



Predictive factors of substance misuse and abuse in South Korean adolescents: a secondary data analysis of the 2021 Youth Risk Behavior Web-based Survey

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Purpose: This study aimed to identify the general characteristics and health behaviors of students with non-therapeutic substance use. **Methods:** This secondary data analysis used data from the 17th Korea Youth Risk Behavior Web-based Survey (2021). Analyses of the 54,848 adolescents used descriptive statistics, the Rao-Scott χ^2 test, and logistic regression. **Results:** The risk factors for substance use among students were anxiety, loneliness, living separately from family, suicidal ideation, e-cigarette use, and high stress. **Conclusion:** The findings help identify the risk factors for non-therapeutic drug use among adolescents. Since South Korea does not have a drug prevention program for its adolescent population, an educational plan based on these findings could help prevent adolescent substance abuse.

Keywords: Adolescent; Adolescent behavior; Substance abuse, oral; Health risk behaviors

INTRODUCTION

The use of substances for non-therapeutic purposes is a significant global issue. According to the United Nations Office on Drugs and Crime [1], the number of individuals diagnosed with substance use is steadily increasing, representing approximately 39 million individuals. Adolescence is the critical onset period for such use and is reportedly the highest among young people aged 18 to 25 years [1]. This issue is aggravated in South Korea, which is considered relatively safe from drug and substance misuse and abuse, particularly among adolescents [2].

Adolescence is referred to as a “time of storm and stress.” Adolescents begin to think and act psychologically independent of the protection and observation of older generations; however, they often feel conflicted and easily overwhelmed by enthusiasm or anxiety due to their psychological immaturity [3]. Adolescents are highly susceptible to drug or sub-

stance misuse or abuse as they are naturally curious, seek challenges, rebel against established norms, and often experience low self-esteem and peer pressure [3]. Further, the brain undergoes significant cognitive and emotional development during adolescence. Hence, substance use during this period of psychosocial transformation causes serious health problems [3] and hinders young people’s successful transition to adulthood [4]. Therefore, adolescents may experience cognitive impairment, mental illness, low academic achievement, inflammation, or vascular disorders. Moreover, the use of a single substance typically leads to the use of other dangerous ones [5]. Further, the risk of exacerbating existing health problems exists since adolescents are more likely to engage in substance use in areas without medical surveillance than in safe and legal spaces [1]. The recent increase in the prevalence of mental illness has contributed to an increase in the legal purchase of substances online or directly from overseas through messengers, the ease of which has reached danger-

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ous levels [2].

According to historical data provided by the Counseling and Welfare Center for Youth, the number of adolescent counseling cases for cigarette “smoking, drinking, and substance misuse and abuse” increased by 9.3% compared with 2020 [6]. Conversely, while most behavioral problems significantly decrease by the time they reach adulthood [7], substance abuse-related problems tend to persist or become more complex later in life. Complete recovery from adolescent substance abuse is challenging because it cannot be achieved through the simple cessation of substance use; rather, it requires addressing the frequent recurrence of substance dependency symptoms, withdrawal, and an increase in tolerance [5].

Prevention is divided into the following stages: primary intervention, early intervention (secondary prevention), treatment, rehabilitation, and relapse prevention (tertiary prevention) [8]. Primary prevention occurs before addiction and includes enhancing awareness through substance education programs, strengthening legal sanctions, and promoting substance use prevention through mass media. Secondary prevention involves the early detection and treatment of substance use, whereas tertiary prevention involves rehabilitation. Effective addiction prevention is only possible when all primary, secondary, and tertiary preventive measures are implemented. Botvin and Griffin [9] argued that identifying risk factors is the most important aspect of the development of prevention programs, helping to limit abuse in conjunction with clarifying adolescents’ developmental processes through research. Nawi et al. [10] revealed the risk factors and reported that various demographic factors, such as one’s growth environment and community, are important determinants of substance abuse risk. Furthermore, the Drug Abuse Resistance Education and School Program to Educate and Control Drug Abuse provide preventive education in the U.S. Countries such as England, Germany, and the Netherlands proactively offer substance education to adolescent populations [11]. However, in South Korea, such education is limited to one-time events or promotional programs.

Numerous studies on adolescent health are currently being conducted. Most research on adolescents’ problem behaviors has focused on digital addiction [12], smoking or drinking [13,14], violence [15], and suicide [16]. In a literature review on addiction, Lee [17] noted that studies on substance use in Korea are scarce. Furthermore, Chae [18] reported that substance misuse and abuse in adults highlights the necessity of

identifying the risk factors according to which prevention and treatment programs should be customized. However, research on the risk factors for substance abuse among adolescents in South Korea is lacking.

Adolescents spend most of their time at school with their peers. Hence, to obtain a comprehensive idea of their propensity for substance abuse, data analysis based on systematic research at the national level is required. Accordingly, this study identified the predictive factors for substance use in adolescents who have experienced substance use and used data from the 17th Korea Youth Risk Behavior Web-based Survey conducted in 2021. We hoped to apply these results to recommend guidelines for safe substance use among adolescents. This study aimed to identify the relationship between non-therapeutic substance use, general characteristics, and health behavior and to identify predictors of non-therapeutic substance use.

METHODS

Ethical statements: This study received an Institutional Review Board (IRB) review exemption from the IRB of Dong-A University (No. 2-1040709-AB-N-01-202308-HR-031-02) due to the use of secondary data with anonymity.

1. Study Design

I conducted a secondary analysis of raw data from the 17th Korea Youth Risk Behavior Web-based Survey conducted in 2021 to identify the predictive factors of adolescent substance use for non-therapeutic purposes. The reporting of this study was based on the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines [19].

2. Participants and Data Collection

The survey is an annual anonymous self-report online survey of middle- to high-school Korean adolescents that identifies their health behaviors by referring to smoking, drinking, obesity, diet, and physical activity. Individuals were randomly selected through stratified cluster sampling to minimize sampling errors after dividing the population into 39 regional groups and school levels as stratified variables and then further stratifying the population by city size, school level, and school type using proportional allocation. The 17th edi-

tion of the survey was conducted from August 30 to November 11, 2021, and included 54,848 students, with a participation rate of 92.9%. Survey data were collected using unique coding numbers to avoid identifying the participants' personal information. Thus, the survey guaranteed the participants' anonymity and confidentiality and consisted of 113 questions and 109 indicators. In this study, the dependent variable was the experience of substance use for non-therapeutic purposes, and the explanatory variables were selected according to the findings of earlier studies [20]. A raw data request form was prepared and submitted to the Korea Disease Control and Prevention Agency. The data for the relevant year were downloaded and used after obtaining approval from the representative agency in accordance with the raw data disclosure and utilization regulations of the Youth Risk Behavior Web-based Survey.

3. Study Variables

1) Participants' general characteristics

The general participant characteristics considered in this study were sex, city of residence, school type, level of academic achievement, socioeconomic status, and family cohabitation. Academic achievement and socioeconomic status were categorized as "high" for high and upper-middle, "middle" for middle, and "low" for low and lower-middle. Responses other than "living with family" to the question "What is your current living situation?" (e.g., living in the house of a relative, boarding house, dormitory, care facility, or living alone) were categorized as "not living with family."

2) Participants' health-behavior related characteristics

Students' health behavior-related characteristics included problem behaviors and mental health variables. Problem behaviors included smoking, drinking, substance use, perceived health status, and subjective sleep satisfaction. This study considered individuals' drinking and smoking experiences, excluding those related to religious or cultural rituals. Substance use included the habitual use of stimulants, tranquilizers, butane, and toluene for non-therapeutic purposes. The responses "very healthy" and "healthy" as the perceived mental health status were reclassified as "healthy," and all the other responses as "unhealthy." For subjective sleep satisfaction, the responses indicating sleep as "very adequate" or "adequate" for fatigue recovery were reclassified as "adequate" and all the other responses as "inadequate."

The mental health self-assessments included stress, depression, suicidal ideation, suicidal plans, suicide attempts, loneliness, and anxiety. In general, the responses indicating "very high" and "high" levels of perceived stress were reclassified as "high," whereas all other responses as "low." The responses "yes" and "no" regarding any experience of depression, suicidal ideation, suicide plans, and suicide attempts over the preceding 12 months were used. Further, the responses "always" and "often" concerning the experience of loneliness were reclassified as "high," and the other responses as "low." For anxiety, the original 1–4 scoring scale in the instrument used generalized anxiety disorder (GAD-7) [21] was modified to a 0–3 scale, and composite scores of less than 5 points were reclassified as "minimal," 5–9 points as "mild," 10–14 points as "moderate," and 15–21 points as "severe."

4. Data Analysis

This study used a complex sampling design to analyze the data, reflecting the stratification, clustering, weighting, and finite population correction factors provided in the 2021 survey. The IBM SPSS/Win 22 statistical program (IBM Corp.) was used to perform the complex samples general linear model procedure and complex sample Rao–Scott χ^2 test to analyze substance use according to subjects' general characteristics, problem behaviors, and health behaviors. The data analysis was conducted using the corrected, weighted variables. Descriptive statistical analysis was used to analyze the participants' general characteristics, problem behaviors, and health behaviors and were presented as frequencies that did not reflect the weights and as percentages that reflected the weights. Factors influencing participants' substance use were analyzed using complex sample multinomial logistic regression. The independent variables found to be significant ($p < .05$) in the univariate analysis were used to calculate the odds ratios and 95% confidence intervals (CIs) for each factor.

RESULTS

1. Comparison of Participants' General Characteristics and Health Behaviors according to Their Substance Use Experience

In this study, 395 respondents reported having used substances for non-therapeutic purposes (0.7%). Table 1 presents a comparison of adolescents' general characteristics and

health behaviors according to their experience of substance use. Most (67.8%; $\chi^2 = 12.12, p = .002$) attended coeducational schools. Individuals in the substance-using group most frequently reported “high” for subjective academic performance (39.2%; $\chi^2 = 18.18, p < .001$) and “middle” for subjective economic status (40.3%; $\chi^2 = 33.23, p < .001$). A considerable proportion, 13.9%, of the substance-using group did not live

with their parents compared with only 4.3% of the non-using group ($\chi^2 = 103.73, p < .001$).

Regarding problem behaviors in the substance-using group, 51.9% had experienced drinking ($\chi^2 = 67.46, p < .001$), 26.3% had experienced smoking ($\chi^2 = 140.88, p < .001$), and 24.1% had used e-cigarettes ($\chi^2 = 210.96, p < .001$). Furthermore, regarding perceived health status, 50.6% of the sub-

Table 1. Differences in Substance Use according to Participants’ General Characteristics and Health Behaviors (N=54,848)

| Variables | Categories | Drug use | | χ^2 (p) |
|------------------------------|-------------------------|------------|---------------|-----------------|
| | | Yes | No | |
| | | n (%) | n (%) | |
| Sex | Male | 234 (59.2) | 28,167 (51.7) | 3.43 (.074) |
| | Female | 161 (40.8) | 26,286 (48.3) | |
| Location | Big cities | 158 (40.0) | 23,704 (43.5) | 4.48 (.078) |
| | Small and medium cities | 206 (52.2) | 26,658 (49.0) | |
| | Countryside | 31 (7.8) | 4,091 (7.5) | |
| School type | Girls’ school | 40 (10.1) | 8,793 (16.1) | 12.12 (.002) |
| | Boys’ school | 87 (22.0) | 8,589 (15.8) | |
| | Coeducational | 268 (67.8) | 37,071 (68.1) | |
| Academic performance | High | 155 (39.2) | 20,373 (37.4) | 18.81 (< .001) |
| | Middle | 92 (23.3) | 16,811 (30.9) | |
| | Low | 148 (37.5) | 17,269 (31.7) | |
| Economic status | High | 158 (40.0) | 21,410 (49.3) | 33.23 (< .001) |
| | Middle | 159 (40.3) | 26,918 (49.4) | |
| | Low | 78 (19.7) | 6,125 (11.2) | |
| Living with family | Yes | 340 (86.1) | 52,086 (95.7) | 103.73 (< .001) |
| | No | 55 (13.9) | 2,367 (4.3) | |
| Drinker | Yes | 205 (51.9) | 17,734 (32.6) | 67.46 (< .001) |
| | No | 190 (48.1) | 36,719 (67.4) | |
| Smoker | Yes | 104 (26.3) | 5,225 (9.6) | 140.88 (< .001) |
| | No | 291 (73.7) | 49,228 (90.4) | |
| Smoker (e-cigarettes) | Yes | 95 (24.1) | 3,681 (6.8) | 210.96 (< .001) |
| | No | 300 (75.9) | 50,772 (93.2) | |
| Perceived health status | Healthy | 195 (49.4) | 35,334 (64.9) | 47.24 (< .001) |
| | Unhealthy | 200 (50.6) | 19,119 (35.1) | |
| Sleep satisfaction | Adequate | 330 (83.5) | 41,679 (76.5) | 10.84 (.002) |
| | Inadequate | 65 (16.5) | 12,774 (23.5) | |
| Perceived stress | High | 244 (61.8) | 21,001 (38.6) | 77.47 (< .001) |
| | Low | 151 (38.2) | 33,452 (61.4) | |
| Depression | Yes | 202 (51.1) | 14,490 (26.6) | 129.71 (< .001) |
| | No | 193 (48.9) | 39,963 (73.4) | |
| Suicidal ideation | Yes | 159 (40.3) | 6,797 (12.5) | 282.93 (< .001) |
| | No | 236 (59.7) | 47,656 (87.5) | |
| Suicidal plan | Yes | 90 (22.8) | 2,116 (3.9) | 457.07 (< .001) |
| | No | 305 (77.2) | 52,337 (96.1) | |
| Suicide attempt | Yes | 60 (15.2) | 1,185 (2.2) | 353.55 (< .001) |
| | No | 335 (84.8) | 53,268 (97.8) | |
| Loneliness experience | High | 165 (41.8) | 8,590 (15.8) | 224.31 (< .001) |
| | Low | 230 (58.2) | 45,863 (84.2) | |
| Generalized anxiety disorder | Minimal | 150 (38.0) | 35,514 (65.2) | 404.37 (< .001) |
| | Mild | 99 (25.1) | 12,380 (22.7) | |
| | Moderate | 65 (16.5) | 4,406 (8.1) | |
| | Severe | 81 (20.5) | 2,153 (4.0) | |

stance-using group reported being “unhealthy” ($\chi^2=47.24$, $p<.001$), whereas 83.5% reported “adequate” recovery from fatigue after sleep ($\chi^2=10.84$, $p=.002$). Regarding perceived stress, 61.8% and 38.6% of the using and non-using groups, respectively, reported having experienced stress ($\chi^2=77.47$, $p<.001$), and 51.1% of the substance-using group reported having experienced depression ($\chi^2=129.71$, $p<.001$). A higher proportion of the substance-using group reported having had suicidal ideation ($\chi^2=282.93$, $p<.001$) and suicidal plans ($\chi^2=457.07$, $p<.001$) and having made suicide attempts ($\chi^2=353.55$, $p<.001$) than the non-using group. Furthermore, 41.8% and 15.8% of the former and latter groups, respectively, experienced loneliness ($\chi^2=224.31$, $p<.001$). The level of generalized anxiety disorder was significantly higher in the substance-use group than in the non-use group ($\chi^2=404.37$, $p<.001$). The proportions of those with moderate anxiety were 16.5% and 8.1% in the substance use and non-use groups, respectively. Moreover, the proportions of those with severe anxiety disorder were 20.5% and 4.0% in the former and latter groups, respectively.

2. Factors Influencing Individuals’ Experience of Substance Use

Complex-sample logistic regression analysis was performed to identify the factors affecting individuals’ experiences of substance use. These factors were examined in the order of their significance (Table 2).

There were 3.78 times more adolescents who did not live with their parents than those who did (95% CI, 2.70–5.31), 2.65 times more used e-cigarettes than those who did not (95% CI, 1.66–4.23) and 2.42 times more adolescents reported stress than those who did not (95% CI, 1.98–2.95). There were 2.76 times more individuals who had planned to commit suicide than those who did not (95% CI, 1.96–3.90), 4.13 times more individuals who had experienced loneliness than those who did not (95% CI, 3.37–5.05). The group with severe anxiety levels was 10.21 times larger than the group with a minimal level of anxiety, while the group with moderate anxiety levels was 3.20 times larger (95% CI, 2.39–4.29).

DISCUSSION

This study identified risk factors for non-therapeutic substance use using raw data from the 17th Korea Youth Risk Behavior Web-based Survey conducted in 2021. According to

Table 2. Factors Affecting Substance Use in Adolescents (N=54,848)

| Variables | Categories | OR | 95% CI | p |
|------------------------------|------------------|-------|------------|-------|
| Academic performance | Middle | 0.72 | 0.55–0.93 | .020 |
| | Low | 1.19 | 0.93–1.51 | .028 |
| | High (ref) | | | |
| Economic status | Middle | 0.83 | 0.66–1.05 | .020 |
| | Low | 1.57 | 1.17–2.12 | <.001 |
| | High (ref) | | | |
| Living with family | No | 3.78 | 2.70–5.31 | <.001 |
| | Yes (ref) | | | |
| Drinker | Yes | 1.32 | 0.83–2.09 | <.001 |
| | No (ref) | | | |
| Smoker | Yes | 1.44 | 1.13–1.85 | <.001 |
| | No (ref) | | | |
| Smoker (e-cigarettes) | Yes | 2.65 | 1.66–4.23 | <.001 |
| | No (ref) | | | |
| Perceived health status | Unhealthy | 1.42 | 1.15–1.76 | <.001 |
| | Healthy (ref) | | | |
| Sleep satisfaction | Not adequate | 1.57 | 1.18–2.08 | <.001 |
| | Inadequate (ref) | | | |
| Perceived stress | High | 2.42 | 1.98–2.95 | <.001 |
| | Low (ref) | | | |
| Depression | Yes | 1.59 | 1.26–2.01 | <.001 |
| | No (ref) | | | |
| Suicidal ideation | Yes | 1.96 | 1.46–2.57 | <.001 |
| | No (ref) | | | |
| Suicidal plan | Yes | 2.76 | 1.96–3.90 | <.001 |
| | No (ref) | | | |
| Suicide attempt | Yes | 1.95 | 1.35–2.82 | <.001 |
| | No (ref) | | | |
| Loneliness experience | Yes | 4.13 | 3.37–5.05 | <.001 |
| | No (ref) | | | |
| Generalized anxiety disorder | Mild | 1.99 | 1.54–2.57 | <.001 |
| | Moderate | 3.20 | 2.39–4.29 | <.001 |
| | Severe | 10.21 | 7.79–13.36 | <.001 |
| | Minimal (ref) | | | |

CI, confidence interval; OR, odds ratio.

a survey, the proportion of adolescents who habitually use substances for non-therapeutic purposes increased from 0.4% in 2016 to 0.7% in 2021 [22]. The number of teenagers classified as drug offenders approximately doubled between 2018 and 2022 [23].

Misuse or abuse of drugs does not always result in problematic substance use; however, it can cause other issues or increase the likelihood of substance use if individuals lack adequate coping skills to resolve such problems. This study also clarified factors influencing substance use.

This study revealed that high anxiety and stress levels are associated with an increased likelihood of substance use. Nawi et al. [10] identified the risk and protective factors for adolescent substance use at the individual, family, and com-

munity levels and found that individual factors were related to behavioral problems, depressive disorders, emotional problems, and e-cigarette use, consistent with the current findings showing higher anxiety and stress levels in the substance-using group than in the non-use group.

This study also revealed that the proportion of the substance-using group reporting loneliness was higher than that of the non-use group. Hosseinbor et al. [24] stated that loneliness causes severe psychological and physical issues and reported significantly high levels of loneliness among drug users. One must engage in social interactions to lead a healthy life, and loneliness affects individuals' social interactions, cognitive functions, and emotional behaviors [25]. Similarly, our findings indicated a higher likelihood of substance use among individuals who do not live with their families. According to Nawi et al. [10], the likelihood of substance use may increase to dangerous levels in the absence of appropriate family control or support. Similarly, Supriyanto et al. [26] reported that families provide support at the emotional and cognitive levels in the context of inappropriate substance use, which can increase an individual's self-esteem regarding safe substance use. These are considered important factors because the presence of family members and other supporters can encourage adolescents to develop a perception of safe substance use, thereby avoiding harm or danger. Moreover, earlier studies have indicated that healthy beliefs; strong connections to one's school, family, and local resources; and organized healthy activities can be protective factors against substance use [10,26].

This study found that more individuals planned suicide in the substance-using group than in the non-use group. Similarly, Lee [17] reported that adolescents who have experienced substance use are at a higher risk of suicidal ideation than those with no such experience and that the degree of such ideation is increased by feelings of depression, stress, and anxiety. Since the risk of suicide is high among adolescents with substance use experiences [27], suicidal ideation must be considered a crucial risk factor for adolescents.

Moreover, anxiety, stress, living with parents, and making suicide plans were identified as predictors that increase the risk factors. As Lee [17] stated, several factors can act as protective or risk factors for addiction, which must be considered because they differ according to an individual's social or cultural background. Further, Kim [28] highlighted the necessity of conducting research to understand the changes in unsafe substance use among adolescents and to prepare adequate countermeasures. The misuse of drugs can lead to

problematic substance use in adolescents [23]. Considering these predictive factors identified in this study, adolescents cannot independently resolve these issues. Therefore, society must recognize that this is not an individual problem, and proactive preventive education is required.

This study had several limitations. The analysis was performed using only variables included in the 17th Korea Youth Risk Behavior Web-based Survey, and the interpretation was limited by the question of whether an individual experienced substance use for non-therapeutic purposes. Nevertheless, the current context of non-therapeutic substance use among Korean adolescents was examined using a large-scale survey that targeted all students, and our findings can be utilized to ensure adolescents' safe substance use and healthy growth.

This study is meaningful in that it detected and analyzed the factors related to adolescent substance use in Korea and had implications for suitable prevention strategies, contributing to the development of solutions to many substance-use-related social problems. Accordingly, programs should be developed to enable active substance abuse prevention and therapeutic intervention based on adolescents' environment and personal situations.

CONCLUSION

This study identified the risk factors for adolescents' non-therapeutic substance use with raw data from the 17th Korea Youth Risk Behavior Web-based Survey of 2021. The identified risk factors for substance use among students were anxiety, loneliness, living separately from family, suicidal ideation, using e-cigarettes, and high stress. Educational plans based on these factors should be developed to prevent substance use among adolescents. Additionally, several recommendations can be made based on this study's findings. First, more studies should be conducted to identify substance abuse risk factors based on earlier research, including studies on childhood psychological difficulties and family factors. Second, programs promoting safe substance use based on adolescent characteristics should be developed.

ARTICLE INFORMATION

Authors' contribution

All the work was done by So Yeon Park.

Conflict of interest

No existing or potential conflict of interest relevant to this article was reported.

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Data availability

Please contact the corresponding author for data availability.

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