

Sexual Experience, Suicidal Behaviors and Depression Association, and Its Tendency to Lead to Smoking and Alcohol Consumption among Korean Adolescents

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ABSTRACT---- *In numerous published findings, the cohesion was they have treated sexual experience, suicidal behaviors and depression, as the outcome variables and regard substance use as the core factors. In this study, we aim to do the opposite. We seek to make sense of the linkage by inverting the analytical direction. We intend to examine the association and the likelihood, and observe the levels to which sexual experience, suicidal behaviors, and depression may play a part in the odds of smoking and alcohol drinking among middle school and high school Korean students. The data obtained were cross-sectional from the 2019 Korean Youth Risk Behavior Web-Based Survey, participated by 57, 303 Korean adolescents. Among which are male 52.1%, female 47.9%, ages 15 below 59.2 % and 15 above 40.4%. This study utilized descriptive, Chi-square, and logistic regression analyses. Our basic findings signified that sexual experience and mental health problems doubled the odds of motivation. Chi-square analyses asserted that the association was statistically significant. All variables were notably correlated to substance use at 0.01 level, that is, when sexual experience, suicidal behaviors, and depression tend to increase, there was a high risk of using substances. The results for logistic regression on alcohol drinking, the -2LL statistic is 73157.25, the Cox & Snell R² is 0.057, and Nagelkerke R² is 0.078 having the df of 1, with the p value of 0.0001, and the -2LL statistic is 39022.46, the Cox & Snell R² is 0.064, and Nagelkerke R² is 0.122 having the df of 1, with the p value of 0.000 for smoking, predicted the maximum likelihood and considerably identified as positive significant indicators in the onset of substance initiation. This study also found that sexual experience had remained robustly substantial with the odds of smoking and drinking, that is, participants with higher sexual experience had the strongest likelihood of substance use motivation. Our overall results contribute to the debate by treating sexual experience, suicidal behaviors, and depression as precedent significant risk factors for developing substance use behaviors among Korean adolescents. For efficient and effective management of sexual experience, suicidal behaviors and depression on teenagers, findings underscore the need for early detection on adolescents at risk. A comprehensive prevention and protective efforts is required along with continuous parental guidance. Intervention programs with coping skills to handle emotional and behavioral problems is essential to help reduce the probability of an increased risk factors and subsequently lessen the threat for developing cigarette smoking and alcohol drinking behaviors among teenagers. School-based programs that can create synergy by embedding teenagers in an academic environment that is equally supportive, beneficial and can help promote a positive mindset is recommended.*

Keywords— alcohol consumption, depression, Korean adolescents, sexual experience, smoking initiation, suicidal behaviors

1. INTRODUCTION

The use of tobacco, alcohol, and prohibited drug use remains persistently high in many countries, despite several years of significant concern, copious efforts for preventative programs, inadequate resource expenditure on mass media, school curricula, and scholastic resource production [1]. Substance use is highest during adolescence [2]. Unhealthful behaviors such as drinking and smoking often begin during this stage, affect health, and result in adulthood disorders [3]. Substance use is, directly and indirectly, accountable for 11.8 million deaths every year. It is responsible for one in five deaths worldwide, and only 1 in 7 users receive treatment out of the 35 million people who

suffer from substance use globally [4,5]. Smoking and drinking have become one of the most critical public health concerns among the youth population worldwide [6-8].

Substance use in depression is highly prevalent, and its frequency has not changed over decades [9]. Individuals diagnosed with substance use have 3 to 4 times depression prevalence. In most clinical practice, it has been observed and documented that comorbidity of substance use and depression among patients suffering from dual diagnoses has been an essential matter to be seriously considered. Reciprocation in this comorbidity has been observed in all pharmacological types of addictive drugs, including nicotine and alcohol [10]. Substance use is prevalently co-occurring with depression and can work bi-directionally or vice versa [11]. Literature suggests that depression is more likely to develop when a higher alcohol level is consumed [12]. Retrospective studies signify early-onset smoking projects a higher risk for depression and more chronic depressive symptoms [13]. Other issues may develop when both exist together, especially among adolescents at risk of experiencing poor outcomes [14]. Positive association between problems with substance use and depression levels in adolescents might cause a higher risk for a suicidal attempt [15].

Studies suggested a strong association between substance use and severe risk for suicidal behaviors, especially for patients aged 15-30 years old suffering from psychiatric disorders [16]. In adolescents, the co-occurrence of alcohol, tobacco, and suicidal ideation had a statistically significant relationship. Health-related behaviors such as alcohol drinking and smoking are associated with suicidal behavior [17-18]. Alcohol dependence increases the risk of suicide, death risk of suicide attempt, and risk of suicidal ideation by 2.59 percent [19]. Smoking appears to be the best predictor of sexually risky behavior in male and female adolescents [20-21].

Alcohol drinking and smoking cigarettes work as a short-range mating strategy. It increases the risk of adolescent sexual urge, especially among high school students engaging in sexual intercourse, provided that cigarette and alcohol use are still considered masculine traits, especially among men [22-23]. Researchers have also discovered that as substance use increased in frequency, the probability of sex and the number of sexual partners also increased. Substance use has more substantial effects on sexual behavior among the female population, especially individuals of Hispanic, Asian, and Caucasian origin, and among older youth. A study with a sample of 60,000 young adults implied a relationship between cigarette smoking and the onset of sexual activity [24-26]. A vast spectrum of studies highlight and document the proximal role of smoking and alcohol consumption as initiates to suicidal behaviors, depression, and sexual experience.

In South Korea, more than 59, 000 children 10-14 years old continuously consume cigarettes each day. The daily number of users are 9–24-year-olds had reached 8.99 million, representing 17.4% percent of the country's entire population. [27] Data from Statista's Key Market Indicators (KMI) has also projected smoking prevalence in South Korea to reach 20. 2% (15 years older) by 2025. Approximately 9.1 % of South Koreans aged 9-17 have consumed alcohol. The rate was significantly high among male respondents, with an estimated 13.4%. Koreans consumed alcohol on average 8.8 days per month [28].

Adolescent suicide is also the most serious and almost permanent psychological health problem. Suicide has been consistently the second –most common cause of death in the younger population ranging from 10-19 years old. There was a remarkable increase from 5.3 persons per 100,000 in 2001, to 35% to 7.2 persons per 100, 000 in 2014 [29]. Moreover, the most common cause of death in Korean adolescents is suicide [30]; In fact, the rate of suicide attempts among Korean adolescents has continuously increased; in 2016, the suicide rate among Korean adolescents aged 12 up to 18 years was 7.9 per 100,000, which was twice as that in 20015. [31] In 2016, suicide became the number 1 cause of death among the youth population in South Korea, and the rate has been rising over the years [32]. Suicide continuous to be extremely and the most critical psychological problem in the country.

Risk factors cover mental and behavioral aspects encompassing depression, smoking, alcohol consumption, sexual activity, and high stress, however, a psychiatric disorder such as depression was the primary cause of death of the 90% of Koreans who committed suicide in 2016 [33]. The proportion of Korean adolescents who experienced depression was decreased to 27.1% in 2018 from 41.3% in 2007, a reduction of 14.2 percentage points (%p). According to 2018 data, the proportion was 33.6% for schoolgirls, and 21.1% for schoolboys, with a difference of 1. 6 folds higher in girls. High school students 28.7% displayed a seemingly higher proportion than middle school students 25.2% [34].

In Korea, there is a significant increase in the number of young people who smoke, consume alcohol, and are sexually active. It is alarming the average age group is even younger in 2015 (13.2-year-olds) compared with (13.8-year-olds) in 2009 [35]. The number of young people with sexual experiences has double increased from 2 to 4 times as they also reported the use of prohibited drugs, alcohol consumption, and smoking cigarettes. There are less than 30% of the respondents admitted to always using contraception while nearly half don't use it [36].

Research examining these factors among adolescents continues to accumulate. However, there is almost no research conducted in reversal to these studies. Minimal records reported, in which frequency has also been poorly documented, and a short period or small samples are often used. This puts limitations on the research's ability to examine thoroughly a subject that has been essentially overlooked in medical research.

Therefore, this study intends to investigate the opposite direction. We aim to measure the association and the likelihood of sexual experience and mental health problems on smoking and drinking motivation among middle and high school Korean students. The current exploration is designed to evaluate these factors' relationships in an integrated and concrete manner by combining the variables in one model.

2. METHOD

2.1. Data

We used the data from the 2019 Korean Youth Risk Behavior Web-Based Survey (KYRBS). The KYRBS is a statistical government-approved survey conducted annually since 2005 by the Korea Centers for Disease Control and Prevention to monitor health-related risk behaviors among Korean adolescents. A stratified multistage cluster sampling design was used to obtain a nationally representative sample of middle- and high-school students. The survey was completed anonymously and received a very high participation rate—the participants of this research had a very high response rating and almost had no missing data. Based on the released data by KYRBS 2019, there is 57 303 participants who were sampled using the multistage clustered probability design within the whole country.

2.2 Measurement

2.2.1 Socio-demographic

Socio-demographic variables included age, gender, and student's education level (Middle and High School). Perceived Socioeconomic Status was assessed by a 5-point Likert scale (high, middle-high, middle, middle-low, and low). Living Conditions were classified by those who live with family, relatives, boarding with friends, dormitory, and welfare centers.

2.2.2 Suicidal Behaviors

Suicidal thoughts, plans, and attempts were used as factors for suicidal behaviors and were classified by responding with “yes” and “no” to a question asked whether each respondent had seriously considered suicide and had set up suicidal schemes during a year.

2.2.3. Depression

Depression experience was also categorized by responding with a “yes” or “no” as to whether participants had felt desperate or sad enough to have their daily lives affected for two weeks.

2.2.4. Substance use (smoking and drinking)

Smoking and drinking experience was classified as substance use behavior. Lifetime smoking and drinking experience were assessed by responses with a “yes” or “no” to each question about smoking and drinking experience. Questions asked: “Have you ever smoked at least one cigarette daily in the last 30 days?” and “Have you ever consumed alcohol in the last 30 days?”

2.2.5. Sexual Experience

Similarly, the sexual experience was also analyzed by the response “yes” or “no” to the question “have you ever had sex?”

2.3. Statistical Analysis

The data from the KYRBS is multifaceted sample survey data, and it was analyzed by employing cluster, weight, and stratification methods of statistical analysis. All the analyses were performed using SPSS version 24 for Windows (IBM, 2021). After presenting descriptive statistics including means, standard deviation, frequency distribution, and percentage of the respondents, a Chi-square test with the statistical level set p -value < 0.05 was performed to analyze the association of the study variables relating to sexual experience, mental health problems such as depression, suicidal behaviors (thoughts, plans, attempts), on smoking and alcohol consumption. Logistic regression was utilized to determine the consumption of substances (smoking and alcohol drinking).

3. RESULT

Frequency Distribution of the Respondents

Descriptive statistics of socio-demographic variables exhibited 57 303 participants were analyzed for this study (See Table 1). The analytic sample consisted of 29 841 (52.1%) males and 27 462 (47.9%) females. Age was categorized into two groups, under 15 ($N=33, 908, 59.2\%$) and over 15 ($N=23, 161, 40.4\%$), of the middle school and high school. The highest percentage among the socioeconomic status groups comes from the middle-income group, i.e., 27 457 (47.9%), where their majority live with their families, i.e., 54 267 (94.7%).

Table 1. Frequency Distribution of the Respondents ($N=57303$)

Variables	Frequency	Percent (%)
Gender		
Male	29841	52.1
Female	27462	47.9
Age		
Under 15	33908	59.2
Over 15	23161	40.4
Education		
Middle School	29384	51.3
High School	27919	48.8
Socio-Economic Status		
High	6379	11.1
Middle High	16126	28.1
Middle	27457	47.9
Middle Low	6042	10.5
Low	1299	2.3
Living Conditions		
Family	54267	94.7
Relatives	332	0.6
Boarding with Friends	347	0.6
Dormitory	2126	3.7
Welfare Centers	231	0.4

Results from Chi-square analyses for smoking were observed (see Table 2). The participants were identified as smokers ($N = 7076, 12.3\%$) and non-smokers ($N = 50227, 87.7\%$). Evidence confirmed the strength of the association was statistically significant in all the study variables at p value < 0.05 . Smoking was the highest dependent from sexual experience ($\chi^2 = 5005.66, p = .000$), followed by depression ($\chi^2 = 652.26, p = .000$). As for suicidal behaviors, there is a slight difference between suicidal attempts ($\chi^2 = 476.52, p = .000$) and suicidal thoughts ($\chi^2 = 475.46, p = .000$), compared to suicidal plans ($\chi^2 = 371.32, p = .000$).

Table 2. The Correlation between mental health problems, sexual experience and smoking

	Smoking (Yes) $N = 7076 (12.3\%)$		Smoking (No) $N = 50227 (87.7\%)$		χ^2
	n	%	n	%	
Depression	4194	10.2	37081	89.8	652.26*
Suicidal Behaviors					
Suicidal Thoughts	5571	11.2	44234	88.8	475.46*
Suicidal Plans	6493	11.8	48504	88.2	371.32*
Suicidal Attempts	6568	11.8	49004	88.2	476.52*
Sexual Experience	5376	10	48645	90	5005.66*

* p value < 0.05

In table 3, results from Chi-square analysis for alcohol were measured, and results were noted. The participants were identified as alcohol drinkers ($N = 22240$, 38.8%) and non-alcohol drinkers ($N = 35063$, 61.2%). Substantial scores established that there is a strong, statistically significant relationship among the study variables at p value < 0.05 . Alcohol drinking was the highest dependent from sexual experience ($\chi^2 = 2262.02$, $p = .000$), followed by depression ($\chi^2 = 1200.65$, $p = .000$). As for suicidal behaviors, suicidal thoughts got the highest association ($\chi^2 = 685.4$, $p = .000$), then suicidal plans ($\chi^2 = 360.04$, $p = .000$), and suicidal attempts ($\chi^2 = 354.96$, $p = .000$). Overall results for Tables (2 and 3) suggest that mental health problems seemingly have influence on substance use consumption. Result's best findings highlight sexual experience as the highest association. Increased sexual activity is indicative of increased substance use.

Table 3. The Correlation between mental health problems, sexual experience and alcohol

	Alcohol Consumption (Yes)		Alcohol Consumption (No)		χ^2
	<i>n</i>	%	<i>n</i>	%	
Depression	14205	34.4	2707	65.6	1200.65*
Suicidal Behaviors					
Suicidal Thoughts	18300	36.7	31505	63.3	685.4*
Suicidal Plans	20910	38	34087	62	360.04*
Suicidal Attempts	21192	38.1	34380	61.9	354.96*
Sexual Experience	19677	36.4	34344	63.6	2262.02*

* p value < 0.05

In tables 4 and 5, logistic regression was performed to explore the value of the likelihood in depression, suicidal behaviors, and sexual experience to alcohol consumption. All the subscales in (table 4) were analyzed and interpreted. In this result, the -2LL statistic is 73157.25, the Cox & Snell R^2 is 0.057, and Nagelkerke R^2 is 0.078 having the df of 1 indicating maximum probability in the initiation of alcohol consumption. Results demonstrated that all dependent variables on sexual experience (OR=CI = 5.717- 6.771, $p = 0.000$), suicidal attempts (OR = 2.489, CI = 2.257- 2.745, $p = 0 .007$), suicidal plans (OR = 2.221, CI = 2.042- 2.417, $p = 0 .000$), depression (OR = 1.916, CI = 1.846- 1.988, $p = 0.000$), suicidal thoughts (OR = 1.906, CI = 1.816- 2.002, $p = 0.000$), have positive significant possibility to initiate alcohol drinking.

Table 4. Logistic regression analysis on depression, suicidal behaviors, and sexual experience to alcohol consumption

Likelihood	B	SE B	β	Odds Ratio
Depression	0.650	0.019	0.108	1.916 [1.846- 1.988] ***
Suicidal Behaviors				
Suicidal Thoughts	0.645	0.025	0.040	1.906 [1.816- 2.002] ***
Suicidal Plans	0.798	0.043	0.013	2.221[2.042- 2.417] ***
Suicidal Attempts	0.912	0.050	0.017	2.489 [2.257- 2.745] **
Sexual Experience	1.828	0.043	0.184	6.222 [5.717- 6.771] ***

$df = 1$

-2 Log Likelihood (2LL) = 73157.25

Cox & Snell $R^2 = 0.057$

Nagelkerke $R^2 = 0.078$

** p value < 0.01 , *** p value < 0.001

Similar outcome is also shown in smoking (see Table 5). All the results showed a positive impact and strong likelihood to smoke. the -2LL statistic is 39022.46, the Cox & Snell R^2 is 0.064, and Nagelkerke R^2 is 0.122 having the df of 1 signifying higher probability in the initiation of smoking. Results revealed that all dependent variables on depression (OR = 1.938, CI=1.841- 2.041, $p = 0.000$), suicidal thoughts (OR = 1.994, CI = 1.841- 2.041, $p = 0.000$), suicidal plans (OR = 2.528, CI = 2.293- 2.786, $p = 0 .002$), suicidal attempts (OR = 3.099, CI = 2.786- 3.448, $p = 0 .000$), and sexual experience (OR = 9.723, CI = 9.030- 10.471, $p = 0.000$) have positive significant probability to initiate smoking.

Among all the study variables in tables 4 and 5, sexual experience has remained robustly significant with the odds of smoking and drinking, which means that participants with higher sexual experience had the most substantial likelihood of substance use motivation compared to non-drinkers and non-smokers. The overall results indicate that mental health problems and sexual experience double the odds of motivation.

Table 5. Logistic regression analysis on depression, suicidal behaviors, and sexual experience to smoking

Likelihood	B	SE B	β	Odds Ratio
Depression	0.662	0.026	0.065	1.938 [1.841- 2.041] ***
Suicidal Behaviors				
Suicidal Thoughts	0.690	0.032	0.022	1.994 [1.872- 2.124] ***
Suicidal Plans	0.927	0.050	0.015	2.528 [2.293- 2.786] **
Suicidal Attempts	1.131	0.054	0.035	3.099 [2.786- 3.448] ***
Sexual Experience	2.275	0.038	0.284	9.723 [9.030- 10.471] ***

$df = 1$

-2 Log Likelihood = 39022.46

Cox & Snell $R^2 = 0.064$

Nagelkerke $R^2 = 0.122$

** p value < 0.01, *** p value < 0.001

4. DISCUSSION

This study highlighted the clinical importance of considering sexual experience, depression, and suicidal behaviors, as notably correlated and may instigate smoking and drinking. This research had obtained vital strength based on the model generated from a large national representative sample (KYRBS), descriptive characteristics and demographic factors that could determine correlations and probabilities. The overall outcome indicated that all the study variables showed significant evidence on the association and maximum likelihood in substance usage development and did not provide any adverse findings in all the results. This means that the empirical outcome supported and answered our questions about whether there were associations and likelihood among Korean students with sexual experiences, mental health problems, and suicidal impulses to smoke and drink.

The most notable finding in the present study underscored sexual experience, which exhibited consistency in the overall results. Previous investigations may have explained that this must be due to adolescence's frequent characterizations as consistent with rebelliousness and sexual experience [37]. Pubescent is a stage of self-discovery, curiosity, and experimentation. In this context, teenage sexual development and sexual behavior occur and may place adolescents at higher risk for undesired consequences such as drinking, smoking, and suicide [38]. Prior studies have also shown similar reports that were consistent with our findings—indicative that adolescent sexual experience had association and tendencies to influence smoking and drinking initiation. The results of the current investigation were also substantiated by the foregoing reports that these factors could also predict usage, especially when there is a history of childhood domestic violence, such as experiencing physical and sexual abuse. Though these acts may be concealed, it must be a powerful reason adolescents initiate substance use [39-42]. Sexual experience may affect an individual's drinking behavior starting at an early stage in life [41]. Higher levels of both sexual-based alcohol expectancies (i.e., interpersonal closeness, sexual pleasure, sexual opportunities, sexual disinhibition) and drinking motives may turn sexually active students more susceptible to more habitual intoxication and heavier drinking episodes [39, 43-44].

Findings on depression revealed a pertinently high correlation with alcohol, but the probability was higher with smoking. Empirical evidence from prior studies supported the finding that depression demonstrated causative smoking initiation by increasing initiation risk. Further, it demonstrated causative smoking initiation by intensifying progression to regular use, increasing the risk of chronic smoking, reducing the potentiality for smoking cessation, and providing a distinctive background for theorizing psychological smoking maintenance mechanisms among depressed smokers [45-47]. Increased depression symptoms could relatively influence more psychiatric severe symptoms on alcohol initiation and an increased risk for heavy drinking episodes [48-49]. Adequately, previous studies had also heightened the strength of the current investigation on depression as not only associatively but also commonly and equivalently strong predictors for smoking and alcohol initiation [31, 50-51]. Establishing a clear connection between suicidal behaviors and substance use behaviors has dramatically been a challenge for the academic community. Nonetheless, scholars have sought to explain why, when, or how the two are correlated. Currently, little is known about the longitudinal relationships between suicidal behaviors to later substance use, and minimal explanations exist concerning their ambiguous relationship.

In numerous published findings, the cohesion was that they treat suicide as the outcome variable and regard smoking as the core predictor [51]. However, this is not the case in the present study. This study reversed the analytical direction by examining the level to which sexual experience, depression, and suicidal behaviors, may play a part in the odds of smoking and alcohol drinking. Further results indicated that suicidal behaviors were less associated with substance consumption but had a greater likelihood for alcohol and drinking compulsions. The current study's exposition was coherent with the previous findings, having observed an indicatively stronger connection with increased mental health problems on depression [47, 52-53], suicidal behaviors [54-57], and sexual experience [29, 36, 39, 41-42] as substantively associated with increased substance use. Despite contradiction from three longitudinal studies, this investigation strongly argued that suicide was contemporaneous with smoking and drinking and considered initiation factors. Adolescents suffering from suicidal impulses varying from thoughts and attempts to relapse and completion can shape individual smoking behavior directly or interactively [52, 58-60].

5. LIMITATION OF THE STUDY

The most apparent limitation of the present study was its cross-sectional design. Causality and directionality between sexual experience, mental health problems and substance use could not be specified. Although the data used were accepted as a reliable source of information concerning teenage delinquent behaviors, but solely due to its nature of self-report-based measures we could only determine predictability in the likelihood and not the causality. Another possible limitation of the study was the respondents may have biases and may have not answered truthfully particularly with the sensitive questions. Furthermore, we could not apply exact measures for mental health problems in adolescents based only on experience, as described in this study. Diagnostic criteria to assess the mental health problems was not performed and the lack of pertinent information from other sources like the parents were not included. However, despite these limitations, this study presented an important contribution to the literature in the fields of risky sexual experience, mental health problems and its association and effect to substance use motivation.

6. CONCLUSION AND RECOMMENDATION

Knowledge gained from this prospective cross-sectional study implies that increased sexual experience, suicidal behaviors and depression are significant risk factors for developing substance use behaviors among adolescents. Sexual experience should not be treated any less considering the fact that teenagers are highly experimental and do not seem to be aware of the perilous consequences. It should also be noted that as the risk factors were augmented substance use would also be boosted. If these medical conditions are not adequately addressed, a severe functional impairment may intensify the complication. It may likely progress into co-occurring disorders in which substance use may double the impact for the risk factors, and vice versa. This condition might affect and prolong treatment due to relapse tendencies with the substance usage. For efficient and effective management of sexual experience, suicidal behaviors and depression on teenagers, findings underscore the need for early detection on adolescents at risk. A comprehensive prevention and protective efforts are required along with continuous parental guidance. Intervention programs with coping skills to handle emotional and behavioral problems is essential to help reduce the probability of an increased risk factors and subsequently lessen the threat for developing cigarette smoking and alcohol drinking behaviors among teenagers. School-based programs that can create synergy by embedding teenagers in an academic environment that is equally supportive, beneficial and can help promote a positive mindset is recommended. Future prospective research should aim to understand the extent as how and when these relationships occur among adolescence and how the impact would affect them.

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