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Relationship between health literacy in substance use and alcohol consumption and tobacco use among adolescents, Northeast Thailand

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Abstract:

BACKGROUND: Health literacy (HL) is an important role-play in health risk behaviors such as alcohol drinking and smoking. Inadequate HL in substance use (HLSU) is a barrier to reduce the risk of alcohol and tobacco use. This study aims to investigate the association of HLSU with alcohol consumption and tobacco use among Thai adolescents. Hence, the strengthening of HL program intervention may applied to reduce substance abuse among Thai adolescents.

MATERIALS AND METHODS: This was a cross-sectional study conducted on 1087 university students studying in three universities located in northeastern area with multistage sampling methods by geographical areas. The data were collected by self-administered questionnaire. Multiple logistic regression was applied to determine the effect of HLSU of alcohol consumption and tobacco use.

RESULTS: Most adolescents were drinkers (60.7%) and about 20.7% were smokers. Approximately 40% of them reported as inadequate HLSU. Adolescents with inadequate HLSU and a high level of positive alcohol expectancies and smoking outcome expectancies (SOE) were more likely to drink alcohol and smoke. Conversely, those who had a high level of negative alcohol drinking and SOE were less likely to consume alcohol and tobacco.

CONCLUSION: Adolescents' alcohol consumption and tobacco use were influenced by HL, hence improving adolescents' HLSU could help prevent or reduce the risk of drinking and smoking behaviors.

Keywords:

Adolescent, drinking, health literacy, smoking

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Introduction

Alcohol consumption and tobacco use have been identified as the health behaviors most strongly associated with substance dependence (e.g., alcohol or nicotine dependence) and increased risk of chronic disease in adulthood.^[1] In 2016, it has been found that approximately 26.5% of youth drink alcohol and 17.1% smoke.^[2,3] In Thailand, adolescents' alcohol and tobacco use is a crucial public health problem. Since 2017, the prevalence of youth

current drinkers was 33.5% and current smokers was 20.7%, with the second highest prevalence found in the Northeast region, with 32.8% of alcohol use and 21.1% of tobacco use. This prevalence of substance use has increasingly seen in the age group of 19–24 years, of which a major fraction comprise university students.^[4]

A growing body of literature suggests that health literacy (HL) is an important predictor of health-care utilization, health outcome, and health risk behaviors such as smoking, drinking, and substance use.^[1,5]

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This HL showed a significant role in the promotion of healthy behavior, and modification of attitude toward health care.^[5,6] Moreover, HL in substance use (HLSU), known as addiction information literacy, refers to the degree to which individuals have the capacity to obtain, process, understand, and use substance-related information to make decisions in preventing and avoiding the risk of substance use.^[7,8] Several studies revealed that inadequate HLSU is associated with health risk behaviors (e.g., smoking, alcohol drinking), lower substance risk knowledge, and fewer negative substance-related attitudes.^[5,7,9] In the case of adolescents' alcohol use, limited HLSU might lead to alcohol dependence, poor treatment outcome, and relapsing.^[7,10] In addition, regarding adolescents' tobacco use, inadequate HLSU may have an effect on current smoking, nicotine dependence, relapsing, and cessation outcomes.^[1,9,11] Otherwise, individuals with inadequate HLSU may face difficulties in access, understand, and apply the substance-related information to prevent the substance use.^[6,7] Although several studies have been conducted on the impact of limited HLSU on adverse outcome in adults, only few studies have focused on adolescents.^[1,5,12] Moreover, prior researches have shown that HL determinants such as age, gender, household income, alcohol expectancies (AEs), and smoking outcome expectancies (SOE).^[5,13-17] Nevertheless, HLSU may influence the substance abuse, but there is no other study related among adolescent and there are no statistics and evidence available on this subject in Thailand.^[18,19] Thus, investigating the effect of HLSU on substance abuse may help reduce the risk of their substance abuse behaviors and provide guidance for developing the substance abuse prevention interventions.

Materials and Methods

Study population

This cross-sectional study was conducted from May 2019 to January 2020 in three universities of upper-, middle-, and lower-parts of northeastern Thailand. The eligible participants were students aged 18–22 years with no communication problems and who were willing to participate, whereas those who provided an incomplete response were excluded. The 1087 students who met the eligible criteria were selected by multistage sampling technique. In the first stage, the three universities were selected by using lottery method from the universities' geographically marked spot listings (one part per one university). In the second stage, the five faculties of each university were selected using lottery method from a list of faculties in each university. In the third stage, the students were selected by systematic random sampling from each university. We calculated the sampling interval, which was number four and chose a random start was number two. Then, we repeatedly added the

sampling interval to select subsequent students by selected every fourth student from the list and excluded if absent or unwilling to take part in the research. Then, the student next on the list was taken in. Written informed consent was obtained from the participants after briefing them the research-related information, and self-reported questionnaires were administered to the participants to gather data. This study received ethical approval from the Review Ethics Boards of Mahasarakham University (ref no. PH 096/2562).

Measurements

The self-administered questionnaire was developed based on a literature review which consisted of five parts as follows:

1. Part 1 – The variables included all demographic characteristics and social factors such as sex, age, monthly household income, family's alcohol or tobacco use, and peers' alcohol or tobacco use. All the variables were identified as dichotomous classified variables
2. Part 2 – The HLSU: We administered the Substance Literacy Scale for Thai population (short version) developed by Momen and Kanato.^[20] This summed rating scale comprised 32 items across the following four dimensions: known types of substances abuse, addiction belief, perceived risk factors of substance use, and help others avoid drugs (Cronbach's $\alpha = 0.83$). The total scores were calculated with a summary of the scores of all items (rang 0–106), with higher scores indicating greater HLSU, score 66 or upper as adequate HLSU, and <66 as inadequate
3. Part 3 – AEs were measured by a self-reported questionnaire adapted from Ham *et al.*,^[21] reflecting the expectations of a positive and negative effect of alcohol consumption. A scoring questionnaire ranging from 1 (disagree) to 4 (agree) consisted of 15 items (8 items for positive alcohol expectancies [PAEs] and 7 items for negative alcohol expectancies [NAEs]). The total scores were defined by summing the scores across all items of each dimension; for PAE, range 8–32 and for NAE, range 7–28, we divided AEs scale into two group (high & low) based on median method. The scale has good internal consistency for both PAEs and NAEs (Cronbach's $\alpha = 0.88$ and 0.89, respectively)
4. Part 4 – SOE were assessed by the Smoking Consequences Questionnaire adapted by Myers *et al.*^[22] This is a 21-item self-report measure of expectancies about the positive and negative consequences of smoking (17 items for positive SOE and 4 items for negative). The items are rated on a 10-point Likert scale (0 = absolutely unlikely to 9 = absolutely likely). The total scores were calculated by summing the scores of all items of each scale; positive SOE range 0–153 and negative SOE range

0–36, and the SOE scale was dichotomized based on the median method. It has good internal consistency for both positive and negative SOE (Cronbach's $\alpha = 0.87$ and 0.85 , respectively)

- Part 5 – The primary outcomes of this study were alcohol consumption and tobacco use. The alcohol consumption defined as the respondents were asked whether or not they have ever used alcohol in the past 12 months, and assessed hazardous drinking by The Alcohol Use Disorders Identification Test (AUDIT) (Thai version).^[23] This scale comprised ten items regarding alcohol consumption, drinking behavior, and consequences of drinking. The total scores ranged from 0 to 40 (Cronbach's α , 0.86 for the total scale), and the risk level with scores of 0–7 was regarded as low-risk, 8–15 as hazardous use, 16–19 as harmful use, and 20 or above as alcohol dependence.^[23] Then, the tobacco use defined as the participants were asked: “have you ever smoked cigarettes during the past 12 months?” The respondents were categorized into two groups: smokers if they answered yes and nonsmoker if they answered no.

Data analysis

Descriptive analyses were performed for all variable characteristics. Next, we conducted bivariate odds ratio (OR) to examine the relationship of each predictor (e.g., family and peer substance use, AEs, and SOE), HLSU, and alcohol consumption and tobacco use. Adjusted OR estimated from multivariable logistic regression indicated the association between predictor factors and HLSU with alcohol consumption and tobacco use after adjusted for age, sex, monthly household income, and individual substance use, which were developed in two models. First, in the alcohol consumption model, the present study's alcohol consumption data were categorized into three groups as (1) never drinking, (2) low-risk drinking, and (3) hazardous drinking. Then, multinomial logistic regression was employed for analysis with a reference group of never drinking. Finally, in the tobacco use model, tobacco use data of the participants were divided into two groups as (1) smoking and (2) nonsmoking; binary logistic regression was used for analysis. The statistically significant level was set as $P < 0.05$, and SPSS version 20.0 (IBM Corp., Armonk, NY, USA) was performed for all analyses.

Results

Most of the study participants were female (51.2%), with a median age of 19 years. Approximately 60.7% of youth reported consumed alcohol, whereas 20.7% reported smoking. More than half of them indicated peer (56.3%) and family alcohol use (52.4%) and about one-fourth reported peer and family smoking. Most adolescents reported a high level of PAEs (56.3%) or NAEs (51.0%)

and negative SOE (57.3%), and about 40% of them reported inadequate HLSU [Table 1].

On bivariate model, the inadequate HLSU was associated with an increased likelihood of alcohol consumption and smoking. In addition, the participants' AEs and SOE were related to all level of drinking and smoking. Adolescents with higher negative outcome expectancies were less likely to drink and smoke, whereas those with higher positive outcome expectancies were more likely to consume alcohol and tobacco [Tables 2 and 3].

On multivariate regression analysis, after adjustments were made for age, sex, monthly household income, and individual substance use, the inadequate HLSU had significantly related to increased OR of low-risk drinking (adjusted OR [aOR] = 1.55, 95% confidence interval [CI]: 1.15, 2.08), hazardous drinking (aOR = 1.75, 95% CI: 1.19, 2.58), and smoking (aOR = 1.69, 95% CI: 1.22, 2.33). Moreover, the alcohol expectancies and SOE remained associated with alcohol consumption and tobacco use. In addition, smoking and drinking behavior of peers and family members was significantly related to greater odds of adolescents' tobacco and alcohol consumption [Tables 2 and 3].

Discussion

The findings show that adolescents with inadequate HLSU are accompanied by a higher chance of drinking and smoking, in accordance with the findings of Panahi *et al.*,^[9] Hoover *et al.*,^[11] and Chisolm *et al.*^[24] who reported that limited HL is associated with health risk behaviors (e.g., substance abuse, alcohol use, and smoking). A possible association is that adolescents with inadequate HLSU may have limited ability to access, understand, interpret, and evaluate substance-related information and have low self-management knowledge to make an appropriate decision for preventing or avoiding the risk of substance use.^[5-7] Therefore, if adolescents have inadequate knowledge about alcohol- or smoking-related health risks, they might be unable to make decisions for abstaining from drinking alcohol or smoking cigarettes. The one possibility is parents and peers have a key role of adolescents' health decisions and HL. In particular, parents are the health behavioral models for their teenagers. They might encourage or discourage health behaviors through modeling, discussion, and advice or sharing on the health information that may help to prevent and reduce exposure to health risks.^[12,13,25,26] Peers also influence teenagers' receipt of health information (e.g., alcohol use, smoking, and sexual and deviant behaviors) and health decisions through normative peer pressures or lifestyle practices of their age group.^[1,12] Therefore, youth who receive accurate information about alcohol- or smoking-related health

Table 1: Distribution of participant characteristics, peer and family substance use, alcohol expectancy, smoking outcome expectancy, and health literacy in substance use by alcohol and tobacco use

Variables	Total (n=1087), n (%)	Hazardous drinking (n=184), n (%)	Low-risk drinking (n=476), n (%)	Smoking (n=225), n (%)
Sex				
Male	530 (48.8)	102 (55.4)	268 (56.3)	122 (54.2)
Female	557 (51.2)	82 (44.6)	208 (43.7)	103 (45.8)
Age (years)				
≥20	550 (50.6)	98 (53.3)	252 (52.9)	125 (55.6)
<20	537 (49.4)	86 (46.7)	224 (47.1)	100 (44.4)
Monthly household income (THB)				
≥8000	605 (55.7)	108 (58.7)	272 (57.1)	130 (57.8)
<8000	482 (44.3)	76 (41.3)	204 (42.9)	95 (42.2)
Family alcohol use				
Yes	570 (52.4)	112 (60.9)	288 (60.5)	131 (58.2)
No	517 (47.6)	72 (39.1)	188 (39.5)	94 (41.8)
Peer alcohol use				
Yes	612 (56.3)	128 (69.6)	300 (63.0)	137 (60.9)
No	475 (43.7)	56 (30.4)	176 (37.0)	88 (39.1)
Family tobacco use				
Yes	305 (28.1)	56 (30.4)	142 (29.8)	104 (46.2)
No	782 (71.9)	128 (69.6)	334 (70.2)	121 (53.8)
Peer tobacco use				
Yes	265 (24.4)	50 (27.2)	118 (24.8)	96 (42.7)
No	822 (75.6)	134 (72.8)	358 (75.2)	129 (57.3)
PAEs				
High	612 (56.3)	120 (65.2)	295 (62.0)	-
Low	475 (43.7)	64 (34.8)	181 (38.0)	-
NAEs				
High	554 (51.0)	78 (42.4)	222 (46.6)	-
Low	533 (49.0)	106 (57.6)	254 (53.4)	-
Positive SOE				
High	524 (48.2)	-	-	132 (58.7)
Low	563 (51.8)	-	-	93 (41.3)
Negative SOE				
High	623 (57.3)	-	-	97 (43.1)
Low	464 (42.7)	-	-	128 (56.9)
HLSU				
Inadequate	435 (40.0)	86 (46.7)	212 (44.5)	115 (51.1)
Adequate	652 (60.0)	98 (53.3)	264 (55.5)	110 (48.9)
Tobacco use				
Yes	225 (20.7)	60 (32.6)	120 (25.2)	-
No	862 (79.3)	124 (67.4)	356 (74.8)	-
Alcohol use				
Never drinking	427 (39.3)	-	-	45 (20.0)
Low-risk drinking	476 (43.8)	-	-	120 (53.3)
Hazardous drinking	184 (16.9)	-	-	60 (26.7)

Values are presented as number (%); THB=Thai baht, SOE=Smoking outcome expectancies, HLSU=Health literacy in substance use, PAEs=Positive alcohol expectancies, NAEs=Negative alcohol expectancies

effects might have increased health awareness and know-how to deal with the risk of using substances.^[7,14,27] However, *vice versa*, they receive inaccurate information, especially from parents or peers who drink or smoke, such as positive outcomes of alcohol use or smoking and share social network norms toward substance used;^[13,14,28] youth may trust their parents or peers easily and are unable to interpret and judge the relevance of the information on risk factors. This, in turn, lead them to make decisions

of trying drinking alcohol or smoking.^[7,28] Nonetheless, our findings are inconsistent with those of Brandt *et al.*^[27] and Dermota *et al.*,^[29] who reported that easily accessing substance-related information is associated with higher smoking and drinking. This is possible that substance users have greater personal interest in or more concerned about the negative consequences related to their substance use, thus they may be more likely to search for substance-related information. The inconsistency of

Table 2: Odds ratios and 95% confidence intervals from multinomial logistic regression for alcohol use

Variables	Hazardous drinking		Low-risk drinking	
	OR (95% CI)	aOR (95% CI) [#]	OR (95% CI)	aOR (95% CI) [#]
Inadequate HLSU (ref: adequate)	1.85 (1.30-2.64)**	1.75 (1.19-2.58)**	1.70 (1.29-2.23)**	1.55 (1.15-2.08)**
Family alcohol use (ref: no)	2.35 (1.65-3.35)**	2.08 (1.41-3.05)**	2.31 (1.77-3.02)**	2.07 (1.54-2.77)**
Family tobacco use (ref: no)	1.30 (0.89-1.91)	1.06 (0.66-1.70)	1.27 (0.94-1.71)	1.15 (0.79-1.65)
Peer alcohol use (ref: no)	3.01 (2.09-4.36)**	2.81 (1.89-4.16)**	2.25 (1.72-2.94)**	2.07 (1.55-2.71)**
Peer tobacco use (ref: no)	1.26 (0.85-1.88)	1.26 (0.81-1.94)	1.12 (0.82-1.53)	1.14 (0.81-1.61)
High PAEs (ref: low)	2.18 (1.53-3.13)**	2.11 (1.43-3.10)**	1.90 (1.45-2.48)**	1.84 (1.37-2.45)**
High NAEs (ref: low)	0.50 (0.35-0.72)**	0.58 (0.43-0.85)**	0.59 (0.45-0.77)**	0.68 (0.51-0.90)**

*P<0.05, **P<0.01, [#]Multivariable model adjusted for sex, age, monthly household income, and tobacco use. OR=Odds ratio, aOR=Adjusted OR, CI=Confidence interval, HLSU=Health literacy in substance use, PAEs=Positive alcohol expectancies, NAEs=Negative alcohol expectancies, ref=Reference group

Table 3: Odds ratios and 95% confidence intervals from binary logistic regression for tobacco use

Variables	Smoking	
	OR (95% CI)	aOR (95% CI) [#]
Inadequate HLSU (ref:adequate)	1.77 (1.32-2.38)**	1.69 (1.22-2.33)**
Family tobacco use (ref: no)	2.83 (2.08-3.83)**	1.98 (1.37-2.85)**
Family alcohol use (ref: no)	1.34 (0.99-1.81)	1.17 (0.77-1.76)
Peer tobacco use (ref: no)	3.05 (2.23-4.17)**	2.21 (1.56-3.12)**
Peer alcohol use (ref: no)	1.26 (0.94-1.71)	1.04 (0.68-1.58)
High positive SOE (ref: low)	1.70 (1.26-2.29)**	1.53 (1.11-2.11)*
High negative SOE (ref: low)	0.48 (0.36-0.65)**	0.48 (0.35-0.66)**

*P<0.05, **P<0.01, [#]Multivariable model adjusted for sex, age, monthly household income, and alcohol use. OR=Odds ratio, aOR=Adjusted OR, CI=Confidence interval, HLSU=Health literacy in substance use, SOE=Smoking outcome expectancies, ref=Reference group

many studies may be differences in the study population and HL measurements.

Moreover, in terms of alcohol expectancies and SOE, it was observed that positive outcome expectancies are strongly associated with greater chance of alcohol and tobacco use, whereas negative outcome expectancies are inversely associated with drinking and smoking. This is consistent with the findings of Stewart *et al.*,^[6] Chisolm *et al.*,^[24] and Chen *et al.*^[30] A possible explanation is that the alcohol or tobacco use consequences expectancies refer to the personal's beliefs about behavior, cognition, moods, and emotions that are occurring to oneself when drinking or smoking.^[15,16] Furthermore, an individual's decision about whether or not to use a substance, including alcohol use and smoking, is based on the anticipated positive and negative consequences associated with its use; positive outcome expectancies are thought to promote substance use and relapse, whereas negative outcome expectancies are thought to have the opposite effect.^[16] Besides, the AEs, and SOE can be obtained by directly drinking and smoking oneself, or observing parents or peers drinking or smoking behaviors, that lead adolescents to perceive visible effects of alcohol or tobacco use behaviors.^[15,30,31] Furthermore, AEs and SOE influenced by individuals' HL, which people with inadequate HL had more positive and less negative consequences expectancies on alcohol or tobacco use.^[6,24] In addition, young people's decision to

use substance is often the result of a reasoned assessment of the positive and negative consequences of its use.^[32] Thus, those with lower HL may have lower capacity to access, understand, and apply substance-related information to make appropriate decision in which one was harmful consequences of substance use.^[6,24]

The limitation of this study is its cross-sectional design; hence, causality cannot be inferred. In addition, the data were collected by a self-report questionnaire, which may be subject to a social desirability bias. Our study has the strength of a large sample size and precise effect estimates adjusted for potential confounders. Further, longitudinal studies are needed to prove the causal association between HLSU and substance abuse. In addition, future study needs to determine the relations of substance abuse treatment and addiction severity with HLSU.

Conclusion

This study revealed that HLSU influences adolescents' alcohol and tobacco consumption. Thus, a better understanding of adolescents' HLSU context could help develop campaigns to reduce drinking and smoking behavior among teenagers.

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Conflicts of interest

There are no conflicts of interest.

References

1. Fleary SA, Joseph P, Pappagianopoulos JE. Adolescent health literacy and health behaviors: A systematic review. *J Adolesc*

- 2018;62:116-27.
2. World Health Organization. Global Status Report on Alcohol and Health 2018: Executive Summary. Available from: <https://apps.who.int/iris/handle/10665/312318>. [Last accessed on 2019 Nov 23].
 3. World Health Organization. WHO Report on the Global Tobacco Epidemic, 2017 Monitoring Tobacco use and Prevention Policies: Executive Summary. Available from: https://www.who.int/tobacco/global_report/2017/executive-summary/en/. [Last accessed on 2019 Nov 23].
 4. National Statistical Office. Annual Report 2018. Bangkok, Thailand: National Statistical Office; 2018. p. 62.
 5. Muhanga M, Malungo J. The what, why and how of health literacy: A systematic review of literature. *Int J Health* 2017;5:107-14.
 6. Stewart DW, Adams CE, Cano MA, Correa-Fernández V, Li Y, Waters AJ, *et al.* Associations between health literacy and established predictors of smoking cessation. *Am J Public Health* 2013;103:e43-9.
 7. Rundle-Thiele S, Siemieniako D, Kubacki KK, Deshpande S. Benchmarking alcohol literacy: A multi country study. *Mod Manag Rev* 2013;18:99-111.
 8. Damari B, Azimi A, Shahrabi NS. Status of substance abuse literacy in manufacturing and production sites in Iran: Results from a nationwide survey. *Med J Islam Repub Iran* 2019;33:7.
 9. Panahi R, Niknami S, Ramezankhani A, Tavousi M, Osmani F. Is there a relationship between low health literacy and smoking? *Health Educ Health Promot* 2015;3:43-52.
 10. Rolová G, Barták M, Rogalewicz V, Gavurová B. Health literacy in people undergoing treatment for alcohol abuse – A pilot study. *Kontakt* 2018;20:425-31.
 11. Hoover DS, Wetter DW, Vidrine DJ, Nguyen N, Frank SG, Li Y, *et al.* Enhancing smoking risk communications: The influence of health literacy and message content. *Ann Behav Med* 2018;52:204-15.
 12. Manganello JA. Health literacy and adolescents: A framework and agenda for future research. *Health Educ Res* 2008;23:840-7.
 13. Wang JW, Cao SS, Hu RY. Smoking by family members and friends and electronic-cigarette use in adolescence: A systematic review and meta-analysis. *Tob Induc Dis* 2018;16:05.
 14. Leshargie CT, Alebel A, Kibret GD, Birhanu MY, Mulugeta H, Malloy P, *et al.* The impact of peer pressure on cigarette smoking among high school and university students in Ethiopia: A systemic review and meta-analysis. *PLoS One* 2019;14:e0222572.
 15. Urbán R, Kökönyei G, Demetrovics Z. Alcohol outcome expectancies and drinking motives mediate the association between sensation seeking and alcohol use among adolescents. *Addict Behav* 2008;33:1344-52.
 16. Urbán R. Smoking outcome expectancies mediate the association between sensation seeking, peer smoking, and smoking among young adolescents. *Nicotine Tob Res* 2010;12:59-68.
 17. Javadzade SH, Sharifirad G, Radjati F, Mostafavi F, Reisi M, Hasanzade A. Relationship between health literacy, health status, and healthy behaviors among older adults in Isfahan, Iran. *J Educ Health Promot* 2012;1:31.
 18. Intarakamhang U, Intarakamhang P. Health literacy scale and causal model of childhood overweight. *J Res Health Sci* 2017;17:e00368.
 19. Thongnopakun S, Pumpaibool T, Somrongthong R. The association of sociodemographic characteristics and sexual risk behaviors with health literacy toward behaviors for preventing unintended pregnancy among university students. *J Multidiscip Healthc* 2018;11:149-56.
 20. Momen K, Kanato M. Developing a substance literacy scale for Thai population. *J Med Assoc Thai* 2015;98 Suppl 6:S10-6.
 21. Ham LS, Stewart SH, Norton PJ, Hope DA. Psychometric assessment of the comprehensive effects of alcohol questionnaire: Comparing a brief version to the original full scale. *J Psychopathol Behav Assess* 2005;27:141-58.
 22. Myers MG, McCarthy DM, MacPherson L, Brown SA. Constructing a short form of the smoking consequences questionnaire with adolescents and young adults. *Psychol Assess* 2003;15:163-72.
 23. Silapakit P, Kittirattanapaiboon P. AUDIT: Alcohol Use Disorders Identification Test: Guidelines for Use in Primary Care. 2001 (Thai Version). 2nd ed. Bangkok, Thailand: Tantawanpaper; 2009.
 24. Chisolm DJ, Manganello JA, Kelleher KJ, Marshal MP. Health literacy, alcohol expectancies, and alcohol use behaviors in teens. *Patient Educ Couns* 2014;97:291-6.
 25. Hamzaha SR, Ismail M, Nor ZM. Does attachment to parents and peers influence health literacy among adolescents in Malaysia? *Kontakt* 2018;20:376-83.
 26. Haghdoost AA, Hessari H, Baneshi MR, Rad M, Shahravan A. The impact of mother's literacy on child dental caries: Individual data or aggregate data analysis? *J Educ Health Promot* 2017;6:5.
 27. Brandt L, Schultes MT, Yanagida T, Maier G, Kollmayer M, Spiel C. Differential associations of health literacy with Austrian adolescents' tobacco and alcohol use. *Public Health* 2019;174:74-82.
 28. Foo YC, Tam CL, Lee TH. Family factors and peer influence in drug abuse: A study in rehabilitation centre. *Int J Collab Res Intern Med Public Health* 2012;4:190-201.
 29. Dermota P, Wang J, Dey M, Gmel G, Studer J, Mohler-Kuo M. Health literacy and substance use in young Swiss men. *Int J Public Health* 2013;58:939-48.
 30. Chen CY, Storr CL, Liu CY, Chen KH, Chen WJ, Lin KM. Differential relationships of family drinking with alcohol expectancy among urban school children. *BMC Public Health* 2011;11:87.
 31. Leonardi-Bee J, Jere ML, Britton J. Exposure to parental and sibling smoking and the risk of smoking uptake in childhood and adolescence: A systematic review and meta-analysis. *Thorax* 2011;66:847-55.
 32. Kuther TL. Rational decision perspectives on alcohol consumption by youth. Revising the theory of planned behavior. *Addict Behav* 2002;27:35-47.