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Original Article

Prevalence of Substance Use and Its Risk and Protective Factors Among High School Students in Kerman, Iran

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Abstract

Introduction: Substance use among adolescents is an increasing public health concern. This study investigated the prevalence of substance use and its associated risk and protective factors among high school students in Kerman, Iran.

Methods: This analytical cross-sectional study was conducted from September to December 2025 among 527 students aged 14-19 years, selected through multistage cluster random sampling. Data were collected using a demographic questionnaire, the Cannabis-Alcohol-Tobacco Checklist, and the Risk and Protective Factors for Substance Use Questionnaire. Descriptive and inferential analyses included Chi-squared, independent t-test, one-way ANOVA, and logistic regression. The study was approved by the Ethics Committee of Kerman University of Medical Sciences.

Results: Lifetime, past-12-month, and past-30-day prevalence of substance use were 40.4%, 28.1%, and 16.1%, respectively. Hookah, cigarettes, and alcohol were the most commonly used substances. Prevalence did not differ significantly by sex but was higher among tenth-grade students. Past-30-day use was associated with positive parental attitudes toward substance use (OR = 3.465), low family supervision (OR = 6.047), low school commitment (OR = 5.018), and poor school psychosocial atmosphere (OR = 5.311). Past-12-month use was associated with sensation seeking (OR = 5.581), low family supervision (OR = 9.619), and social environment disorder (OR = 7.617).

Conclusion: Hookah and cigarettes were the most commonly used substances, and use was more frequent in early high school years. These findings support targeted family-, school-, and community-based prevention programs that strengthen supervision, school engagement, and healthy social environments. Multilevel prevention efforts should particularly target family supervision, school connectedness, and the school and community environment during early adolescence.

Keywords: Adolescents, Substance-related disorders, Risk factors, Protective factors, Schools

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Introduction

Substance use among adolescents remains a major public health concern because it is associated with adverse consequences for physical health, mental health, academic performance, and later life functioning.[1] Adolescence is a developmental period marked by rapid biological, psychological, and social changes, increased sensitivity to peer and environmental influences, and greater propensity for risk-taking behaviors, all of which may increase vulnerability to substance initiation and continued use.[2] Early onset of substance use is associated with a higher likelihood of developing substance use disorders in adulthood, academic failure, mental health problems, legal ssues, and increased risk of injuries and mortality.[3]

Global reports continue to show that tobacco, alcohol, and other substance use remain important concerns among young people, underscoring the need for early prevention strategies. Substance use in adolescence is rarely determined by a single factor; rather, it emerges from the interaction of influences at the individual, family, school, and community levels.[4]

In a meta-analysis published by Malekpour et al. in 2022, the overall prevalence of substance use in Iranian adolescent males was reported as follows: The overall reported prevalence with a 95% confidence interval for drug use was 7% (4-11%), methamphetamine 4% (3-6%), tobacco 10% (3-19%), and any addictive substance 4% (2-7%). In addition, the overall prevalence of alcohol use was reported to be 10% (8-11%).[5] In a national study with a sample size of 9402, including 56.9% males and 43.1% females, the prevalence of substance use among Iranian adolescents was reported as follows: 3687 (39.2%) reported having used at least one substance, and 2691 (28.6%) reported having used it recently. Among ever users, 53.0% had used more than one type of substance; among recent users, 47.1% had used more than one type of substance. A higher number of substances used ever or recently was associated with older age, attendance at private schools, lower GPA, single-parent

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family, and lower parental education. [6]

The official UNODC report, which publishes global statistics on drug use usually in the 15–64 age range and age patterns of use, notes that for some substances, e.g., stimulants/ecstasy, levels of use in adolescents are comparable to or higher than in the general population, although patterns vary from region to region.[7] Also, according to official statistics reported by the World Health Organization (WHO) in Europe, Central Asia, and Canada, more than half of 15-year-olds have consumed alcohol at least once. About 1 in 5 teenagers (20%) in these regions have used e-cigarettes. The trend in cannabis use among teenagers is worrying, and the gender gap in drug use is narrowing.[4]

In this study, we applied Bronfenbrenner's ecological systems theory as a conceptual framework to understand adolescent substance use as a multi-level phenomenon. According to this model, human development is shaped by five interconnected environmental systems: The microsystem immediate settings such as family, peers, and school, the mesosystem interactions between microsystems, e.g., consistency between parental and school expectations, the exosystem indirect influences such as parental workplace stress or neighborhood characteristics, the macrosystem broader cultural norms, societal values, and policies regarding drug use, and the chronosystem changes over time, including developmental transitions and historical events.[8]

Viewing adolescent substance use through this ecological lens highlights that initiation and maintenance of drug use cannot be attributed solely to individual risk factors or family dysfunction. Instead, it emerges from dynamic transactions across multiple levels: Risk-enhancing peer norms and inadequate parental monitoring at the microsystem level; poor home–school communication and limited extracurricular opportunities at the mesosystem level; community-level availability of substances and socioeconomic adversity at the exosystem level; permissive cultural attitudes or insufficient prevention policies at the macrosystem level; and life-course transitions such as puberty, school changes, or family disruption at the chronosystem level. This framework therefore supports the design of multi-level prevention and intervention strategies that target individual, relational, community, and policy domains simultaneously.

In Iran, like many other countries, adolescents face various social and environmental pressures that may contribute to substance use. Previous studies in the region have indicated various prevalence rates and identified a range of individual, family, peer, school, and community-level fac ors influencing substance use behaviors among youth.[9]

This study specifically focuses on high school students in Kerman City. While there is some research on substance use among adolescents in Iran, detailed and recent data on prevalence, alongside a comprehensive examination of both risk and protective factors within a specific age group and geographical location, are often limited. Identifying these factors is essential to tailoring preventive strategies that address t is population's unique vulnerabilities and strengths.

This study aimed to investigate the prevalence of substance use, including tobacco, alcohol, and illicit drugs, among high school students and to identify the significant individual, family, school, and community-level risk and protective factors associated with substance use. The findings of this research are expected to provide valuable insights for policymakers, educators, parents, and healthcare professionals to design and implement evidence-based prevention programs targeting adolescent substance use in Kerman a d potentially other similar urban settings.

Methods

Study design and setting

This analytical cross-sectional study was conducted in September–December 2025 among high school students in Kerman, Iran. Kerman is a major urban center in southeastern Iran. The present study was designed to examine substance use in the school setting using a multilevel ecological approach.

Participants and sampling

The target population consisted of high school students enrolled in grades 10–12.

The Cochran formula was used to calculate the sample size:

$$n = \frac{Z^2 pq}{d^2}$$

In this formula, Z was taken as 1.96 95% confidence interval, p was taken as 0.20 20% prevalence of substance use based on previous studies 5, q was taken as 0.80, and d was taken as 0.03 estimation error. By inserting these into the formula, the sample size was calculated to be 420, and by considering a 20% possible dropout, the final sample size was determined to be 500.

The sampling method was carried out using multi-stage cluster sampling. In the first stage, Kerman city was divided into 4 educational regions: North, South, East, and West. In the second stage, 2 schools, 1 girls' school and 1 boys' school, from each region were selected by simple random sampling using a random number table. In the third stage, 3 classes, one from each grade, were selected randomly using a random number table from each school, and all students in those classes were included in the study. A total of 8 schools and 24 classes were sampled, which included about 527 students, considering an average of 20-25 students per class. To ensure sample representation, the proportionality of gender distribution and distribution across educational levels was observed based on Kerman city education statistics. Also, public and private schools were included in the sample in proportion to their actual distribution in Kerman city.

The inclusion criteria for the study included the following: Studying in one of the tenth, eleventh, or twelfth grades of secondary school in 2025; written informed

parental consent for their child to participate in the study; written consent of the student to participate in the study; ability to understand and complete the questionnaires in Persian; regular attendance at school with fewer than 10 sessions of absence this year.

Exclusion criteria also included the following: Unwillingness to continue cooperation at any stage of the study; incomplete completion of the questionnaires more than 20% unanswered questions); presence of a severe cognitive or mental disorder that interferes with the ability to understand and answer the questions; transfer or dropout during the study; lack of parental or student consent.

A total of 700 questionnaires were distributed, and 527 were completed and included in the final analysis. Therefore, 173 (24.7%) questionnaires were excluded because of incomplete responses (Figure 1). Research consistently demonstrates that high-risk adolescents, including those who use substances more heavily, have higher rates of absenteeism. This is an unavoidable limitation of the school-based approach. To minimize loss of representativeness, replacement students were selected from the same school and the same grade level when necessary, using the same random selection procedure as the original sample. Because nonresponse and incomplete questionnaires were more likely among students with higher-risk behaviors, this may have led to underestimation of the true prevalence of substance use.

Data Collection Instruments

Data were collected using a self-administered questionnaire with three parts: Demographic characteristics, the Cannabis-Alcohol-Tobacco Checklist, and the Risk and Protective Factors for Substance Use Questionnaire. The demographic form included age, sex, and grade level. Before starting data collection, a pilot study was conducted on 50 students who were not later included in the main sample to ensure the face and content validity of the ques ionnaires, as well as the time required to complete them.

Despite its official title, which only covers three types of substances, the Cannabis-Alcohol-Tobacco Checklist CTC assessed the frequency and type of substance use, including lifetime prevalence, prevalence in the past 12 months, and prevalence in the past 30 days, for various substances such as hookah, cigarettes, alcohol, cannabis, opiates, and other illicit drugs. The validity and reliability of the Persian version of this questionnaire have been confirmed by Bahirai et al. with a Cronbach's lpha coefficient of 0.87 for the entire questionnaire. [10]

The Risk and Protective Factors for Substance Use Questionnaire developed and standardized by Mohammad Khani 2012 [11] has 86 items in four domains: Individual, family, school, and social, and 12 subscales: Attitude toward substance use, hopelessness, social skills, sensation seeking, impulsivity, sensitivity to anxiety, family conflicts, parental attitude toward substances, family supervision, social environment disorder, sense of commitment to school, and school psychological/social atmosphere. The questionnaire is scored based on a 4-point Likert scale: strongly disagree = 1, disagree = 2, agree = 3, strongly agree = 4. For each subscale, the average score of the items related to it is calculated. A higher score in the negative subscales, such as positive attitude toward substance use, hopelessness, and impulsivity, indicates greater risk, and in the positive subscales, such as social skills and family supervision, indicates greater protection. The cut-off point for the negative subscales is 2.5; a score higher than that is considered high risk.

The reliability and validity of this questionnaire have been confirmed as follows: Internal consistency of the entire questionnaire with a Cronbach's alpha of 0.92, discriminant validity with the ability to distinguish students who use and do not use substances, and construct validity through confirmatory and exploratory factor analysis and compliance with theoretical models predicting substance use.[11]

Before the main data collection, a pilot study was conducted on 50 students who were not included in the final sample to assess face and content validity and to estimate completion time. The pilot study indicated that the questionnaires were understandable and feasible for administration in the school setting, and no major revision was required. The average completion time was approximately 25 minutes, and no major problems in comprehension or item interpretation were identified.

Data Analysis

Data were analyzed using SPSS version 26. Descriptive statistics were used to summarize participant characteristics and prevalence estimates. Chi-square tests were applied for categorical comparisons, independent t-tests for two-group mean comparisons, and one-way ANOVA for multi-group comparisons. Multivariable logistic regression was used to identify independent predictors of 30-day and 12-month substance use, with variables entered based on their univariate associations and after assessing potential confounding. Missing data were handled by complete-case analysis. The statistical significance level was considered at $P < 0.05$.

To assess multicollinearity among independent variables in the regression models, variance inflation factor VIF values were examined for all variables included in the

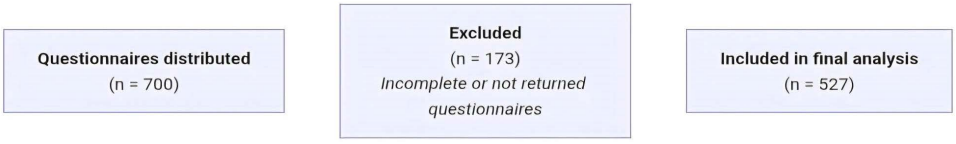


Figure 1. Flowchart of participants in the study

final models. Model fit and calibration were evaluated using the Hosmer-Lemeshow goodness-of-fit test, and discriminative ability was assessed by the area under the receiver operating characteristic curve AUC. Nagelkerke (R^2) and overall classification ac uracy we e also reported to describe model performance.

Results

A total of 527 high school students participated in the study. The mean age of the participants was 16.35 ± 1.39 years, ranging from 14 to 19 years.

The demographic characteri tics of the study participants are presented in Table 1.

Prevalence of Substance Use

The findings revealed a considerable prevalence of substance use among the adolescent participants: 40.4% of students reported having used at least one substance in their lifetime, 28.1% reported substance use in the past 12 months, and 16.1% reported substance use in the past 30 days. Lifetime use means that a person has used a substance at least once in their lifetime, while use in the pa t 12 months and 30 days refers to a specific time period.

The most commonly used substances were Hookah, followed by cigarettes and alcohol (Table 2).

Prevalence of substance use by gender and educational level

The results of logistic regression showed that gender was not a significant predictor of substance use in the past 30 days ($P = 0.756$), past 12 months ($P = 0.203$), and lifetime ($P = 0.358$), indicating that there was no significant difference in the pattern of substance use between male and female students.

Regarding substance use in the past 30 days, there was a significant difference between grades ($P = 0.021$). The rate of substance use in the 10th grade (22.3%) was significantly higher than in the 11th grade (13.1%) and 12th grade (12.7%).

Risk and Protective Factors

Descriptive findings related to the specific objectives of the study

Mean score of attitudes towards substance use

The mean score of attitudes towards substance use among all students was 1.824 with a standard deviation of 0.5448, and a range of 1 to 3.5. 12% of students had a positive attitude towards substance use score higher than 2.5. The mean score of attitudes towards substance use in students with a history of substance use in their lifetime (2.288) was significantly higher than that of students without a history of use (1.509) ($P < 0.001$, t = -22.625, Cohen's d = -2.008). Also, the mean score of this score in students with a history of substance use in the past 30 days (2.649 ± 0.390) was significantly higher than that of students without a history of recent use (1.665 ± 0.410; t = -20.406, $P < 0.001$).

Table 1. Demographic characteristics of the study participants

Variable		Number (Percentage)
Gender	Male	250 (47.4%)
	Female	277 (52.6%)
Educational level	Tenth	179 (34.0%)
	Elev nth	183 (34.7%)
	Twelfth	165 (31.3%)

Mean Hopelessness Score

The mean hopelessness score among all students was 1.863, with a standard deviation of 0.567 and a range of 1 to 3.56. 15.6% of students reported a high level of hopelessness score higher than 2.5. An independent t-test showed that there was no significant difference between the mean hopelessness score of female students (1.874) and male students (1.851) ($P = 0.643$, t = -0.463). The mean hopelessness score of students with a lifetime history of substance use (2.348) was significantly higher than that of students without a history of use (1.534) ($P < 0.001$, t = -22.815, Cohen's d = -2.025). Also, this mean was significantly higher in students who used drugs in the past 30 days (2.745 ± 0.389) than in non-using students (1.694 ± 0.419) (t = -21.410, $P < 0.001$).

Mean social skills level score

The mean social skills score in the entire sample was 1.84 with a standard deviation of 0.591. The minimum and maximum scores were recorded as 1.000 and 3.875, respectively. Seventy-two (13.7%) students were in the group with high social skills. An independent t-test showed that there was no significant difference between the mean social skills score of female students (1.87139) and male students (1.80900) ($P = 0.227$, Cohen's d = -0.106). The mean social skills score in individuals with a history of substance use (2.34683) was significantly higher than in individuals without a history of use (1.49920) ($P < 0.001$, Cohen's d = -2.016). The higher social skills scores among substance users were unexpected and should be interpreted cautiously. One possible explanation is measurement misalignment, because the social skills scale may not have captured the specific interpersonal competencies relevant to resisting substance use in this age group. Another possibility is that some users may report greater peer-oriented interaction or social confidence, which could

Table 2. Prevalence of substance use among high school students with estimated 95% confidence intervals (n = 527)

Substance	Lifetime % estimated 95% CI	Past 12 months % estimated 95% CI	Past 30 days % estimated 95% CI
Hookah	31.9% (28-36%)	21.1% (18-25%)	10.6% (8-13%)
Cigarette	29.0% (25-33%)	18.4% (15-22%)	9.3% (7-12%)
Alcohol	12.0% (9-15%)	7.6% (5-10%)	3.4% (2-5%)
sedative	7.8% (5-10%)	4.7% (3-7%)	1.9% (1-3%)
Cannabis	6.6% (4-9%)	3.6% (2-6%)	1.5% (0.5-3%)
opioids	5.1% (3-7%)	3.0% (1-5%)	1.3% (0.5-3%)
stimulant	3.6% (2-6%)	0.8% (0-2%)	-

Note. 95% confidence intervals were estimated for binomial proportions using the Wilson score method and the total sample size (n = 527)

inflate scores without reflecting genuinely protective social functioning. Future studies should examine this association using more detailed and behaviorally anchored measures of social skills and should verify whether the direction of the association remains stable across different instruments and populations.

Mean score of sensation seeking

The mean sensation seeking score in the entire sample was 1.82614 with a standard deviation of 0.574776. The minimum and maximum scores were recorded as 1.000 and 3.875, respectively. 11.8% of the students (n = 62) were in the high sensation-seeking group. An independent t-test showed that there was no significant difference between the mean sensation-seeking score of female students (1.83890) and male students (|1.81200) ($P = 0.592$, Cohen's d = -0.047). The mean sensation seeking score in individuals with a history of use in the past 12 months (2.48480) was significantly higher than that of individuals without a history of use (1.56893) ($P < 0.001$, Cohen's d = -2.283).

Mean impulsivity score

The mean impulsivity score in the entire sample was 1.850727 with a standard deviation of 0.603960. 13.5% of the students (n = 71) were in the high impulsivity group. An independent t-test showed that there was no significant difference between the mean impulsivity score of female students (1.864620) and male students (1.835333) ($P = 0.579$). The mean impulsivity score in individuals with a history of substance use in their lifetime (2.361502) was significantly higher than that of individuals without a history of use (1.504246) ($P < 0.001$, Cohen's d = -1.978).

Mean anxiety sensitivity score

The mean anxiety sensitivity score in the entire sample was 1.842 with a standard deviation of 0.6040. 14.8% of students (n = 78) were in the high anxiety sensitivity group. An independent t-test showed that there was no significant difference between the mean anxiety sensitivity score of female students (1.866) and male students (1.816) ($P = 0.346$). The mean anxiety sensitivity score in individuals with a history of lifetime substance use (2.335) was significantly higher than that of individuals without a history of use (1.508) ($P < 0.001$, Cohen's d = -1.851).

Average score of family conflict

The average score of family conflict in all students was 1.843 ± 0.569. This average was significantly higher in students who used drugs in the past 30 days (2.718 ± 0.410) than in non-using students (1.674 ± 0.422) (t = -20.993, $P < 0.001$). Also, high family conflict was associated with an increased likelihood of drug use (r = 0.41, $P < 0.001$).

Average score of parents' attitudes towards drug use

The average score of parents' attitudes towards drug use from the students' perspective was 1.851 ± 0.628. This mean was significantly higher in students who used drugs in the past 30 days (2.741 ± 0.502) than in non-using students (1.680 ± 0.490) (t = -18.210, $P < 0.001$).

Mean score of family supervision

The mean score of family supervision in all students was 1.839 ± 0.591. This mean was significantly higher in students who used drugs in the past 30 days (2.699 ± 0.416) than in non-using students (1.674 ± 0.462) (t = -19.033, $P < 0.001$).

Mean score of social environment disorder

The mean score of social environment disorder in all students was 1.858 ± 0.574. This mean was significantly higher in students who used drugs in the past 30 days (2.718 ± 0.445) than in non-users (1.693 ± 0.431) (t = -19.984, $P < 0.001$).

Mean score of school commitment

The mean score of school commitment in all students was 1.833 ± 0.597. This mean was significantly higher in students who used drugs in the past 30 days (2.725 ± 0.494) than in non-users (1.661 ± 0.442) (t = -19.920, $P < 0.001$).

Mean school psychosocial climate score

The mean school psychosocial climate score for all students was 1.846 ± 0.618. This mean was significantly higher in students who had used drugs in the past 30 days (2.760 ± 0.487) than in students who had not used drugs (1.671 ± 0.467) (t = -19.546, $P < 0.001$).

Logistic regression analysis, after controlling for other variables, identified several significant predictors of substance use. Positive attitudes toward substance use were associated with a greater likelihood of substance use ($P < 0.05$).

Higher levels of hopelessness were significantly associated with increased substance use ($P < 0.05$).

Students who displayed higher sensation-seeking tendencies were more likely to use substances ($P < 0.05$).

Lower levels of parental monitoring were significantly associated with increased substance use ($P < 0.05$).

Positive parental attitudes toward substance use were associated with increased substance use ($P < 0.05$). Students who were less committed to school were more likely to use substances ($P < 0.05$).

Higher levels of perceived societal disorder were significantly associated with increased substance use ($P < 0.05$). Conversely, family supervision, school commitment, and a favorable school psychosocial environment can reduce the likelihood of substance use in this group ($P < 0.001$) (Table 3).

The relationship between risk and protective factors and substance use across the lifespan

The results of the Chi-square test showed that there was a significant relationship between all the risk and protective factors studied and lifetime substance use ($P < 0.001$). The strongest relationship was related to the variable "hopelessness" (Phi = 0.511, $P < 0.001$), followed by "social

skills" (Phi = 0.483, $P < 0.001$) and "social environment disorder" (Phi = 0.472, $P < 0.001$).

Correlation analysis showed significant associations between substance use and multiple risk and protective factors, with the strongest correlations observed for social environment disorder, family supervision, family conflict, parental attitudes toward substance use, school commitment, and school psychosocial atmosphere. The highest observed correlation was with social environment disorder, followed by family supervision and family conflict.

Scores were dichotomized based on the median split before Chi-square analysis.

Predictors of substance use in the past 30 days

The results of logistic regression showed that in the multivariate model, the following variables were significant predictors of substance use in the past 30 days:

- Parental attitude towards substance use: OR = 3.465, 95% CI: 1.065-11.273, $P = 0.039$
- Amount of family supervision: OR = 6.047, 95% CI: 1.469-24.889, $P = 0.013$
- Amount of feeling of commitment to school: OR = 5.018, 95% CI: 1.232-20.436, $P = 0.024$
- Status of the school's psychological/social atmosphere: OR = 5.311, 95% CI: 1.168-24.151, $P = 0.031$

Table 3. Comparison of Risk and Protective Factors scores between users and non-users

Variable	User Mean ± SD	Non-user Mean ± SD	T	*P* value
Attitudes towards substance use	2.649 ± 0.390	1.665 ± 0.410	-20.406	< 0.001
Hopelessness	2.745 ± 0.389	1.694 ± 0.419	-21.410	< 0.001
Social skills	2.729 ± 0.451	1.671 ± 0.444	-20.061	< 0.001
Sensation-seeking	2.712 ± 0.506	1.656 ± 0.406	-21.039	< 0.001
Impulsivity	2.706 ± 0.415	1.686 ± 0.484	-18.178	< 0.001
Sensitivity to anxiety	2.706 ± 0.532	1.676 ± 0.458	-18.476	< 0.001
Family conflicts	2.718 ± 0.410	1.674 ± 0.422	-20.993	< 0.001
Parental attitudes towards substance use	2.741 ± 0.502	1.680 ± 0.490	-18.210	< 0.001
Family supervision	2.699 ± 0.416	1.674 ± 0.462	-19.033	< 0.001
Disordered social environment	2.718 ± 0.445	1.693 ± 0.431	-19.984	< 0.001
Feeling of commitment to school	2.725 ± 0.494	1.661 ± 0.442	-19.920	< 0.001
Psychological/social atmosphere of school	2.760 ± 0.487	1.671 ± 0.467	-19.546	< 0.001

The final logistic regression model was able to account for 84.2% of the changes in the dependent variable, substance use in the past 30 days (Nagelkerke $R^2 = 0.842$). The model was also able to correctly classify 96.0% of the cases.

Predictors of substance use in the past 12 months

The results of logistic regression showed that in the multivariate model, the following variables were significant predictors of substance use in the past 12 months:

- Sensation seeking: OR = 5.581, 95% CI: 1.729-18.008, $P = 0.004$
- Family supervision: OR = 9.619, 95% CI: 3.389-27.307, $P < 0.001$
- Social environment disorder: OR = 7.617, 95% CI: 2.590-22.398, $P < 0.001$

The odds ratios for family supervision and social environment disorder were relatively large, so they should be interpreted as strong associations rather than precise causal effects. Given the cross-sectional design, high outcome prevalence, and the number of predictors entered into the models, these estimates may be somewhat unst ble and should be viewed cautiously (Table 4).

Discussion

The present study found that substance use was common among high school students in Kerman, with lifetime, 12-month, and 30-day prevalence of 40.4%, 28.1%, and 16.1%, respectively. Hookah and cigarettes were the most frequently used substances, suggesting that tobacco-related products remain the dominant forms of adolescent substance exposure in this setting. These findings are consistent with prior evidence showing that adolescent substance use remains a significant public health concern in Iran and internationally.

The high prevalence of hookah use deserves specific attention because hookah is often perceived as socially acceptable and less harmful than cigarettes. Youth studies show that perceived social acceptability and low perceived harm are associated with higher odds of hookah use, which supports the need for product-specific prevention messaging.[3] In this sample, hookah was the most common substance, so prevention programs should directly address misconceptions about its safety, nicotine exposure, and social normalization among adolescents.

The findings of this study showed that 40.4% of students reported a lifetime history of substance use, which is

Table 4. Multivariate logistic regression models for substance use

Predictive factors	Consumption in the last 30 days	Consumption in the last 30 days	Consumption in the past 12 months	Consumption in the past 12 months
	OR 95% CI	*P* value	OR 95% CI	*P* value
Parental attitude towards substance use	3.465 1.065-11.273	0.039	-	-
Amount of family supervision	6.047 1.469-24.889	0.013	9.619 (3.389-27.307	< 0.001
Amount of feeling of commitment to school	5.018 1.232-20.436	0.024	-	-
State of the school's psychological/social atmosphere	5.311 1.168-24.151	0.031	-	-
Amount of sensation seeking	-	-	5.581 1.729-18.008	0.004
Amount of disorder in the social environment	-	-	7.617 2.590-22.398	< 0.001

slightly higher than that reported in the study by Bahiraei et al, who reported a prevalence of 34.2% in adolescents in Tehran.[12] This difference could be due to social and cultural changes in recent years, as well as regional differences in access to substances and social norms. Also, the prevalence of substance use in the past 30 days 16.1% in the present study is similar to the findings of Taremian et al. in Iranian students (15.3%), indicating a continuation of the pattern of use from adolescence to young adulthood.[13]

The most common substances used in this study were hookah (31.9%) and cigarettes (29%), respectively, which is consistent with a study conducted by Balvardi et al. in 2021, which reported hookah (20.6%) and cigarettes (18.4%) as the most common substances used in medical students.[9] Of course, taking into account that the study by Balvardi et al. was conducted on college students, who have different conditions than students, and therefore, the results should be interpreted with caution, it can ultimately be concluded that the possibility of the continuation of the pattern of substance use that began in adolescence into young adulthood and beyond is likely. This finding could be due to easy access to tobacco and a more positive attitude of the community towards hookah use compared to other substances. Also, the culture of social acceptance of hookah as a family pastime in Iran could play an important role in the high prevalence of its use.

Unlike some earlier studies,[14] this study did not show a significant association between sex and substance use. This pattern may reflect changing social norms, more similar access to substances across sexes, and a narrowing of traditional gender differences in risky behavior.[13]

A notable finding was the higher prevalence of substance use among the 10th-grade students compared with the 11th- and 12th-grade students. This finding is unexpected and inconsistent with many previous studies, such as Cleveland et al, which have shown that substance use increases with age.[14] This discrepancy could be due to several factors: First, the greater vulnerability of adolescents in early adolescence due to rapid physiological and psychological changes; second, stronger peer pressure in the first year of secondary school to be accepted into a new group; and third, lower awareness and coping skills in younger students. This finding highlights the importance of preventive interventions in the early years of secondary school.

Furthermore, this unusual pattern may reflect cohort or selection effects rather than a simple developmental gradient. Because school-based surveys tend to underrepresent students who have dropped out or are frequently absent, and these groups are at higher risk of substance use, the observed grade pattern may partly reflect selective retention of higher-risk students in the lower grades or differential absenteeism in the upper grades. Longitudinal data are needed to determine whether this represents a developmental pattern or a sampling-related effect.

At the individual level, positive attitudes toward substance use, hopelessness, and sensation seeking were among the strongest correlates and predictors of use. These associations suggest that beliefs about substances, emotional distress, and novelty-seeking tendencies are important correlates of adolescent substance use. Because the design was cross-sectional, these variables should be interpreted as associated factors rather than causal determinants. This pattern is consistent with the Social Development Model [15] and with a prior Iranian study showing that belief systems, self-control-related characteristics, and personal vulnerabilities are important determinants of substance use.[13] Of course, given that the target group of this study was college students and not students, comparing their results with each other should be done with caution. Theoretical explanations are straightforward: Favorable attitudes can reduce perceived risk, hopelessness may increase self-medication tendencies, and sensation seeking can increase attraction to novel and rewarding experiences.[16] Because these are modifiable domains, school-based prevention programs should explicitly address beliefs about substances, coping skills, and emotion regulation.

The finding that social skills scores were higher among substance users is counterintuitive and should be interpreted with caution. One explanation is measurement misalignment: the scale may have captured general social confidence, assertiveness, or peer engagement rather than the specific social competencies that protect against substance use. Another possibility is that the construct of "social skills" was operationalized in a way that overlaps with peer affiliation or social exposure, which could appear as higher scores among adolescents who are more socially active and, therefore, more exposed to substance-using peers. Future studies should examine this relationship using alternative instruments and, if possible, multi-informant or behavioral measures of social functioning.

Family supervision and parental attitudes toward substance use were also associated with substance use in the multivariable models. In particular, lower family supervision was associated with higher odds of substance use, highlighting parental monitoring as an important protective correlate. This is consistent with other literature showing that family monitoring and parenting norms shape adolescent behavior by limiting access, reinforcing expectations, and influencing modeling processes.[17] The findings suggest that prevention should not focus only on students, but should also include parents through supervision training, communication skills, and guidance on clear anti-substance norms.[18] Given the school-based setting of this study, such family-linked strategies may be particularly feasible through parent meetings and school counseling services.

School-level factors were also important. Lower school commitment and a less favorable school psychosocial climate were associated with substance use, suggesting that school connectedness may be an important protective correlate. Social environment disorder was likewise associated with substance use, supporting the role of broader contextual influences beyond the family and school

settings. These findings fit ecological and developmental perspectives that view school connectedness as a buffer against risk behavior by increasing belonging, structure, and engagement with prosocial activities.[14] Community disorganization also remained an important risk factor, which is consistent with the idea that adolescents are influenced by neighborhood safety, availability of substances, and social norms beyond the school context. Taken together, the results support a multilevel prevention approach rather than isolated individual-level intervention.

The findings support several specific and actionable prevention strategies. First, because hookah was the most prevalent substance, school health education should include hookah-specific content rather than treating all substances as a single category. Such programs should address its social acceptability, perceived harmlessness, and common misconceptions about filtration and safety. Second, because the 10th-grade students showed the highest prevalence, preventive interventions should be delivered at the transition to high school. This timing is important because it may capture students before risk behaviors become established and before school disengagement or absenteeism can further increase vulnerability. Third, because family supervision was strongly associated with substance use, parent-focused interventions should emphasize practical monitoring skills, clear household rules, and communication about substance use expectations. These programs should not be generic parenting sessions, but should specifically target supervision of adolescent peer contact, after-school time, and exposure to risk environments. Fourth, because school commitment was associated with lower substance use, schools should strengthen connectedness through mentoring, extracurricular participation, and supportive teacher–student relationships. These interventions are likely to be more effective when they are embedded in the school environ ent rather than delivered as isolated lectures.

Limitations

This study has several limitations. Its cross-sectional design prevents the establishment of causal relationships between the identified factors and substance use. Data were self-reported, which may introduce recall bias or social desirability bias. The study was conducted in Kerman City, and the findings may not be generalizable to other regions of Iran or other populations. Future longitudinal studies are needed to explore causal pathways and confirm these findings. In addition, 173 of 700 distributed questionnaires were excluded because of incomplete responses, which may have introduced selection bias and led to underestimation of substance use prevalence. The school-based design also excluded students absent on the day of data collection, and absenteeism is likely higher among adolescents with greater behavioral risk, which may further reduce the observed prevalence. Future studies using community-based sampling and methods to improve response completeness are recommended.

In addition to the aforementioned limitations, our study also has several strengths, such as a relatively large sample size, the use of valid instruments, and a multi-level analytical approach, which makes the validity of its findings acceptable.

Future studies are recommended to be conducted in a community-based manner to address an important part of the limitations of this study. In addition, although we used standardized questionnaires, there is a high probability that high-risk adolescents will incompletely complete the questionnaire, will not submit it, or will not complete it honestly. Therefore, if methods such as structured clinical interviews or laboratory tests are used in add tion to th questionnaire, the current gap will be filled.

Conclusion

This study shows that substance use is common among high school students in Kerman, and hookah and cigarettes are the most frequently used substances with the highest prevalence of use among the 10th-grade students. The most important actionable finding is that early high school students, especially the 10th graders, represent a high-priority target for prevention, and hookah use should be addressed specifically rather than treated as a general substance-use issue. We recommend immediate implementation of school-based prevention programs at the transition to high school, combined with parent-focused training to strengthen monitoring skills, clear household rules, and communication about substance use. These interventions should be tailored to the specific patterns observed in this study, especially hookah use, family supervision, and school commitment. A multilevel approach that combines student education, parent engagement, and school connectedness is likely to be more appropriate than generic awareness campaigns alone. Future longitudinal studies are needed to determine whether the observed grade-level pattern reflects a developmental trend or a selection effect related to dropout and absenteeism.

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Competing Interests
The authors declare no conflict of interest.

Data Availability Statement
Data are available on request.

Ethical Approval
The study was approved by the Ethics Committee of Kerman University of Medical Sciences (Ethical code: IR.KMU.AH.REC.1404.034). Written informed consent was obtained from all participating students and their parents/guardians. Participants were assured of anonymity and confidentiality, and their participation was voluntary. They were informed of their right to withdraw from the study at any time without penalty.

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