

Consumption of Licit and Illicit Substances and Depressive Symptoms in Adolescents

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ABSTRACT

Introduction: The consumption of psychoactive substances and depressive symptoms has increased in adolescents with an impact on the biopsychosocial development of young people, representing a public health problem.

Objective: To identify whether there is an association between the consumption of licit and illicit substances and the presence of depressive symptoms in adolescents between 10 and 19 years of age.

Material and method: Observational, cross-sectional, descriptive study. It included 135 adolescents between 12 and 19 years of age, both sexes. Age, sex, education, occupation, marital status, and family composition were questioned, and specific problems related to substance use were identified through the Drug Use Screening Inventory (DUSI-R). A descriptive analysis and Fisher's exact test were performed, considering $p < .05$ as significant.

Results: 52.6% men, 74.8% living in urban areas. Alcohol consumption was the most frequent, followed by tobacco and marijuana, in 74% of cases a member of the family has ingested it. Social competence and social networks were the dimensions with the greatest problem (low tolerance and impulsiveness, tendency to isolation). 63% had moderate to severe depressive symptoms, related to substance use. Higher consumption of tobacco, marijuana and cocaine by men (.008, <.001 and <.001), but not with alcohol (.461).

Conclusions: Most of them have consumed at least one licit or illicit substance before the age of 18, it is moderately related to depressive symptoms and gender, worrying patterns were identified in the severity of depressive symptoms and psychosocial conditions.

Keywords: Adolescents; Alcohol consumption; Illicit drugs; Depression; Substance-related disorders

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1. INTRODUCTION

Adolescence is a developmental period characterized by significant physical, emotional, and social transformations. From a psychosocial perspective, the absence of maturation in the prefrontal cortex complicates the discernment of appropriate behaviors, leading to its characterization as the most problematic stage. This stage is considered particularly susceptible to risk behaviors and

access to harmful substances. As stated by Hidalgo, Vicario, and Gonzalez (2017).

The social and family environment exerts a significant influence on substance experimentation, particularly in the absence of parental supervision and support, the replication of consumption behaviors (particularly alcohol consumption), and the lack of knowledge regarding the consequences of substance abuse. As posited by

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Rodríguez Parrales, Rodríguez Quiróz, Ramírez Velez, and Rodríguez Lino (2023) and Pulido Trujillo, San Jorge Cárdenas, Morales Contreras, and Peregrina Martínez (2024),

Notwithstanding the prevalence of psychoactive substance use among adolescents, there is a paucity of adequate treatment for this condition. Moreover, the resources allocated to multidisciplinary abstinence and/or rehabilitation care are inadequate. In Mexico, the National Institute of Statistics and Geography has reported a disconcerting escalation in the consumption of alcohol, tobacco, and other drugs among adolescents between the ages of 12 and 19. This phenomenon, which has been identified as a contributing factor to disability and premature mortality in this particularly vulnerable population, demands urgent attention from a comprehensive perspective. As indicated by Thomasius, Arnaud, Holtmann, and Kiefer (2020) and INEGI (2023),

The predominant motivations for substance use encompass social factors, enhancement, coping mechanisms (anxiety, withdrawal, depression), and conformity. These motivations can be influenced by the specific type of drug. The external factors associated with these behaviors have been found to be more stable across different substances, while internal motives exhibit variability in their levels. This variability necessitates a comprehensive consideration of these factors when formulating intervention strategies (Mahu, Barret, Conrod, Bartel, & Steward, 2021).

According to the findings reported in the World Drug Report, alcohol and tobacco persist as the predominant licit substances of initiation among adolescents, with marijuana and solvents following closely behind. (Oficina de las Naciones Unidas contra la Droga y el Delito, 2021)

The consumption of licit substances, such as tobacco and alcohol, in conjunction with illicit substances, such as cannabis, has been demonstrated to amplify the adverse effects of alcohol. In addition to the effects of the substances consumed, the personality of the subject, mediating and distal effects intervene. (Waddel, 2021)

Recent studies have identified a correlation between substance use and severe mental health consequences, with depression being highlighted as one of the most prevalent disorders among adolescent users. (Arteaga Zambrano & Mendoza Alcívar, 2022) (Gómez Campuzano, Reyes Ruiz, Carmona, & Silvera, 2022)

The use of substances by adolescents has been demonstrated to serve as a predictor of depression severity, impulsivity, propensity, and suicidal ideation, independent of age, sex, race, and ethnicity. Conversely, depression has been shown to exacerbate substance use and diminish quality of life, thereby engendering a vicious cycle that perpetuates the deterioration of physical and mental health. As posited by Marino et al. (2024) and Guillen Pereira et al. (2025).

In this sense, the present study focuses on analyzing the relationship between the consumption of licit and illicit substances and the presence of depressive symptoms in adolescents assigned to the Family Medicine Unit No. 9 of the Mexican Institute of Social Security in Santa Ana Chiautempan, Tlaxcala, Mexico. This approach is particularly salient given its capacity to elucidate the repercussions of the sociocultural milieu of the region on the consumption patterns and mental well-being of adolescents. The findings of this study have the potential to inform the development of prevention and treatment strategies tailored to the unique requirements of this demographic.

MATERIALS AND METHODS

This study employed a quantitative, observational, cross-sectional, and descriptive approach in the Family Medicine Unit Number 9 in Santa Ana Chiautempan, Tlaxcala, Mexico. The study population included adolescents between 10 and 19 years of age from both sexes who had resided in Tlaxcala for at least six months and who were willing to participate. Exclusion criteria included individuals who reported a medical indication for psychiatric treatment or a diagnosis of depression at the time of the study.

A sample calculation was performed using the formula for finite populations, considering the total of 5,479 adolescents in the specified age range. The calculation assumed a confidence interval of 95%, an error rate of 5%, and a probability of .5, which resulted in the inclusion of 135 adolescents. The sampling method employed was non-probabilistic, encompassing consecutive cases across all offices. The subjects were situated in the outpatient consultation, emergency service, preventive medicine, and dentistry areas, irrespective of whether they were present as patients or companions.

Following a thorough explanation of the procedure, any existing uncertainties were addressed, and the adolescents provided their authorization through an informed assent signature. This consent was obtained from the parents or guardians of the adolescents. The surveys were administered individually and confidentially, ensuring the protection of personal data.

A pre-structured survey was administered to collect general data, including age, sex, education, occupation, marital status, family composition, and family history of drug use. The survey also included the Drug Use Screening Inventory-R, a tool that has been previously validated in Mexico by the Youth Integration Centers (CIJ). The collaboration with Solveig E. Rodríguez Kuri, Jorge Luis Arellánez Hernández, David Bruno Díaz Negrete, and Juan David González Sánchez yielded consistent results (9).

DUSI-R comprises 159 questions with a dichotomous response scale (yes/no) distributed in 10 areas of psychosocial adjustment (substance use, mental health, antisocial behaviors, family functioning, school performance, interpersonal relationships and peer group,

work adjustment, social skills, sexual behaviors, and use of free time). The evaluation of each area is based on a severity index, which is expressed as a percentage. In addition to this, a calculation of the Global Severity Index (IGG) is performed. The Global Severity Index is calculated by taking the average of all subscales. The classification of severity is then determined as follows: absence of severity, low, moderate, high, or very high severity.

A database was generated in the Excel program and the SPSS version 24 program for analysis. A descriptive analysis was conducted, incorporating frequencies and percentages to characterize the data. The age variable was presented with the median, interquartile range (IQR), and 95% confidence interval (95% CI) due to its non-Gaussian distribution, which was determined through the Kolmogorov-Smirnov test. To facilitate a more nuanced analysis, the data were stratified into two distinct groups: one comprising individuals aged 18 and above, and the other consisting of those below this age threshold. This categorization was employed to assess the relationship between age and the aforementioned variables, including sex, familial background, substance use, and geographical origin. The chi-square test and Fisher's exact test were utilized in this study. A p value of less than .05 was considered to be statistically significant.

The project received approval from the Local Research Committee of the Mexican Institute of Social Security in Tlaxcala, bearing the registration number R-2024-2902-048.

RESULTS

The study sample comprised 135 adolescents, ranging in age from 12 to 19 years, with a median age of 17 years, an interquartile range (IQR) of 3 years, and a 95% confidence interval (CI) of 16.03 to 16.8 years. Of these participants, 46 (41.5%) were under the age of 18, while 79 (58.5%) were between 18 and 19 years of age. The population under study was 71% male and 64% female. The majority of the population, 74.8%, resided in urban areas, while 25.2% resided in rural areas.

Regarding educational attainment, 14.8% (20) have completed primary school, 25.9% (35) have attended secondary school, 40% (54) have obtained a high school diploma, and 19.3% (44) have attained a bachelor's degree. According to family members' classifications, 32.6% (44) of the subjects were designated as traditional family, while 67.4% (91) were classified as extended family.

According to the results of the DUSI Drug Use Screening Inventory, the behavioral problems observed include low tolerance and impulsivity, as indicated by the following: frequent arguments with people (62.2%), distrust of people

(91%), frequent feelings of upset (46.7%), and being easily upset (67.4%).

While in a state of well-being, 61.5% (83) of the subjects reported the presence of sleep disorders, 63.7% experienced abdominal discomfort, 69.6% engaged in unprotected sexual activity, and 56.3% reported a decrease in energy levels.

With regard to psychological disorders, anxiety is the most prevalent condition, manifesting in various forms. These include feelings of nervousness among people (89.6%), deliberate property destruction (44.4%), restlessness (69.9%), difficulty concentrating (64.4%), and a range of depressive symptoms, such as frequent feelings of sadness (59.3%), desire to cry (2.2%), and physical exhaustion (30.4%), as well as contemplating what life would be like if one were deceased (13.3%).

Social competencies tend to be isolated, with subjects reporting feelings of disliking their peers (74.1%), unhappiness (68.1%), difficulties making new friends (74.1%), and difficulties maintaining eye contact during social interactions (74.1%).

The family system is impacted in the majority of respondents. Specifically, 74.1% of respondents reported that a family member had consumed alcohol to the extent of causing problems at home. Additionally, 73.3% of respondents indicated that their parents exhibited indifference towards their preferences and dislikes. Furthermore, 73.3% of respondents reported a lack of parental attention towards their achievements and significant matters. Finally, 73.3% of respondents indicated that they engaged in discussions with their parents. Conversely, only 26.7% of respondents reported engaging in shared activities with their family members.

It is noteworthy that the majority of respondents exhibited substandard academic performance, with 24.4% attaining lower grades compared to their previous performance and 12% contemplating the cessation of their academic pursuits.

With respect to labor adjustment, a mere 12.6% (17) of the subjects reported having engaged in labor at some point. While 30.4% have engaged in less physical activity than their peers, 80.7% spend more than two hours per day watching television, and 43% report spending their leisure time in sedentary activities.

As indicated by the data presented in Table 1, the dimensions that exhibited the most significant issues were social competence and social networks. In contrast, academic performance and job adjustment severity demonstrated a lower prevalence of these concerns.

Table 1. DUSI Drug Use Screening Inventory

	None	Low severity	Moderate Severity	High severity	Very high severity
Health status	14 (10.4)	25 (18.5)	27 (20)	19 (14.1)	50 (37)

Psychological disorder	8 (5.9)	29 (21.5)	25 (18.5)	32 (23.7)	41 (30.4)
Social Competence	6 (4.4)	11 (8.1)	18 (13.3)	18 (13.3)	82 (60.7)
Family System	16 (11.9)	19 (14.1)	18 (13.3)	46 (34.1)	36 (26.7)
School performance	7 (5.2)	26 (19.3)	77 (57)	23 (17)	2 (1.5)
Job Adjustment	12 (8.9)	105 (77.8)	7 (5.2)	3 (2.2)	8 (5.9)
Recreational activities	9 (6.7)	15 (11.1)	20 (14.8)	27 (20)	64 (47.4)
Social Media	15 (11.1)	22 (16.3)	2 (1.5)	48 (35.6)	48 (35.6)
Depression	6 (4.4)	3 (2.2)	19 (14.1)	103 (76.3)	4 (3)
Frequency (percentage)					

With respect to substance use, only 11.1% (15) denied the use of licit or illicit substances, with alcohol consumption being the most frequent, followed by tobacco and marijuana (Table 2).

Substance of consumption	Alcohol	Tobacco	Marijuana	Cocaine	Crack	Solvents/inhalants
Consumption	107 (79.3)	83 (61.5)	58 (43)	42 (31.1)	40 (29.6)	41 (30.4)
Consumption in the last year	109 (80.7)	109 (80.7)	45 (33.3)	19 (14.1)	14 (10.4)	13 (9.6)
Consumption in the last month	102 (75.6)	58 (43)	31 (23)	10 (7.4)	2 (1.5)	1 (.7)
Start before 16 years old	88 (65.2)	38 (28.1)	14 (10.3)	8 (5.2)	8 (5.9)	8 (5.9)
Frequency (percentage)						

A statistical difference was observed between the consumption of tobacco, cocaine and marijuana in relation to sex (Fisher's exact test .008, <.001 and <.001 respectively) with higher consumption in men, there was no difference with alcohol consumption (Fisher's exact test .461) (Figure 1).

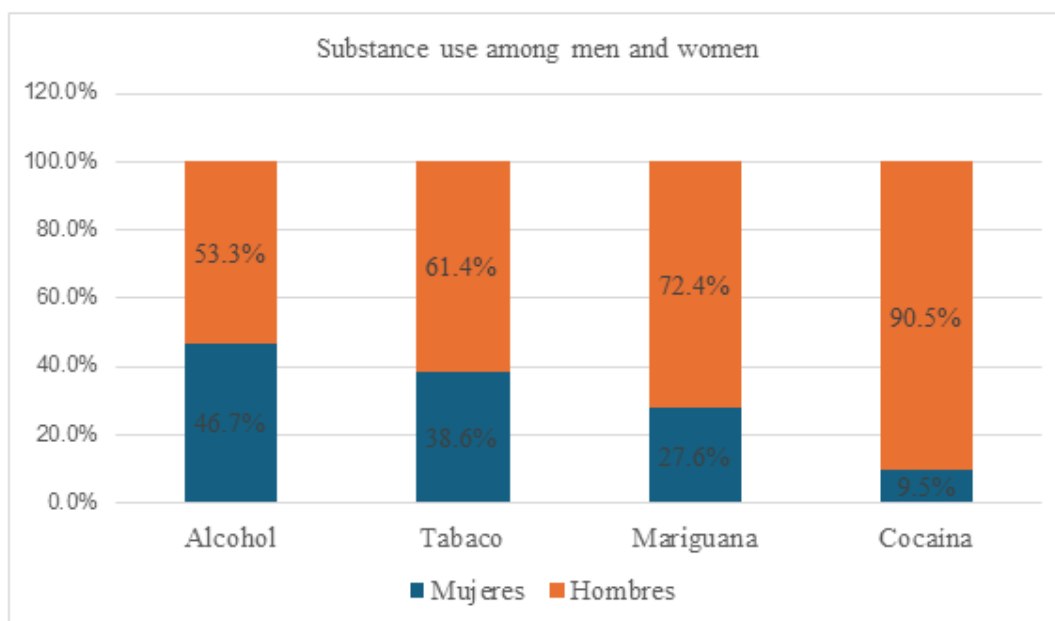


Figure 1. Substance use among men and women

In terms of origin, the majority of consumption is in adolescents in urban areas, with a statistical difference in the consumption of alcohol, tobacco, and marijuana (Fisher's exact test .009, .029, and .009, respectively) (Figure 2).

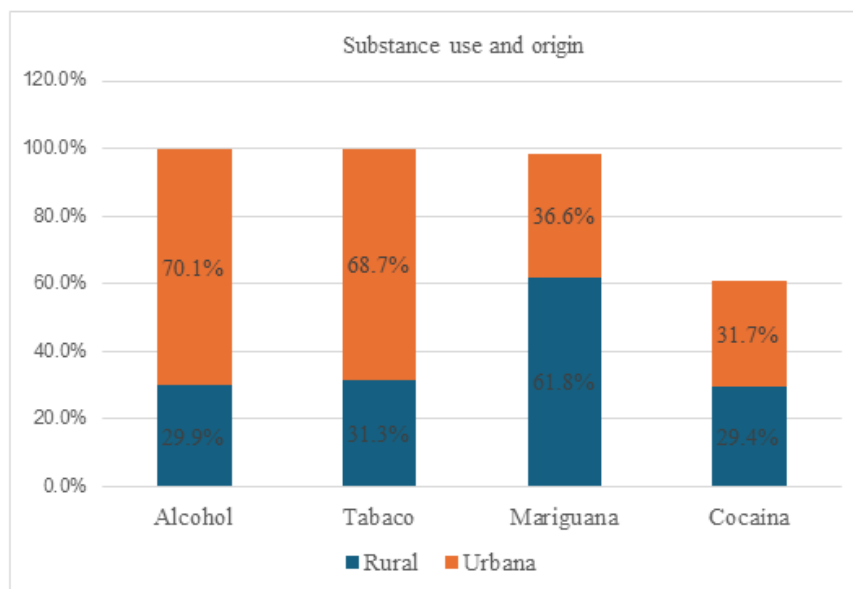


Figure 2. Substance use and origin

An examination of the data revealed no statistically significant differences in substance use based on family type ($p > .05$). However, a closer look at specific substances revealed that tobacco and cocaine use was more prevalent among children under the age of 18 (Fisher's exact test $< .001$ and $.001$, respectively). Additionally, alcohol and marijuana use was observed to be higher among adolescents aged 18 and 19, though this difference did not reach statistical significance (Fisher's exact test $.667$ and $.059$, respectively).

Finally, the study found that 56.3% (76) of participants exhibited symptoms consistent with depression, including a marked loss of interest or pleasure in activities (65.9%, 89) and insomnia or hypersomnia (48.9%, 66). Additionally, 11.9% (16) of participants reported recurrent thoughts of death, suicidal ideation, or suicide attempts. Notably, 4.4% (6) of participants did not exhibit depressive symptoms. The prevalence of depression among the adolescent population was examined, with

32.6% of the sample exhibiting low severity. Furthermore, 63% of the adolescents demonstrated moderate to severe depression, with 57.9% exhibiting moderate severity, 4.4% exhibiting high severity, and 0.7% exhibiting very high severity.

A comparison was made between the presence of depressive symptoms and the type of substances consumed. The consumption of alcohol, tobacco, and marijuana was found to be related to the presence of depressive symptoms ($p < .001$, $p = .003$, and $p = .033$, respectively).

A comparison of depressive symptoms was conducted among individuals who consumed licit substances (alcohol and/or tobacco), as well as illicit substances (marijuana, cocaine, crack, and/or solvents). The results indicated a moderate relationship between substance use and depressive symptoms, with a significant differen

ce observed between depressive symptoms and gender as well as between depressive symptoms and origin (Table 3).

		No 15 (11.1)	Licit 34 (25.2)	Illicit 6 (4.4)	Both 80 (59.3)	P*	Cramer* *
Depressive symptoms	None	6 (4.4)	0	0	0	<.001	.380
	Low Severity	4 (3)	7 (5.2)	2 (1.5)	31 (23)		
	Moderate severity	5 (3.7)	25 (18.5)	24 (17.8)	44 (32.6)		
	High Severity	0	1 (.7)	0	5 (3.7)		
	Very high severity	0	1 (.7)	0	0		
Gender	Woman	9 (6.7)	25 (18.5)	2 (1.5)	28 (20.7)	.001	.341
	Man	6 (4.4)	9 (6.7)	4 (3)	52 (38.5)		
Origin	Rural	0	7 (5.2)	0	27 (20)	.014	.280
	Urban	15 (11.1)	27 (20)	6 (4.4)	53 (39.3)		

Frequency (percentage within the total), *Pearson's Chi-square test, ** Cramer's V Test

DISCUSSION

The consumption of both licit and illicit substances, as well as depression, among adolescents constitutes a significant challenge within the domain of public health. At this particular stage of development, adolescents exhibit an elevated degree of vulnerability to the influence of peers and are more susceptible to exposure to risky behaviors.

In the present study, the majority of adolescents have consumed or are currently consuming a substance. A mere 20% of respondents denied this assertion, with alcohol and tobacco being the most commonly used substances.

The majority of the adolescents surveyed reside in urban areas, a factor that may have influenced the observed patterns of substance use. This is likely attributable to enhanced access to these substances and the presence of a social milieu characterized by risk, a finding that aligns with the conclusions of a preceding study highlighting the pivotal role of environmental influences and cultural characteristics in shaping consumption patterns. (Pavón Benítez, 2020)

The survey revealed that tobacco and alcohol use are prevalent among two-thirds of the surveyed population (79% and 68%, respectively). This figure exceeds the prevalence rates reported in a systematic review of the Nigerian population. In that study, the prevalence of tobacco use ranged from 4.3% to 50%, while alcohol use ranged from 12.8% to 71.6% across different regions. Notably, the age of first substance use was before the age of 15 (contrary to the findings of the study, which reported ages between 15 and 16). This discrepancy could be indicative of cultural influences on substance use patterns. As posited by Ekpenyong et al. (2024).

In the present study, the consumption of the substance in question was documented in one-third of the population. However, the specific manner in which the substance was consumed was not a subject of inquiry. A statistical disparity was observed between male and female participants, with males exhibiting a higher propensity for consumption. This finding aligns with previous reports (Valdés García & Domínguez Mateos, 2023).

In a survey conducted to assess the consumption patterns of cannabis in Washington, a state where its use is legal, the participants were exclusively those who consume the substance. The survey categorized the participants based on their product type and frequency of consumption. The most prevalent form of consumption was through vaping oil or liquid, followed by concentrates and edibles. Less than half of the population expressed concerns regarding its addictive potential and identified adolescents as being particularly vulnerable to harm. Individuals who consume cannabis daily were observed to experience the most complications. A comparable trend is observed in our population, where approximately half of the adolescents have experimented with marijuana, though its use has

declined to a quarter in the past month. As stated by Garrett, Williams, Carlini, and Hammond (2025).

The family constitutes a significant yet non-determinative factor. The provision of support by parents is imperative; parents are the primary agents responsible for the identification of behaviors or warning signs in their children. However, limited education can impede this process, potentially leading to an underestimation of risk. The present study reveals that more than half of the surveyed population exhibits poor family relationships, characterized by feelings of disgust towards family members and a perceived lack of parental indifference. These findings underscore the crucial role of parental support in fostering positive familial environments. In this study, the educational attainment of the parents or the socioeconomic status was not considered, factors that have been demonstrated to influence the decision to use substances. As stated in the work of Cohen, Mikulincer, and Weller (2025).

A wide variety of family integration configurations should be noted. The most common configuration is that of composite families, which include the father, mother, children, and other relatives, such as grandparents, uncles, aunts, cousins, and in-laws. Family dynamics have been demonstrated to act as factors related to the appearance of depressive symptoms.

In Veracruz, Mexico, a study was conducted in which adolescents and parents were interviewed independently to ascertain their perceptions of drug use. The study revealed that adolescents exhibited a limited understanding of the harms associated with drugs, a finding that aligns with the present study's findings. The most prevalent substance used was alcohol, as adolescents perceived it to be low risk. The findings revealed a divergence in the impact of parental influence. While the parents attributed the consumption to the influence of friends, the young people themselves cited parental influence as a contributing factor. The findings underscore the pivotal role of effective family communication in fostering resilience and well-being. As stated by Pulido Trujillo, De San Jorge Cárdenas, Morales Contreras, and Peregrina Martínez (2024).

The present study found an association between the use of licit and illicit substances and depressive symptoms, particularly the feeling of sadness and noncompliance with household rules. These results are consistent with those of previous studies that indicated a heightened vulnerability of adolescents to adverse circumstances following psychoactive substance consumption. (Arteaga Zambrano & Mendoza Alcívar, 2022)

Despite the documented rise in consumption observed in rural areas, which has been attributed to the absence of social networks, this study reveals that the urban population exhibits the highest levels of consumption. As stated by Pavón Benítez (2020).

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Díaz-Negrete and García-Aurrecochea emphasize that substances such as marijuana and cocaine have been associated with elevated levels of emotional and psychosocial disorders. However, no statistical differences were observed. Adolescents with high and very high severity of depressive symptoms exhibited a higher frequency of illicit substance use, suggesting that these substances could be utilized as a dysfunctional coping mechanism in the face of emotional adversity. (Díaz Negrete & Córdova Alcaráz, 2008)

LIMITATIONS

The primary constraint was the population, as the sample size was calculated based on the population of a small family medicine unit, typically from a population with a medium economic level. It is imperative to incorporate individuals from diverse educational backgrounds and geographical origins. A further limitation pertains to the instrument employed to assess the severity of the observed damage. Although the diagnosis of depression is made on the basis of a clinical evaluation, according to the Diagnostic and Statistical Manual of Mental Disorders (DSM 5), the results obtained provide compelling evidence of the necessity for comprehensive evaluation of adolescents.

CONCLUSIONS

The consumption of both licit and illicit substances among adolescents was found to be prevalent, with alcohol being the most commonly used substance, followed by tobacco and marijuana.

The age of onset for alcohol was on average 15 years old, while for illicit substances, such as marijuana, it was 16 years old. This critical period represents a crucial time when the implementation of preventive strategies is necessary.

The social acceptance of legal substance use, particularly within family and educational environments, may be indicative of a perceived low risk. This observation underscores the necessity for educational initiatives that address the long-term consequences of substance use, emphasizing its physical and emotional impact on adolescents.

The present study sought to further investigate the relationship between substance use and depressive symptoms, with the objective of identifying which patterns of substance consumption might exacerbate emotional problems in vulnerable adolescents.

The majority of the adolescent subjects exhibited symptoms consistent with depression, with the most prevalent manifestations comprising challenges with concentration, feelings of inadequacy, and contemplations of despair.

A comprehensive review of the extant literature on the subject revealed that family conflicts, a paucity of parental supervision, and exposure to consumption patterns within

the home were identified as key factors associated with substance use.

CONFLICT OF INTEREST

No author has a conflict of interest to report

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AUTHORS' CONTRIBUTIONS

Conceptualization and Design E.D.SM, L.B.C.; Methodology, E.D.SM, L.B.C, M.L.L.V.; Data Acquisition and Software, E.D.SM, M.L.L.V.; Data analysis and interpretation, M.L.L.V, L.B.C., P.S.J. M.C.J.; Principal Investigator, L.B.C., Research, L.B.C., Manuscript Writing E.D.SM, L.B.C, M.L.L.V — Preparation of Original Draft, E.D.SM, L.B.C, M.L.L.V, L.B.C. P.S.J; Writing, revision and editing of the manuscript, M.L.L.V., Visualization, E.D.SM, L.B.C, M.L.L.V, L.B.C, P.S.J, M.C.J.; Supervision, E.D.SM, L.B.C, M.L.L.V, L.B.C, P.S.J, M.C.J.

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