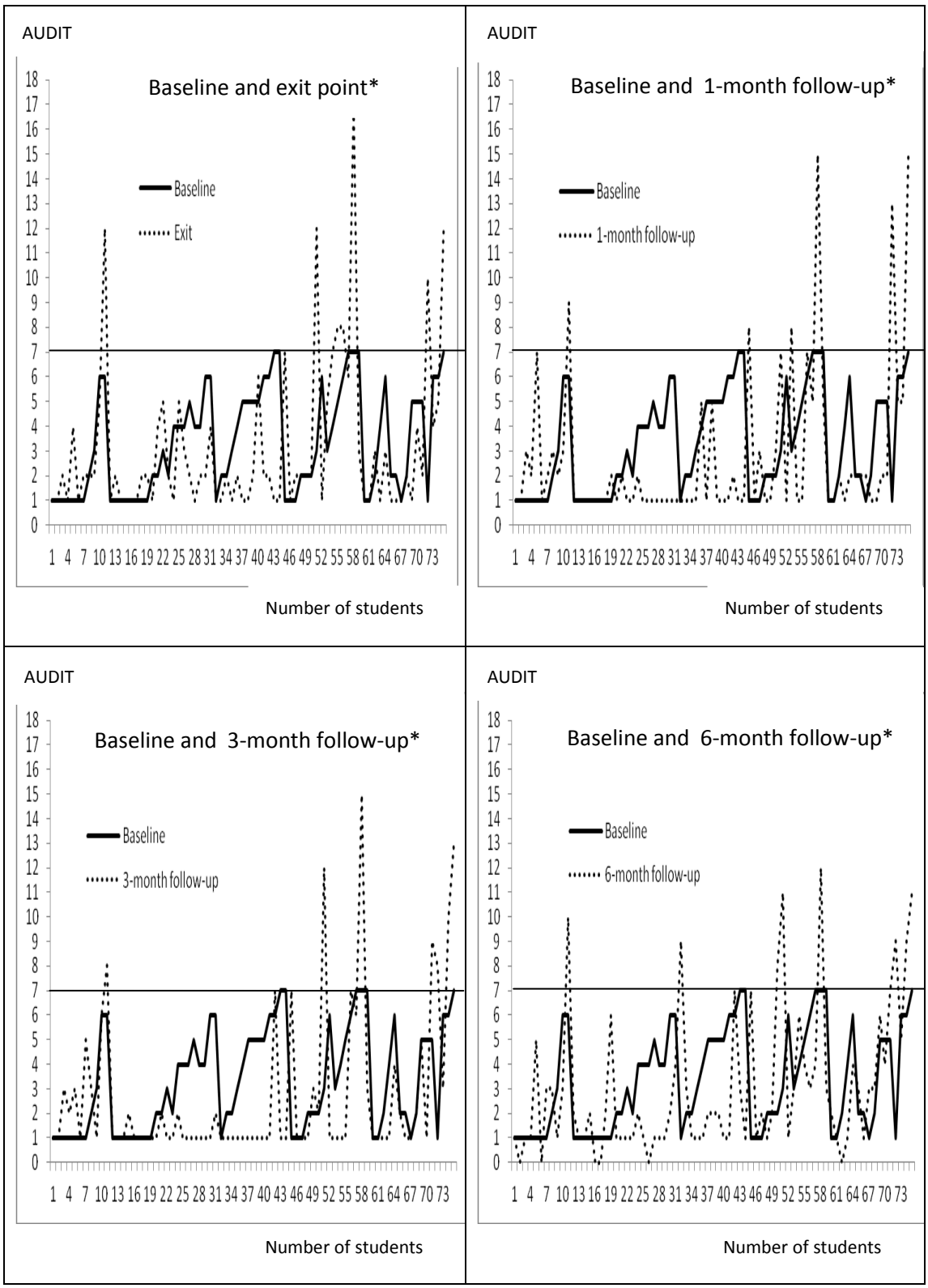
In the control school, when the individual AUDIT scores were analyzed at baseline and at four time-points post-intervention (exit, 1-month, 3-month,and 6-month follow-up), it was found that majority of the students maintained their AUDIT score not higher than the score of 7 which was considered as low-risk drinking score. However, some students had scores higher than 7 which was already considered as high-risk drinking score. Only a few students had scores of 0 which was the considered as score of abstainers (Figure 7).

Figure 6: The individual AUDIT score according to four time-points post-intervention compared to baseline point in the intervention school.



* score 0 = abstainers, 1-7 = low-risk drinkers, 8-15 = hazardous, 16-19 = harmful

Figure 7: The individual AUDIT score according to time points post intervention compared to baseline point in control school



* score 0 = abstainers, 1-7 = low-risk drinkers, 8-15 = hazardous, 16-19 = harmful

4.2.2.3. Comparison of drinking risk levels between the two groups

At baseline, all students from both groups were low-risk drinkers. After students from the intervention school received the PALMSS alcohol prevention program, there was a gradual increase in the number of abstainers from exit to 6-month follow-up, 2 abstainers at exit and 1-month follow-up, 3 abstainers at 3-month follow-up and 10 abstainers at 6-month-follow-up (Figure 8). In the control school however, students developed a higher risk for drinking. Six students reached the hazardous level, 1 student with harmful risk at exit point, 7 students classified as hazardous at 1- and 3-month follow-up, and 8 students as hazardous and 6 students as abstainers at the 6-month follow-up (Figure 9).

Figure 8: Drinking risk level at baseline, exit, 1-,3- and 6-month follow-up in the intervention school

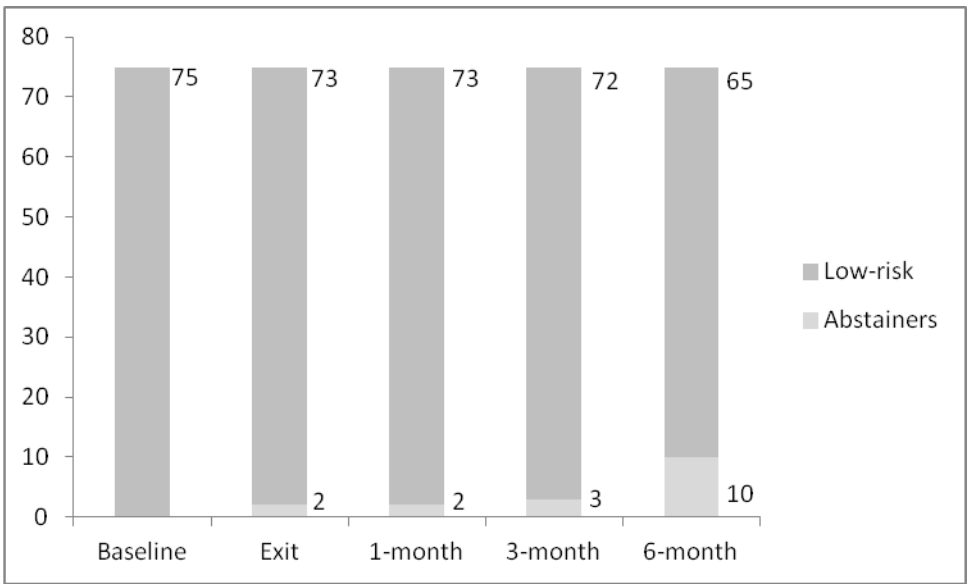
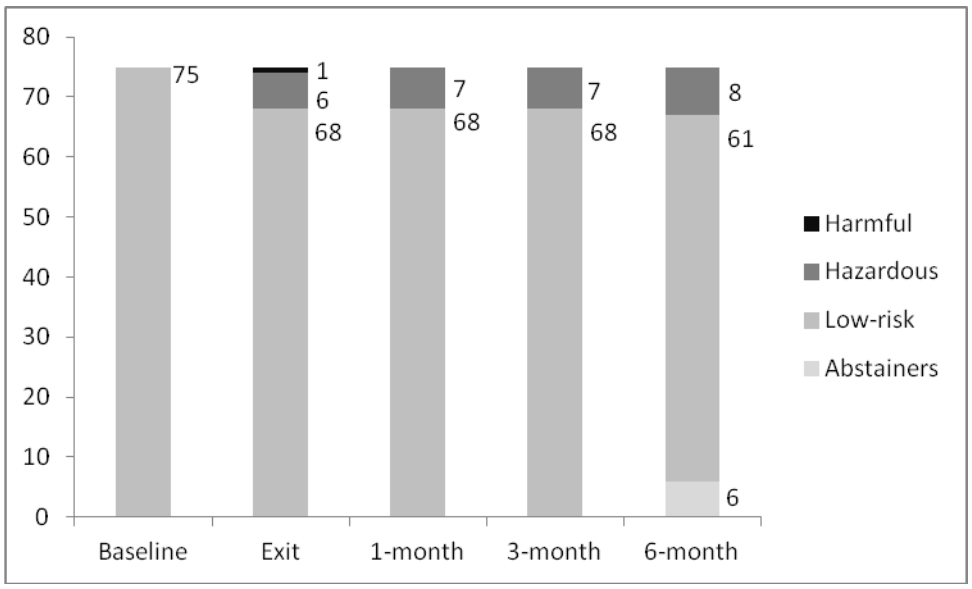


Figure 9: Drinking risk level at baseline, exit, 1-,3- and 6-month follow-up in the control school



4.2.2.4. Comparison of the number of students who remained at low-risk drinking level at 6-month follow-up between the intervention school and the control school.

The intervention group had a significant higher number of students who maintained at a low-risk drinking limit and who became abstainers than the control group at 6-month follow-up (Table 10).

Table 10: Comparison of the number of students who maintained at the low-risk drinking limits at 6-month follow-up between the intervention school and the control school

Drinking Risk Level	**Intervention (n=75)**	**Control (n=75)**	***p*-value**
Abstainers (0 score)	10 (13.33%)	6 (8.00%)	0.008*
Low-risk (1-7 score)	65 (86.67%)	61 (81.33%)	
Hazardous (8-15 score)	0 (0%)	8 (10.67%)	

* Significant at p-value < 0.05, using Exact test

4.2.3. The effect of the program on reducing of alcohol consumption

4.2.3.1. Alcohol consumption in the intervention and the control school

Alcohol consumption in the intervention school decreased slightly from baseline to exit point, slightly elevated from exit to 1- and 3-month follow-up, decreased four-fold from 3- to 6-month follow-up and was significantly decreased at 6-month follow-up compared to that of the baseline. However, a different pattern was observed in the alcohol consumption in the control group. It increased approximately five times from baseline to exit point, then dropped to a level that was still higher than that of the baseline point after which it increased again at 3-month follow-up and peaked at 6-month follow-up as shown in Table 11.

Table 11: The average of alcohol consumption of the intervention school (n=75) and the control school (n=75) at different time-points

Time of data collection	**Alcohol consumption (grams)**	
	Intervention mean ±SE.	**Control mean ±SE.**
Baseline	9.49 ± 2.69	7.39 ± 2.75
Exit point	7.86 ± 2.16	39.13 ± 13.60
1-month follow-up	10.86 ± 3.97	11.73 ± 3.75
3-month follow-up	12.38 ± 5.08	32.02 ± 16.75
6-month follow-up	3.36 ± 1.58	45.86 ± 16.44

4.2.3.2. Comparison of alcohol consumption before and after intervention

At 6-month follow-up post-intervention, students in the intervention group had significantly lowered their alcohol consumption than before intervention was started. However, students in the control group had significantly increased their consumption of alcohol after intervention compared to before intervention began (Table 12).

Table 12: Comparison of alcohol consumption before and after intervention (6 - month follow-up) between the intervention and the control school

School	Alcohol consumption (grams)		*p*-value
	Before implementation	After (6 - month follow-up)	
Intervention			0.028*
mean ± SE.	9.49 ± 2.69	3.36 ± 1.57	
median (IQR)	0 (0 - 0)	0 (0 - 0)	
min – max	0 - 118.50	0 - 88.00	
Control			0.020*
mean ± SE.	7.39 ± 2.75	45.86 ± 16.44	
median (IQR)	0 (0 - 0)	0 (0 - 0)	
min - max	0 - 180.00	0 - 772.00	

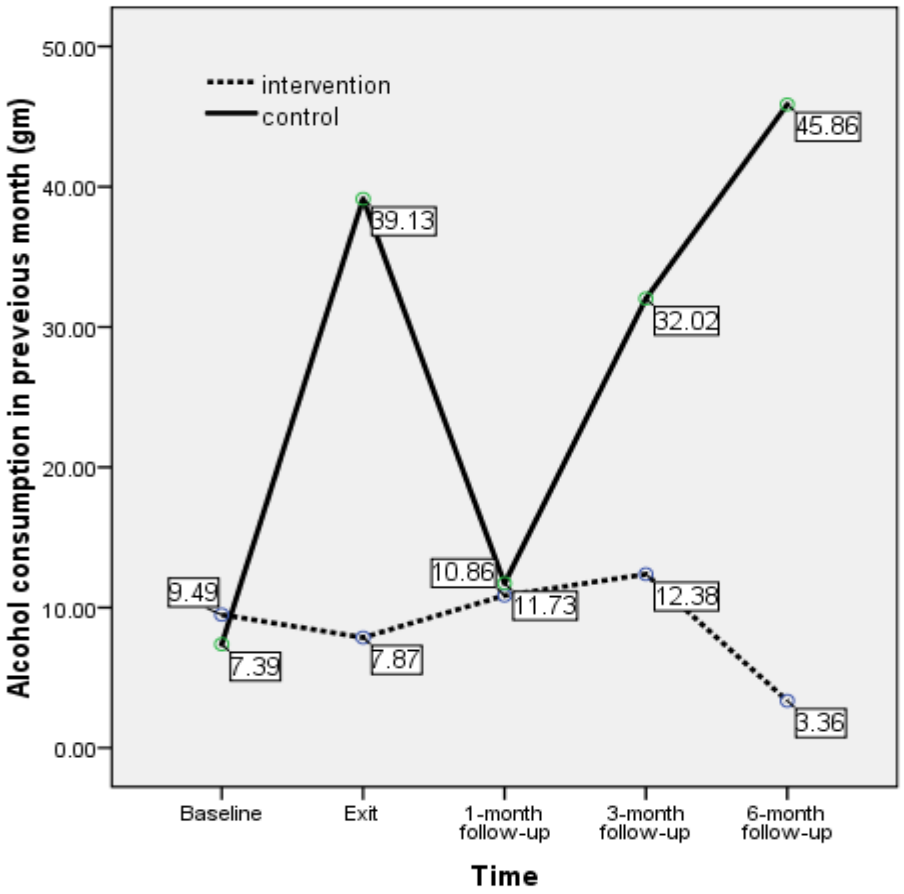
* Significant at p-value < 0.05, using Wilcoxon signed-ranks test

4.2.3.3. Comparison of alcohol consumption between the two groups

At the baseline point and 1-month follow-up, alcohol consumption in both school were similar, but a difference was noted at the exit point, 3- and 6-month follow-up. In the intervention group, the alcohol consumption had slightly decreased from baseline to exit point, increased by a small amount from exit to 1- and 3-month follow-up then declined sharply from 3- to 6-month follow-up. In contrast, students in the control group increased their alcohol consumption nearly four times from the baseline to exit point, declined dramatically from exit point to 1-month follow-up,

then increased steadily reaching its peak at 6-month follow-up. Apart from the baseline and 1-month follow-up, there was a big difference in alcohol consumption between the two groups as shown in Figure 10.

Figure 10: Comparison of alcohol consumption between the intervention school and the control school



4.2.3.4. Testing the difference of alcohol consumption between the intervention and the control school.

At the pre-test there was no difference in the alcohol consumption of the two groups (Mann-Whitney test , $Z = -0.03$, $p=0.98$). However, from the exit point to 3-month follow-up both groups were not significantly different in their alcohol consumption as seen in the calculated values using the Mann-Whitney test at exit ($Z = -0.88$, $p = 0.38$) , at 1- month follow- up ($Z = - 0.05$, $p = 0.96$), and 3-month

follow-up (Z = 0.38, p = 0.70). Furthermore, there was significant difference between groups at 6-month follow-up (Z = -2.48, p = 0.01) as shown in Table 13.

Table 13: Comparison of the alcohol consumption in a typical month between students from the intervention (n=75) and the control schools (n=75) at five time-points

Time of data collection	**Alcohol consumption (grams)**		***p*-value**
	Intervention	**Control**	
	Mean rank (min-max)	**Mean rank (min-max)**	
Baseline	75.57 (0-118.50)	75.43 (0-180.00)	0.977
Exit point	73.16 (0-105.00)	77.84 (0-788.50)	0.383
1-month follow-up	75.39 (0-200.00)	75.61 (0-158.00)	0.961
3-month follow-up	74.43 (0-345.00)	76.57 (0-1212.70)	0.702
6-month follow-up	69.89 (0-88.00)	81.11 (0-772.00)	0.013*

* Significant at p-value < 0.05, using Mann-Whitney test

4.2.3.5. Comparison of the number of students who drank in the previous month between the intervention school and the control school

The number of students who drank in the previous month from both groups were similar from baseline up until 3-month follow-up. However, the number of drinkers in the control school was significantly higher than the intervention school at 6-month follow- up, $\chi 2$ (1, n =150) = 4.960, p=0.026 as shown in Table 14.

Table 14: The number of students who drank in the previous month

Time	Intervention (n=75)	Control (n=75)	*p*-value
Base line	15 (20.00%)	16 (21.33%)	0.840
Exit point	17 (22.67%)	20 (26.67%)	0.570
1-month follow up	13 (17.33%)	13 (17.33%)	1.000
3-month follow up	20 (26.67%)	21 (28.00%)	0.855
6-month follow up	7 (9.33%)	17 (22.67%)	0.026*

* Significant at p-value < 0.05, using Chi-square

4.2.4. The satisfaction among students in the intervention school toward the PALMSS alcohol prevention program

The PALMSS alcohol prevention program was well accepted by students. After the students underwent 4 lessons lasting approximately 50 minutes to learn the PALMSS alcohol prevention program, the lessons were assessed for their contents by the responders. The four lessons were rated to have a very good level of satisfaction with individual scores of 54.00 (IQR= 50.00-57.00) for lesson 1, 55.00 (IQR= 51.00-57.00) for lesson 2, 55.00 (IQR= 51.00-57.25) for lesson 3 and 55.00 (IQR= 52.00-58.00) for lesson 4. Students' satisfaction were high in all lessons as evidenced by the percentages of 90.00%, 91.67%, 91.67% and 91.67% in lesson 1, 2, 3, and 4, respectively, as shown in Table 15. The contents of program were of interest to the subjects since they did not have sufficient knowledge regarding safe drinking level and myths about alcohol consumption. Moreover, they reported that they were entertained by the video presentations and interactive activities included in the program.

Table 15: Level of students' satisfaction toward the PALMSS alcohol prevention program among students in the intervention school (n=75)

Lesson	**Median, (IQR)**	**Percentage of satisfaction**
Lesson 1	54.00 (50.00-57.00)	90.00
Lesson 2	55.00 (51.00-57.00)	91.67
Lesson 3	55.00 (51.00-57.25)	91.67
Lesson 4	55.00 (52.00-58.00)	91.67

CHAPTER V
DISCUSSION

This section will display the summary of findings and discussion part. The discussion of the study would demonstrate the effect of the PALMSS alcohol prevention program on increasing of alcohol knowledge, maintaining of low-risk drinking limits and reducing of alcohol consumption among students. Moreover, findings would further be supported by comparing and contrasting with previous relevant studies. Finally, the recommendations will be presented.

5.1. Summary of research findings

The PALMSS alcohol prevention program, a selective and extra-curricular program, aimed to assess the knowledge and skills of low-risk drinkers who were of 11^{th} grade students regarding their ability to control and manage their alcohol consumption. Four 50-minute modules with different degrees of complexity at each level (Basic, Intermediate I, Intermediate II and Advanced module) designed with the same core components were administered via CD-ROM. Based on the Social Cognitive Theory, the six core components of the program were: alcohol knowledge, low-risk drinking, social drinking, media-influence, resisting peer pressure and self-efficacy. There were a total of 152 eligible students who met screening criteria as low-risk drinkers at the baseline point (Intervention n=76; Control n=76). However, two students were lost at follow-up from moving to another school at exit point. Therefore, only 150 participants were able to complete the whole program.

The findings indicated that most of variables among eligible students were comparable between the intervention school and the control school. Both schools had students aged 16 years old and whose population were composed largely of girls. Most students had fathers who were alcohol drinkers compared to the mothers. Also, both schools had a relatively low knowledge of alcohol estimated to be 40%. The average age at which they started drinking alcohol was also similar estimated to be at around 15 years old. The mean AUDIT score was 3 which was classified as low-risk drinkers. Mean alcohol consumption in a typical month was the same at approximately 7 to 9 grams of ethanol. However, only two variables: GPA and peer drinking were significantly different between the two schools. Students in the intervention school had a significantly higher GPA and peer drinking than those in the control school. The GPA T-scores, standardized GPA scores, were also significantly different between both schools. After the GPA and peer drinking were adjusted to test the effect of the PALMSS alcohol prevention program on alcohol knowledge, drinking risk level and alcohol consumption, findings revealed that there was no difference between adjusting and not adjusting the two variables. It can be concluded that the two baseline characteristics had no significant impact on the findings of the study.

Students from the intervention group were assigned to complete the PALMSS alcohol prevention program in four weeks while students from the control group were tasked to learn about alcohol through usual delivery method of their school. The effect of PALMSS alcohol prevention program was monitored according to an interview scheduled at 5 time-points namely, at baseline, exit point, 1-, 3- and 6 -months post-intervention. Three significant findings were obtained:

1. Alcohol knowledge: After adjusting for GPA and peer drinking, alcohol knowledge scores from the exit point to 6-month follow-up, differed significantly between two groups ($F(1,146) = 199.11$, p-value = < 0.001). However, within-subject testing showed there was no effect of the PALMSS alcohol prevention program on changes in mean alcohol knowledge scores over the four time points, ($F(3,438) = 1.87$, p-value = 0.13).

2. Drinking risk level : The intervention group had a significantly higher number of students who maintained a low-risk drinking limit and became abstainers than the control group at 6-month follow-up ($\chi^2 = 9.13$, *p*-value = 0.008). At baseline, all students from both groups were low-risk drinkers. After students from the intervention group received the PALMSS alcohol prevention program, there was a gradually increase in the number of abstainers from exit to 6-mohth follow-up: 2 abstainers at exit and 1-month follow-up, 3 abstainers at 3-month follow-up and 10 abstainers at 6-month-follow-up. Conversely, students from the control group developed a higher risk of drinking, 6 students reached a hazardous level, and 1 student was harmful risk at exit point, 7 students were hazardous at 1-and 3-month follow-up, at 6-month follow-up, there were 8 students identified as hazardous with only 6 students identified as the abstainers.

3. Alcohol consumption: A significant difference in alcohol consumption between the intervention school and the control school (Mann-Whitney test, Z = -2.477, *p* = 0.013) was seen at 6-months follow-up. Students from the intervention group had significantly lowered their alcohol consumption than before intervention was started while students from the control group significantly increased their alcohol consumption compared to before intervention was started. Also, the proportion of students from the intervention school who consumed alcohol in the previous month was significantly lower than the control school at 6-months follow- up (intervention = 7 students, control = 17 students).

5.2. Discussions

5.2.1. Alcohol knowledge

Alcohol education program is needed for low-risk drinkers. Although the WHO (World Health Organization, 2010b) pointed out that individuals whose scores were in the lower-risk range did not require any intervention to change their substance use, it still is a good practice to reinforce that what they are doing show responsibility and should encourage them to continue their current low-risk substance use patterns. Moreover, alcohol education should be delivered to low-risk drinkers because general awareness of alcohol risks is promoted in community, serving as a preventive measure and, at the same time, minimize the extent of drinking (Babor & Higgins-Biddle, 2001b).

Low-risk drinkers need a specially designed alcohol education program. Currently, the universal alcohol education programs is the most widely used preventive intervention for underage drinking in the school setting (Windle & Zucker, 2010) which, however, affect only drunkenness and binge drinking (Foxcroft & Tsertsvadze, 2011). The current curriculum for senior high school students in Thailand is unable to respond to the need for alcohol education in school (The Ministry of Education Thailand, 2008). Therefore, the PALMSS alcohol prevention program was designed to add the regular curriculum addressing the need for an alcohol prevention program specifically for low-risk drinkers which characterized the majority of senior high school students who reported drinking alcohol in the previous year in Phayao province (Hongthong, et al., 2012). The program was designed specifically for low-risk drinkers who have started consuming alcohol to identify the motivations for drinking through the six core components of the program: P = peer, A = alcohol knowledge, L = low-risk drinking, M = media-influence, S = social drinking and S = self-efficacy. The program also aimed to address the knowledge and skills needed to maintain their alcohol consumption at low-risk drinking limits.

The program was found to be more effective than the traditional delivery method in improving alcohol knowledge. The findings revealed that the effect of the program on alcohol knowledge from the exit point to 6-month follow-up in the intervention group was significantly higher than the control group. Research (Sharp, 1994) has pointed out that alcohol knowledge change easily after receiving school-based program. After students from the intervention group received the PALMSS alcohol prevention program, their alcohol knowledge score increased dramatically from baseline to exit point and remained constant until 6-months follow-up. As within-subject testing showed there was no effect of the PALMSS alcohol prevention program on changes in mean alcohol knowledge scores over the four time points after implementing the program. These findings are also consistent with other studies which showed the impact of alcohol education program on improving alcohol knowledge (Hallgren et al., 2011; McBride, et al., 2004; Vogl, et al., 2009).

The key contributor in increasing alcohol knowledge among students is the components of the program which mainly focused on the negative impacts of alcohol consumption during adolescence. Also, the information about low-risk drinking limits was provided which could minimize the harmful effects of alcohol consumption. This was consistent with some programs such as the CLIMATE alcohol prevention program (Vogl, et al., 2009), School Health and Alcohol Harm Reduction Project (SHAHRP study) (McBride, et al., 2004) and PRIME for Life (Hallgren, et al., 2011) which were programs involved in harm minimization and prevention designed for secondary school students that provided guidelines for low-risk drinking to reduce the risks associated with drinking. Since the majority of senior high school students in Phayao province (Hongthong, et al., 2012), had already experimented alcohol, they no longer qualified as candidates for primary prevention programs as they have been shown to be ineffective on low-risk drinkers in the school setting (Foxcroft & Tsertsvadze, 2011).

The alcohol knowledge provided in the program was designed specifically for low-risk drinkers. The findings revealed that alcohol knowledge in the intervention group increased dramatically by approximately 64% from baseline to exit point, remained constant from 1- and 6-months follow-up with 70% increase from baseline to 1-, 3- and 6-month post intervention. On the other hand, in the control

group, only slight increase by 14% in alcohol knowledge from baseline to exit point was seen and then remained constant from exit point and 6-month follow-up. It can be inferred that students from the control school were unable to improve their alcohol related-knowledge from other knowledge sources since their alcohol knowledge was lower than the intervention group and remained unchanged from exit point to 6-month follow-up.

5.2.2. Maintaining the low-risk drinking level

One hypothesis that was tested in this study was the capability of the students to maintain their risk at low levels after receiving the program. It was observed that students from the intervention school had significantly bigger proportion of students who maintained the low-risk drinking limits and became abstainers than that of the control group at 6-month follow-up. After students from intervention school received the program, there was a gradual increase in the number of abstainers from exit to 6-month follow-up, specifically, 2 abstainers at exit and at 1-month follow-up, 3 abstainers at 3-month follow-up and 10 abstainers at 6-month-follow-up. On the other hand, students from the control group developed a higher risk for drinking, where 6 students were categorized as hazardous, and 1 student at harmful risk at exit point, 7 students hazardous at 1- and 3-month follow-up, and 8 students hazardous, and 6 students as abstainers at the 6-month follow-up.

The evidence above showed the positive effect of the program on maintaining the number of low-risk drinkers. This can be attributed to the program being designed based upon the recommendations of the American Public Health Association (2008) which emphasized that the education of low-risk drinkers regarding risky behaviors be required to increase their chances of maintaining their drinking levels at low-risk. Moreover, Coffman et al.(2007), pointed out that the appropriate intervention for students who had already initiated use should address the existing the motivations behind drinking. Since the program, which based on Social Cognitive Theory, was composed of six core components: alcohol knowledge, low-risk drinking, social drinking, media-influence, resisting peer pressure and self-

efficacy, it was able to demonstrate its positive effect on maintaining the low-risk drinking level among intervention group.

5.2.3. Alcohol consumption

Students from both schools had similar average age at which drinking was first started which was estimated at around 15 years old. This was consistent with the national survey of Thai high school students which reported that most boys and girls started drinking at the age of 15 years old (Assanangkornchai, Mukthong, & Intanont, 2009). It was also not different from the report among 12th grade Ontario students where alcohol drinking was initiated at an average age of 14.4 years old (CAMH Population Studies eBulletine, 2013).

In addition, the findings demonstrated that the program was more effective than the traditional delivery of alcohol education in the regular class. Data revealed that there was significantly lower level of alcohol consumption among students in the intervention school than the control school at 6-month follow-up. Furthermore, the number of drinkers in the previous month among students in intervention school was significantly lower than the control school at 6-month follow-up (intervention = 7 students, control = 17 students). In other studies conducted (Newton, Andrews, Teesson, & Vogl, 2009; Vogl, et al., 2009), the behavioral changes resulting from the intervention were not immediately demonstrated, but appeared at 6-12 months after the intervention. The Trans-theoretical Model (TTM) describes that the action stage occur when people have been successful in modifying the addictive behavior at an interval of 1 day to 6 months with the maintenance stage defined as lasting from 6 months to a lifetime (DiClemente, 2007). Moreover, Dr. Radut & Smoker Association (Radut & Smoker Association, 2013) also suggested that the time people spent on changing their behavior varied, but was in general about six months.

The majority of school-based alcohol prevention program demonstrated only minimal effects in reducing alcohol consumption according to Spoth et al. (2009) who showed that only 41 out of 127 interventions revealed some evidence of significant effects or positive changes in targeted alcohol use behavior with the most positive effect across program being for drunkenness and binge drinking (Foxcroft &

Tsertsvadze, 2011). However, this study, the PALMSS alcohol prevention program, successfully reduced alcohol consumption which can be attributed to its interactive computer delivery which incorporated a social approach with six core components: P = peer, A = alcohol knowledge, L = low-risk drinking, M = media-influence, S = social drinking and S = self-efficacy. As previous research studies have pointed out, the most effective alcohol educational program should use interactive delivery techniques, incorporate social influence, teach competency refusal skill, provide follow-up lessons and adopt a harm minimization approach (McBride, et al., 2004; Soole, Mazerolle, & Rombouts, 2005; Tobler, 2000). Moreover, the positive results were consistent with others study which focused on harm reduction messages, but opposed to abstinence based message for drinking (McBride, et al., 2004; Newton, et al., 2009; Vogl, et al., 2009). The program was also designed consistent with the American Public Health Association (2008) statement that education of low-risk drinkers about risky drinking is required to enhance their ability to maintain drinking levels at low- risk and that alcohol messages delivery to low-risk adolescents drinkers should include risk avoidance message (Whiteley, et al., 2008).

5.2.4. Religion and alcohol consumption among senior high school students

Religion influenced the alcohol consumption among senior high school students. In this study, at 1-month follow-up, data was gathered between August and September 2012 which was considered the Buddha Lent period (usually between August and October). During this period, both schools in this study held activities which promoted an anti-alcohol campaign. The campaign proved to effective since students from both schools had relatively the same amount of alcohol consumption in the previous month (intervention group = 10.86 gm, control group = 11.73 g), which was considered quite low at the 1-month follow-up.

A positive effect of religion was also found among senior high school students in this study. In the control school, the 1-month follow-up had the lowest point of alcohol consumption of 11.73 grams compared to the other three follow-up sessions (exit point, 3 and 6- month follow-up) where consumption was at 39.13 g, 32.02 g and 45.86 grams, respectively.

Buddhism teaches the avoidance of alcohol drinking and use of other substances. “No Alcohol during Buddhist Lent” has been promoted in Thailand since 2003 which has resulted in a lot of Thai people to stop drinking during this period. This was evidenced by the Thai Health Promotion Foundation (Thai Health Promotion Foundation, 2008) which revealed that 65% of Thai people abstained from drinking during Buddhist Lent. This study also revealed that students from both schools consumed relatively low amounts of alcohol in comparison with the three follow-ups. Moreover, in other societies, research has also demonstrated religion as a protective factor against alcohol and drug use among adolescents. In Central America, it was revealed that personal belief in religion coupled with parental religiosity influenced a reduction in alcohol and marijuana usage (Kliewer & Murrelle, 2007). In the same, Buddhist practices and beliefs were negatively correlated to alcohol consumption among Thai adolescents (Newman, Shell, Li, & Innadda, 2006).

The influence of Buddhist Lent period was the one significant limitation which made it difficult to clearly ascertain the achievements of the PLAMSS alcohol prevention program in reducing alcohol consumption. Findings from the control school showed there was an increase of alcohol consumption after the baseline point and was also significantly higher than the intervention group at 6-month follow-up. However, the program had no effect on alcohol consumption among students at 1-month follow-up which fell during the period of the Buddhist Lent.

5.2.5. Intervention

The PALMSS alcohol prevention program was a selective and extra-curricular program aimed to address the knowledge and skills needed to control and manage the alcohol consumption of senior high students who were low-risk drinkers. There were four 50-minute modules designed with the same core components, but differing in the complexity of each level ranging from Basic, Intermediate I, Intermediate II to the Advanced module. The PALMSS alcohol prevention program was designed based on literature reviews and previous studies relevant to the alcohol educational program provided for high school students. According to the American

Public Health Association (2008), to educate low-risk drinkers about risky drinking was required for enhancing them to maintain their drinking at a low- risk level. The existing motivations for drink should be addressed for those students who experimented with alcohol during their lifetime (Coffman, et al., 2007) and alcohol messages delivered to adolescents who were low-risk drinkers should include risk avoidance messages (Whiteley, et al., 2008). Moreover, it was designed according to the National Institute on Drug Abuse (2011) recommendation that the principle of prevention programs for high school students should increase academic and social competence with regards to seven skills: (1) study habits and academic support, (2) communication, (3) peer relationship, (4) self-efficacy and assertiveness, (5) drug resistance skills, (6) reinforcement of anti-drug attitudes, and (7) strengthening of personal commitments against drug abuse.

The theory that supported the program was the Social Cognitive Theory (SCT), developed by Albert Bandura in the 1970s, based on the concept of *reciprocal determinism,* which is defined as the dynamic interplay among personal factors (knowledge, skills, experience, culture, ect.), the environment and behavior (Bandura, 1997). Social Cognitive Theory (Bandura, 1977, 1986) has been one of the most popular theories used to identify factors that may influence alcohol use behavior. According to Bandura (Bandura, 1977, 1986), certain behaviors may be explained by the reciprocal influence of three sets of factors: behavioral, individual, and environmental factors. Individual factors refer to physical and psychological situations that are internal to the person, which also include cognitive factors. Environmental factors refer to situations that are external to the person, such as accessibility to services, culture, and social support. Since both individual and environmental factors play roles in behavior shaping, they also serve as mediators in programs aimed at changing alcohol use behavior. The program did not change alcohol use behavior directly but instead enhanced self-efficacy to promote confidence in refusing alcohol drinking, gain more knowledge about alcohol as well as provide information about how to deal with social risk factor such as social drinking, peer and media-influence. All of these helped students maintain their drinking levels at low-risk.

The PALMSS alcohol prevention program was well accepted among students. After students from the intervention school received the program which included 4 lessons, the students rated all lessons to be very highly satisfactory specifically, 54.00 scores (IQR= 50.00-57.00) for lesson 1, 55.00 scores (IQR= 51.00-57.00) for lesson 2, 55.00 scores (IQR= 51.00-57.25) for lesson 3 and 55.00 scores (IQR= 52.00-58.00) for lesson 4. The components of program were of interest to the respondents since they had no knowledge about the safe drinking level and related myths about alcohol consumption. They also reported that they enjoyed the video presentations and the interactive activities of the program.

The reason for the high acceptability among students of the program was the identification of the needs of the target group. Students and teachers were all involved during the development stage of the program wherein their needs were incorporated into design. Moreover, the program was delivered using computer via the CD-ROM, which helped to enhance the acceptability among students. The advantage of the computer approach was that adolescents are comfortable with computer learning with a special preference for receiving health information from a computer rather than from face-to-face interactions (Paperny, 2004). Computer programs allow users to access and navigate the contents at their own pace (Schinke, et al., 2010) with interactive lessons that also allow them to enjoy audio presentations, animation, graphics, and video clips. Computer-delivered alcohol prevention programs have successfully reduced alcohol and others substance use among adolescents and young adults (Duncan, et al., 2000; Elliott, et al., 2008; Lord & D'Amante, 2007; Schinke, et al., 2004). Research suggested that the effectiveness of alcohol prevention program delivered by computer could increase knowledge and reduce alcohol consumption (Schinke, et al., 2010; Vogl, et al., 2009). A CD-ROM was considered to be appropriate for high schools located in the rural areas in this study since the internet did not work. Also, costs as well as other barriers to implementation being quite low thus computers served as a complete and consistent delivery method for every situation; moreover, there was less risk of program adaptation (Schinke & Schwinn, 2005).

5.3. Study limitations

1. A laboratory was not available to confirm alcohol consumption among students in this study. Respondent usually drank only a small amount of alcohol which could not measured accurately in a laboratory (Blood Alcohol Concentration). To remedy this, the Timeline Follow Back (TLFB), an assessment tool, was used to help individuals recall alcohol consumption over a previous time period. The TLFB has been found to have high reliability, $r > 0.85$ (Sobell, et al., 1996) and to be a valid assessment of alcohol use when participants were given assurance of confidentiality (Sobell & Sobell, 1992).

2. The respondents was recruited from two medium-sized high schools in Phayao province; therefore, the study findings may not represent the other areas.

3. Short follow-up for assessing the sustainability of the effect the PALMSS alcohol prevention program.

5.4. Recommendations

The PALMSS alcohol prevention program demonstrated its effect on increasing alcohol knowledge after implementing the program until 6-month follow-up, maintaining alcohol knowledge after implementing the program until 6-month follow-up, maintaining low-risk drinking limits and reducing alcohol consumption at 6-month follow-up. It is therefore, suggested that the program should be added to the regular curriculum in high schools and that the Ministry of Education Thailand promote the utilization of this program among high school children. Furthermore, the findings of this study could be used to guide policy makers to bring about a shift in policy to introduce more specific alcohol educational program for other schools/provinces.

5.5. Further research

1. Promoting the implementation of PALMSS alcohol prevention program in others high schools to get more consolidated evidence;

2. Applying the PALMSS alcohol education program for low-risk drinking freshmen by providing an online educational program;

3. Integrating religious activities in the PALMSS alcohol prevention program for promoting the benefits of program;

4. Testing the cost-effectiveness of the PALMSS alcohol prevention program; and

5. Focusing on the qualitative study for understanding the experience of alcohol consumption among low-risk drinkers.

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APPENDICES

APPENDIX A THE INTERVIEW SCHEDULE

Interviewer's name…… Interviewee's code..……

Instructions: Please fill in the answer that best describe the student's characteristics.

Instructions: Please fill in the answer that best describe the student's characteristics.

1. How old is the student now?.....years old
2. What is student's gender? ☐ 1. Male ☐ 2. Female
3. What is student's last Grade Point Average (GPA)……..
4. What is student's religion? ☐ 1. Buddhism ☐ 2. Others, specify..……..
5. What is the educational attainment of student's father?
   - ☐ 1. Primary school ☐ 2. Secondary school ☐ 3. Vocational college
   - ☐ 4. Diploma ☐ 5. Bachelor's degree ☐ 6. Master's degree
   - ☐ 7. Ph.D. ☐ 8. Others, specify…….
6. What is the educational attainment of student's mother?
   - ☐ 1. Primary school ☐ 2. Secondary school ☐ 3. Vocational college
   - ☐ 4. Diploma ☐ 5. Bachelor's degree ☐ 6. Master's degree
   - ☐ 7. Ph.D. ☐ 8. Others, specify …….
7. What is their parents' marital status?
   - ☐ 1. Married ☐ 2. Divorced ☐ 3. Separated
   - ☐ 4. Father, deceased ☐ 5. Mother, deceased ☐ 6.Both parents are deceased
8. Is the student currently lives with his/her parents?
   - ☐ 0. No. They are living with……(skip to item 11)
     - ☐ 1. their relatives, specify……..
     - ☐ 2. friends
     - ☐ 3. others, specify……..
   - ☐ 1. Yes (item 9)
9. What is the student's father's occupation?
   - ☐ 1. agriculture
   - ☐ 2. employee
   - ☐ 3. civil servant
   - ☐ 4. shop owner/owns a business
   - ☐ 5. state enterprise employee
   - ☐ 6. retiree
   - ☐ 7. unemployed
   - ☐ 8. others……

10. What is the student's mother's occupation?

☐ 1. agriculture ☐ 5. state enterprise employee

☐ 2. employee ☐ 6. retiree

☐ 3. civil servant ☐ 7. unemployed

☐ 4. shop owner/ owns a business ☐ 8. Housewife ☐ 9.others……

11. What is the student's guardian's occupation?

☐ 1. agriculture ☐ 5. state enterprise employee

☐ 2. employee ☐ 6. retiree

☐ 3. civil servant ☐ 7. unemployed

☐ 4. shop owner/owns a business ☐ 8. Housewife ☐ 9.others……

12. How much is the student's allowance? …….baht / per week

13. Is his/her allowance enough for his/her expenses?

☐ 1. Not enough ☐ 2. Enough

14. What is student's family's estimated income?.....baht/month

15. Family drinking: Please check √ to identify the person who drank in the previous year and the frequency of drinking.

Person in their family			Frequency of drinking in the previous year				
Person	Stay with		Never	Once a month	2-4 times a month	2-4 times per week	More that 4 times a week
	No	Yes					
1.Father							
2.Mother							
3.Elder brother/sister							
4.Younger brother/sister							
5.Cousin 5.1 …….							
5.2…….							
5.3…….							
5.4…….							
5.5…….							
6.Close friend/s							
7. Neighbors							

PART II: Alcohol Knowledge Test

Please indicate whether the following statements are "True" or "False" by the student by placing an "X" in the box.

Item	True	False
1. 'Fizzy' drinks, such as sparkling wines, increase the rate of alcohol absorption by the body.		
2. Alcohol is a drug.		
3. Teenage drink for social acceptance, and to gain adult status.		
4. Drinking too much causes a person death.		
5. A can of beer (5%) 330 ml. contains 1.3 standard drinks.		
6. Alcohol is a stimulant that makes people feel more wide awake.		
7. Drinking black coffee helps the sobering process.		
8. It takes about two hour for the body to metabolize two standard drinks.		
9. A 750 ml bottle of spirit contains 15 standard drinks.		
10. Females digest and metabolize alcohol differently from males when drink equally.		
11. All alcohol consumed will eventually reach the bloodstream.		
12. You can do things, such as taking a shower or dancing, to sober up more quickly.		
13. Alcohol drinking stimulates the central nervous system.		
14. Low risk drinking level is no more than 2 standard drinks in a day.		
15. It is illegal to sell alcohol beverages to anyone under the age of 20.		
16. There is more alcohol in a standard drink of beer than in a standard drink of spirit.		
17. The recommended guidelines say it is okay to drink a small amount of alcohol every day.		

Item	True	False
18. Liquor, taken straight, will affect you faster than liquor mixed with water.		
19. Eating while drinking will slow down the absorption of alcohol in the body.		
20. A blood alcohol concentration of 50 mg/dL is the legal definition of alcohol intoxication in Thailand in relation to driving.		

PART III : Alcohol Consumption Record

1. Has the student started drinking alcohol?

   ☐ 0. No (move to page.9) ☐ 1. Yes

2. When did he/she start drinking alcohol?.....years old

3. Please mark with an "X" each type of beverage which he/she has consumed in his/her lifetime, last year or last month.

Type of beverages	Life time		Last year		Last month		If drank last month
	Yes	No	Yes	No	Yes	No	Total amount
1. Beer							
2. Wine							
3. Wine cooler							
4. Ready to drink (RTD)							
5. Frozen drink							
6. Spirit							
7. White spirit							
8. Local beverage (Lao Nam Khao)							
9. Herbal liquor (Lao Yah Daung)							
10. Thai traditional rice wine (Sa Tho)							
11. Sake							
12. Others specify……..							

4.Timeline Follow Back (TLFB) will be used to interview students and it help to recall student's memory of alcohol drinking in last 30 days. Please check / on the date that students consumed alcohol and fill type, amount and frequency.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
May		22	23	24	25	26
27	28	29	30	31	**June** 1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	

5. The Alcohol Use Disorders Identification Test.

Questions	0	1	2	3	4
1. How often do you have a drink containing alcohol?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
2. How many drinks containing alcohol do you have on a typical day when you are drinking?	1 or 2	3 or 4	5 or 6	7 to 9	10 or more
3. How often do you have six or more drinks on one occasion?	Never	Less than monthly	Monthly	Weekly	Daily or mostly daily
4. How often during the last year have you found that you not able to stop drinking once you had started?	Never	Less than monthly	Monthly	Weekly	Daily or mostly daily
5. How often during the last have you failed to do what was normally expected of you because of drinking?	Never	Less than monthly	Monthly	Weekly	Daily or mostly daily
6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?	Never	Less than monthly	Monthly	Weekly	Daily or mostly daily
7. How often during the last year have you had a feeling of guilt or remorse after drinking?	Never	Less than monthly	Monthly	Weekly	Daily or mostly daily
8. How often during the last year have you been unable to remember what happened the night before because of your drinking?	Never	Less than monthly	Monthly	Weekly	Daily or mostly daily
9. Have you or someone else been injured because of your drinking?	No		Yes, but not in last year		Yes, during the last year
10.Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?	No		Yes, but not in last year		Yes, during the last year
					Total

6. Please mark with a check (✓) the alcohol advertisements encountered by the students.

Mode of advertising	**Frequency of encounter (per week)**			**Specify the advertisements that they can remember**
	1 day	2 - 4 days	5 - 7 days	
1.Television				
2.Newspaper				
3.Internet				
4.Magazine				
5.Movies				
6.Radio				
7.Outdoor				
8.Transportaion				
9.Post				
10.Others, specify…….				

1. What were the alcohol campaigns that were participated in by the students in the previous year?

   ……

   ……

   ……

   ……

2. What were the alcohol campaigns outside of school that were participated in by the students in the previous year?

   ……

   ……

   ……

   ……

APPENDIX B THE INSTRUMENT EVALUATION

The alcohol knowledge test was tested by 30 senior high school students who were studying in other schools in Phayao province who had characteristics similar to the students studying in the intervention school. The Kuder-Richardson (KR-20) method was used to assess the reliability of the alcohol knowledge test. The internal consistency was found to be 0.73 and the detail in each item was presented in the table below:

Item	Internal consistency if Item Deleted
1. 'Fizzy' drinks, such as sparkling wines, increase the rate of alcohol absorption by the body.	.738
2. Alcohol is a drug.	.688
3. Teenage drink for social acceptance, and to gain adult status.	.759
4. Drinking too much causes a person death.	.730
5. A can of beer (5%) 330 ml. contains 1.3 standard drinks.	.748
6. Alcohol is a stimulant that makes people feel more wide awake.	.689
7. Drinking black coffee helps the sobering process.	.671
8. It takes about two hour for the body to metabolize two standard drinks.	.745
9. A 750 ml bottle of spirit contains 15 standard drinks.	.727
10. Females digest and metabolize alcohol differently from males when drink equally.	.710
11. All alcohol consumed will eventually reach the bloodstream.	.699
12. You can do things, such as taking a shower or dancing, to sober up more quickly.	.713
13. Alcohol drinking stimulates the central nervous system.	.735

Item	Internal consistency if Item Deleted
14. Low risk drinking level is no more than 2 standard drinks in a day.	.738
15. It is illegal to sell alcohol beverages to anyone under the age of 20.	.728
16. There is more alcohol in a standard drink of beer than in a standard drink of spirit.	.701
17. The recommended guidelines say it is okay to drink a small amount of alcohol every day.	.678
18. Liquor, taken straight, will affect you faster than liquor mixed with water.	.707
19. Eating while drinking will slow down the absorption of alcohol in the body.	.701
20. A blood alcohol concentration of 50 mg/dL is the legal definition of alcohol intoxication in Thailand in relation to driving.	.745

Internal consistency

Internal consistency	N of Items
.730	20

tem-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Internal consistency if Item Deleted
VAR00001	7.4000	11.766	.096	.738
VAR00002	7.1000	10.300	.640	.688
VAR00003	7.2333	12.599	-.140	.759
VAR00004	6.9000	12.093	.109	.730
VAR00005	7.4667	12.189	-.023	.748
VAR00006	7.4333	10.185	.603	.689
VAR00007	7.3667	9.689	.761	.671
VAR00008	7.6333	12.309	-.043	.745
VAR00009	7.7667	11.978	.175	.727
VAR00010	7.4333	10.806	.396	.710
VAR00011	7.4000	10.455	.504	.699
VAR00012	7.7333	11.375	.429	.713
VAR00013	7.6667	12.023	.070	.735
VAR00014	7.7000	12.217	.006	.738
VAR00015	7.0333	11.689	.178	.728
VAR00016	7.5667	10.668	.504	.701
VAR00017	7.2333	9.909	.699	.678
VAR00018	7.5667	10.875	.429	.707
VAR00019	7.6333	10.792	.521	.701
VAR00020	7.5667	12.185	-.012	.745

APPENDIX C FOCUS GROUP DICUSSION GUIDELINE

Focus group discussion guideline for students

Objective: To assess the need for a desirable alcohol educational program among students

Time for focus group: 40-60 minutes

Questions:

1. What did the students know about alcohol?
2. Where did students get information about alcohol? Did they think that these information about alcohol were enough for them?
3. What did the students need to learn about alcohol? Why?
4. What learning method did the students need to effectively learn about alcohol? What was the estimated time needed to learn?
5. What were the expectations of students if given opportunity to learn about the alcohol educational program?

Focus group discussion guideline for teachers

Objectives: To gather the teachers' opinion toward alcohol educational program given to their students

Time for focus group: 40-60 minutes

Questions:

1. What alcohol educational program/activities were provided by school to their senior students?
2. Did the teachers think that those activities were appropriate for their students?
3. What type of alcohol information should provided to low-risk drinkers in high school?
4. What were the teaching and learning methods used to deliver alcohol information to students? How long were these methods/activities?
5. What were the expectations of the teachers after the students learned about the alcohol educational program?

Contents of the focus group discussion

1. Students

1.1. Information about alcohol which students had previously knew (Previous knowledge of students regarding alcohol)

* Alcohol poisoning
* Diseases related to alcohol such as alcoholism and alcoholic liver cirrhosis

1.2. Sources of alcohol information from regular class subject (Health Educational Subject), newspapers and the Internet. However, they thought that the information from these sources were not enough for preventing risk of drinking.

1.3 Alcohol information which students needed to learn

* Safe drinking
* How to take care themselves when they drunk
* How to avoid exceeding a Blood Alcohol Content (BAC) of not more than the legal limitation (50 mg%) (50 mg/dL)??
* Techniques on how to apply assertive skills in peer situations
* The negative effect of alcohol on the body and poisoning

1.4 Methods of learning about alcohol

* Self-directed learning was the preferred studying method
* Multimedia or through the computer was the chosen method to deliver alcohol knowledge
* Time spent on studying alcohol should not take too long because boredom will be a problem
* They did not see the need to learn in class (from their teachers)

1.5 The expectations if given the opportunity to study alcohol

* Ability to control themselves while drinking but not to point of getting drunk
* Ability to refuse the offer of their friends if invited to drink
* Skills for safe drinking

Contents of focus group discussion (continued)

2. Teachers

2.1 The school provided alcohol-related activities to senior students such as "No Alcohol during Buddhist Lent", dissemination of alcohol information from external experts and inclusion of alcohol-related topics in the health educational subjects. Teachers, though, felt that some topics about alcohol like as safe drinking should be more up-to-date and appropriate to current social activities.

2.2 The teachers thought that alcohol information provided to low-risk drinkers should help them to reduce alcohol consumption. Although the school had an "Alcohol-free" school policy, the teachers still could not control or stop drinking among students. Therefore, students should be provided knowledge about alcohol as well as the skills such as safe drinking, refusal skills, and life skills that they need to avoid risky drinking situations.

2.3 The learning and teaching methods regarding alcohol should be interactive, related to their real life, and fun through the use of audio, animation, graphic and video interfaces. All activities should be appropriate for adolescents and should be an extra curriculum for senior high school students.

2.4 Teacher expected that after the students finished the alcohol prevention program, they will have the correct information about alcohol as well as be equipped with the skills needed to change their drinking behavior (i.e. drinking cessation or alcohol consumption reduction).

APPENDIX D LIST OF EXPERTS

1. Assistant Professor Dr. Apinan Aramrat (PhD., M.D.)
   Position : Director of Research Institute for Health Sciences,
   Chiang Mai University

2. Dr. Phunnapa Kittiratanapaiboon (M.D.)
   Position : Manager of Integrated Management for Alcohol Intervention Program
   Consultant of Department of Mental Health,
   Ministry of Public Health, Thailand

3. Dr. Sarodh Pechmanee (Dr.P.H. Health Education and Behavioral Science)
   Position: Lecturer at School of Allied Health and Public Health
   Walailak University, Thailand

4. Dr. Sukchatree Prasopsuk (Ph.D. Computational Linguistics)
   Position: Lecturer at School of Information and Communication Technology
   University of Phayao, Thailand

5. Dr. Prajuk Sriharaj (Ph.D. Education Management)
   Position: Deputy Director of The Secondary Educational Service Area office 36,
   Thailand

6. Dr. Robert Sedgwick Chapman (M.D., M.P.H.) : Back Translation process
   Position: Lecturer at College of Public Health Sciences,
   Chulalongkorn University, Thailand

APPENDIX E THE ETHICAL CONSIDERATION

AF 01-12

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

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COA No. 124/2555

ใบรับรองโครงการวิจัย

โครงการวิจัยที่ 081.1/55	:	ผลของการใช้โปรแกรมพีเอแอลอีมเอสเอสเพื่อป้องกันการดื่มเครื่องดื่มแอลกอฮอล์ในการรักษาระดับการดื่มแบบเสี่ยงต่ำของนักเรียนมัธยมศึกษาที่มีพฤติกรรมการดื่มแบบเสี่ยงต่ำ
ผู้วิจัยหลัก	:	นางดลนภา หงษ์ทอง
หน่วยงาน	:	วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย

คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย ได้พิจารณา โดยใช้หลัก ของ The International Conference on Harmonization – Good Clinical Practice (ICH-GCP) อนุมัติให้ดำเนินการศึกษาวิจัยเรื่องดังกล่าวได้

ลงนาม.....
(รองศาสตราจารย์ นายแพทย์ปรีดา ทัศนประดิษฐ)
ประธาน

ลงนาม.....
(ผู้ช่วยศาสตราจารย์ ดร.นันทรี ชัยชนะวงศาโรจน์)
กรรมการและเลขานุการ

วันที่รับรอง : 10 สิงหาคม 2555 **วันหมดอายุ** : 9 สิงหาคม 2556

เอกสารที่คณะกรรมการรับรอง

1) โครงการวิจัย
2) ข้อมูลสำหรับกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัยและใบยินยอมของกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย
3) ผู้วิจัย
4) แบบสอบถาม

เลขที่โครงการวิจัย 081.1/55
วันที่รับรอง 10 ส.ค. 2555
วันหมดอายุ 09 ส.ค. 2556

เงื่อนไข

1. ข้าพเจ้ารับทราบว่าเป็นการผิดจริยธรรม หากดำเนินการเก็บข้อมูลการวิจัยก่อนได้รับการอนุมัติจากคณะกรรมการพิจารณาจริยธรรมการวิจัยฯ
2. หากใบรับรองโครงการวิจัยหมดอายุ การดำเนินการวิจัยต้องหยุด เมื่อต้องการต่ออายุต้องขออนุมัติใหม่ล่วงหน้าไม่ต่ำกว่า 1 เดือน พร้อมส่งรายงานความก้าวหน้าการวิจัย
3. ต้องดำเนินการวิจัยตามที่ระบุไว้ในโครงการวิจัยอย่างเคร่งครัด
4. ใช้เอกสารข้อมูลสำหรับกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย ใบยินยอมของกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย และเอกสารเชิญเข้าร่วมวิจัย (ถ้ามี) **เฉพาะที่ประทับตราคณะกรรมการเท่านั้น**
5. หากเกิดเหตุการณ์ไม่พึงประสงค์ร้ายแรงในสถานที่เก็บข้อมูลที่ขออนุมัติจากคณะกรรมการ ต้องรายงานคณะกรรมการภายใน 5 วันทำการ
6. หากมีการเปลี่ยนแปลงการดำเนินการวิจัย ให้ส่งคณะกรรมการพิจารณารับรองก่อนดำเนินการ
7. โครงการวิจัยไม่เกิน 1 ปี ส่งแบบรายงานสิ้นสุดโครงการวิจัย (AF 03-12) และบทคัดย่อผลการวิจัยภายใน 30 วัน เมื่อโครงการวิจัยเสร็จสิ้น สำหรับโครงการวิจัยที่เป็นวิทยานิพนธ์ให้ส่งบทคัดย่อผลการวิจัย ภายใน 30 วัน เมื่อโครงการวิจัยเสร็จสิ้น

BIOGRAPHY

Name	Mrs. Donnapa Hongthong
Date of birth	7th February 1973
Place of birth	Phayao province, Thailand
Education	1. Bachelor Degree in Nursing Science, 1994 Boromarajonani College of Nursing Phayao, Thailand 2. Bachelor Degree in Public Health, 1998 Sukhothai Thammathirat Open University, Thailand 3. Master Degree in Public Health Nursing, 1999 Mahidol University, Thailand 4. Master of Nursing, 2008 University of Wollongong, Australia
Position and affiliation	Lecturer Boromarajonani College of Nursing Phayao, Thailand
E-mail address	Donnapah@hotmail.com