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

Suneerat Yangyuen, Chatchada Mahaweerawat¹, Sawan Thitisutthi, Udomsak Mahaweerawat

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

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.²³ 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.¹⁵

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This HL showed a significant role in the promotion of healthy behavior, and modification of attitude toward health care.\cite{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.\cite{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.\cite{9,7,9} In the case of adolescents’ alcohol use, limited HLSU might lead to alcohol dependence, poor treatment outcome, and relapsing.\cite{7,10} In addition, regarding adolescents’ tobacco use, inadequate HLSU may have an effect on current smoking, nicotine dependence, relapsing, and cessation outcomes.\cite{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.\cite{6,7} Although several studies have been conducted on the impact of limited HLSU on adverse outcomes in adults, only few studies have focused on adolescents.\cite{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).\cite{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.\cite{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 for 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.\cite{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.,\cite{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.\cite{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 α = 0.87 and 0.85, respectively).

5. 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
effects might have increased health awareness and know-how to deal with the risk of using substances.\cite{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 use\cite{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.\cite{7,28} Nonetheless, our findings are inconsistent with those of Brandt et al.\cite{27} and Dermota et al.,\cite{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

| 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 (46.8)                      | -                     |
| 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
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 (0.35-0.68)** |

*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

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.

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