ORIGINAL ARTICLE

Association between Mental Health and the Use of Electronic Cigarettes and other Drugs among Mexican University Students

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RESUMEN

Introducción: en México, el uso de drogas y cigarros electrónicos (cigarro-e) han aumentado considerablemente y la población universitaria es la de mayor prevalencia. A pesar de ser una problemática actual, son escasos los estudios que evalúan de forma simultánea la salud mental, el bienestar mental y el consumo de drogas y de cigarros-e en universitarios mexicanos. **Objetivo:** analizar la asociación de la salud mental y el consumo de drogas y de cigarros-e en universitarios mexicanos. **Método:** se realizó un estudio transversal con alcance correlacional en una muestra de 422 universitarios. Se empleó el reactivo de frecuencia de consumo de drogas de la prueba ASSIST v3.1, la Encuesta Global de Tabaquismo en Adultos, la Escala de Depresión, Ansiedad y Estrés (DASS-21) y la Escala de Bienestar Mental de Warwick–Edinburgh. **Resultados:** el consumo de tabaco y el consumo de cigarro-e se asoció con estrés, depresión y ansiedad; el consumo de alcohol se asoció con estrés y bienestar mental; el consumo de cannabis se asoció con estrés; el consumo de cocaína se asoció con estrés y depresión, y bienestar mental; el consumo de estimulantes se asoció solo con bienestar mental; el consumo de sedantes y otras drogas se asoció con las subescalas de estrés, depresión y ansiedad, y bienestar mental. El uso del cigarro-e al menos en una sola ocasión predijo mayores puntajes en: estrés, ansiedad y depresión; el uso diario actual se asoció con menor bienestar mental. **Discusión y conclusiones:** los hallazgos respaldan la necesidad de crear estrategias de prevención, detección y tratamiento de las conductas de consumo de drogas, especialmente en población adulta joven y en contextos escolares de nivel superior.

Palabras clave: salud mental, estudiantes universitarios, cigarro electrónico, ansiedad, uso de sustancias.

ABSTRACT

Introduction: in Mexico, the use of drugs and electronic cigarettes (e-cigarettes) has increased considerably, with the university population showing the highest prevalence. Despite being a current issue, there are few studies that simultaneously evaluate mental health, mental well-being, and the consumption of drugs and e-cigarettes in Mexican university students are scarce. **Objective:** to analyze the association between mental health and the use of drugs and e-cigarettes in Mexican university students. **Method:** a cross-sectional, correlational study was conducted with a sample of 422 university students. Instruments included the drug use frequency item from the ASSIST v3.1 test, the Global Adult Tobacco Survey (GATS), the Depression, Anxiety and Stress Scale (DASS-21), and the Warwick–Edinburgh Mental Well-being Scale (WEMWBS). **Results:** tobacco and e-cigarette use were associated with stress, depression, and anxiety; alcohol use was associated with stress and mental well-being; cannabis use was associated with stress; cocaine use was associated with stress, depression, and mental well-being; stimulant use was associated solely with mental well-being; and the use of sedatives and other drugs was associated with stress, depression, anxiety subscales, and mental well-being. Having used e-cigarettes at least once predicted higher scores for stress, anxiety, and depression, whereas current daily use was associated with lower mental well-being. **Discussion and conclusions:** the findings support the need to develop strategies for the prevention, detection, and treatment of substance use behaviors, particularly among young adults and in higher education settings.

Keywords: mental health, university students, electronic cigarette, anxiety, substance use.

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INTRODUCTION

Drug use in Mexico has risen over the last few decades. The prevalence of illegal drugs has increased, going from 9.9% in 2016 to 13.1% in 2025. Cannabis is still the most commonly used illegal drug and its usage has risen from 8.6% in 2016 to 12% in 2025, as shown in the most recent National Survey on Drug, Alcohol, and Tobacco Use (Comisión Nacional de Salud Mental y Adicciones [CONASAMA], Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz [INP] and Instituto Nacional de Salud Pública [INSP], 2025). The same report shows that cigarette use dropped significantly in comparison to e-cigarette use, which increased from 1.1% in 2016 to 2.6% by the same year. This finding is particularly important since e-cigarettes are not harmless and there is a common misconception that they are safe devices which lead people to reduce their consumption of conventional cigarettes (Arora et al., 2025; Clinical Oncology Society of Australia, 2025).

Since young adults have the highest use of such drugs, it is appropriate to direct prevention and care efforts towards people in this age group, for example university students (Kava et al., 2024). University students should receive particular attention in relation to substance use since, at this stage of their professional training, they have to cope with academic, emotional, family, and social problems which can cause emotional distress; and if this condition is not treated, it could result in mood disorders and thus raise the likelihood of substance use (Cuadrado-Quishpe et al., 2025; Pérez et al., 2023).

This phase of life is marked by the beginning of independence and the increased academic demands, in addition to the fact that many students have to combine their studies with part-time work or move away from their hometowns and families; because of these circumstances they become more susceptible to experiencing symptoms of anxiety and depression, factors which may play a role in the start and continuation of drug use (Jacobs et al., 2024; Pérez et al., 2023).

In the presence of emotional distress, the use of substances can act as a way of coping or as a form of self-medication in order to alleviate the physical and cognitive-emotional symptoms caused by aging and the difficulties posed by the school environment, thereby turning this pattern of substance use into a vicious cycle that has an adverse effect on quality of life and emotional well-being (Aas et al., 2021; Esmaeelzadeh et al., 2018).

Romm et al. (2022) state that a number of factors are linked to substance use, such as sociodemographic characteristics (including sex, educational level, relationship status, and sexual orientation) and psychosocial factors (for example, introversion, adverse childhood experiences, and the presence of depressive symptoms), all of which predict behaviours that are harmful to mental health in general and to substance use in particular. Moreover, the easy access to substances in university settings represents a contextual risk factor since it makes access easier and increases the likelihood of use (Blows & Isaacs, 2022). This risk increases when students go through exam periods, suffer from academic overload, or encounter interpersonal problems (Acle-Mena, 2025; Pérez et al., 2023).

Although there is a relationship between mood and the use of substances among young people, this association is generally complicated, and the evidence published in recent years is limited and not enough for Latin America and, especially, for Mexico. Moreover, the studies carried out up to now have only looked at anxiety and depression in relation to various substances (excluding e-cigarettes) and have ignored stress, which is another important and common issue in university life.

Several studies have found significant associations between mental well-being and the presence of symptoms of anxiety and depression and substance use among university students. For instance, excessive alcohol consumption (*binge drinking*) and the use of other high-risk drugs have been linked to higher levels of psychological distress (Chang et al., 2022). In a similar way, the combined use of alcohol, cannabis, and e-cigarettes is connected with anxious-depressive symptomatology (Kava et al., 2024;Lui et al., 2025).

Other longitudinal studies have shown similar results, indicating that mixed symptoms (depression and anxiety) can lead to an earlier onset and may even play a role in maintaining substance use, such as nicotine, cannabis, and vaping products including e-cigarettes (Clendennen et al., 2023; Jacobs et al., 2024; Kang & Malvaso, 2024). Others have observed that parental depressive symptoms and cigarette use were linked to particular patterns of recent use of cigarettes, e-cigarettes, and cannabis (Wang et al., 2024); those who experienced constant discrimination and had higher depression scores were found to use nicotine and *cannabis* for as long as six months (Jacobs et al., 2024); e-cigarette use was connected with poor general mental health, especially in the areas of social dysfunction, anhedonia, and loss of confidence (Kang & Malvaso, 2024); and early initiation of vaping was associated to depressive symptoms (Arora et al., 2024).

Clendennen and colleagues (2023) looked at whether depression, anxiety and combined symptoms were linked to the use of nicotine or THC in electronic cigarettes over the previous 30 days among a group of students aged between 16 and 23 years; similarly, anxiety symptoms were associated with nicotine use in e-cigarettes one year later.

In a study conducted among university students, Blows and Isaacs (2022) found an association between drug use (primarily alcohol, marijuana, and ecstasy) and mental health, as reflected by high levels of stress and anxiety. Moreover, Walters et al. (2018), in their study which included 1,316 university students, discovered that it was only the depressive symptoms which were linked to the use of marijuana, tobacco, amphetamines, cocaine, sedatives and hallucinogens.

Dual and polysubstance use is consistently connected with adverse mental health outcomes, such as the associations between alcohol intake and a range of psychological symptoms (Lui et al., 2025), as well as between psychological distress and dual-use behaviours (for example, the combination of e-cigarettes with alcohol, marijuana, or conventional cigarettes). These findings show how important it is to look into the relationship between drug use and mental health among Mexican university students. Existing literature mainly concentrates on depression and anxiety, leaving a gap regarding this group and the particular effects of using e-cigarettes.

On the basis of the arguments mentioned above, this present study addresses the following research question: What is the level of association between mental health and the use of electronic cigarettes and other substances in university students?; Furthermore, the objective is to evaluate the statistical association between mental health, specifically anxiety, stress, and depression, and the use of e-cigarettes and other drugs within this population.

METHOD

Design

A quantitative, non-experimental, observational, cross-sectional, and correlational study was conducted.

Participants

A non-probabilistic convenience sampling method was used, based on the availability of the participating universities and the students' consent to complete the questionnaire. The sample consisted of 422 students enrolled at the Faculty of Higher Studies Iztacala and the Faculty of Higher Studies Zaragoza of the National Autonomous University of Mexico (UNAM), and at the University Center of the Valles of the University of Guadalajara. The mean age was 19.30 years (*SD* = 3.018), with a minimum age of 18 years and a maximum of 54 years. Most participants were women (*n* = 224, 53.1%), 45.0% (*n* = 190) were men, .7% (*n* = 3) identified as nonbinary, and 1.2% (*n* = 5) preferred not to state their gender.

Inclusion criteria: Participants were required to be formally enrolled in a bachelor's degree program at one of the participating universities, reading the informed consent and privacy notice, and voluntarily agreeing to participate in the study.

Exclusion criteria: Cases in which participants had a psychiatric diagnosis at the time of assessment that prevented them from providing free and informed consent or were taking any psychiatric medication. All high-risk cases were referred to free or institutional psychological support centers.

Elimination criteria: Cases in which participants withdrew their consent or left incomplete any instruments corresponding to the variables of interest for this research.

Instruments

Identification form: An ad hoc questionnaire that collected participant information, such as sex, gender, age, institution of origin, and the degree program in which they were enrolled. Alcohol, Smoking and Substance Involvement Screening Test (ASSIST v3.1): Since the interest was to estimate the recent frequency of use to subsequently analyze the association between variables, the following question was included: "*In the past 3 months, how often have you used any of the following substances?*" Regarding tobacco, alcohol, cannabis, cocaine, amphetamine-type stimulants, inhalants, sedatives or sleeping pills, hallucinogens, opiates, and other substances, which were answered on a Likert-type scale ranging from *never to daily* (World Health Organization, 2011). A Cronbach's alpha analysis was calculated to assess the internal consistency of these questions, based on the responses of the participants in this study, resulting in a coefficient of $\alpha = .563$.

Global Adult Tobacco Survey (GATS): A scale designed to assess e-cigarette consumption patterns. Section EC (Electronic Cigarette) was utilized (INSP, 2023).

Depression, Anxiety and Stress Scale (DASS-21): An abbreviated 21-item self-report instrument that measures the severity of anxiety, depression, and stress symptoms. Response options are rated on a 4-point Likert scale from 0 to 3, where 0 = *Did not ap-*

ply to me at all, 1 = *Applied to me to some degree, or some of the time*, 2 = *Applied to me to a considerable degree or a good part of time*, and 3 = *Applied to me very much or most of the time* (Dominguez-Lara et al., 2024). A Cronbach's alpha analysis using the responses of the 422 participants in this study showed an internal consistency of α = .946 for this instrument in this study.

Warwick-Edinburgh Mental Well-being Scale (WEMWBS): A 14-item instrument measuring affective-emotional, cognitive-evaluative, and psychological functioning aspects. Items are answered with respect to the past 2 weeks using a 5-point Likert scale ranging from 1 to 5: *none of the time, rarely, some of the time, often,* and *all of the time*. Lower scores indicate lower mental well-being (Barraza, 2021; Castellví et al., 2014). A Cronbach's alpha analysis based on the responses of the 422 participants in the present study showed high internal consistency for this instrument (α = .925).

Procedure

Once the project was approved by the ethics committee and authorized by the institutions, the questionnaires and instruments were administered to the university students who gave their consent to participate, through the Survio® platform. This digital platform allows for the automated design, distribution, and analysis of surveys via a web link.

A ticket to a movie showing in cinemas situated in the metropolitan area was given to 75 per cent of the participants as a non-coercive incentive. The distribution of the tickets was dependent on availability. It was made clear to the participants that, since the number of tickets was limited, they would be handed out as long as they were available and that receiving a ticket had nothing to do with the answers they provided or with the amount of substance use they reported. The administration of the questionnaires occurred in October and November 2025. After the data had been collected, a statistical analysis was performed using SPSS version 21.

Data Analysis

Descriptive analyses were conducted for sociodemographic variables (age and sex), as well as variables related to psychoactive substance use (combustible cigarettes, e-cigarettes, alcohol, cannabis, cocaine, amphetamine-type stimulants, inhalants, sedatives or sleeping pills, hallucinogens, opioids, and other substances) and mental health (anxiety, stress, depression, and mental well-being).

Correlation analyses were carried out taking into account a "variable 1" on mental health, with respect to a "variable 2" measuring psychoactive substance use or sociodemographic characteristics. For those "variable 2" with an ordinal measurement level, Spearman correlation analyses were performed, while for nominal categorical variables, the strength of association was evaluated using the ETA coefficient.

Simple linear regression analyses were performed with variables that showed significant correlation in the Spearman analysis. In these regressions, the mental health measure was taken as the dependent variable and a substance use or sociodemographic measure as the independent variable.

To determine whether lifetime ('ever') or current use of e-cigarettes (or other vapers) was a predictor of the mental health outcomes, the two variables concerning electronic device use were modified in the database by the creation of dummy or dichotomous variables. This change transformed the level of measurement from polytomous nominal to dichotomous nominal, enabling each response to be examined individually in relation to the presence or absence of use and its connection with an increased or decreased score for stress, anxiety, depression, and/or mental well-being. Multiple linear regression analyses were then carried out, using as independent variables the sets of dichotomous or dummy variables that represented ever or current use of electronic devices, with a mental health variable serving as the dependent variable.

Ethical Considerations

This study was reviewed and approved by the Ethics Committee of Facultad de Estudios Superiores Iztacala, de la Universidad Nacional Autónoma de México (UNAM), under approval number CE/FESI/062024/1768.

RESULTS

Regarding substance use in the past 3 months, alcohol was the most commonly used substance across weekly, monthly, and "once or twice" frequencies. Table 1 presents the detailed breakdown of psychoactive substance use frequency.

About the question "*Before today, had you ever heard of electronic cigarettes or vapers?*" 96.9% (*n* = 409) of the sample responded affirmatively; in relation to the question "*Have you ever, even if just once, used an electronic cigarette or another type of vaper?*" 50.7% (*n* = 214) answered yes; to the question "*Do you currently use electronic cigarettes or any type of vaper?*", only 6.9% (*n* = 29) indicated that they used it on some days, 2.1% (*n* = 9)

reported using them daily. Furthermore, when asked "*Have you ever used electronic cigarettes or any other type of vape daily?*" 9.5% (*n* = 40) reported that they had.

In relation to the question, "*How satisfied are you with using electronic cigarettes or any other type of vaper compared with smoking regular cigarettes?*", approximately 7% (*n* = 29) of participants reported a level of satisfaction ranging from satisfactory to much more satisfactory. Lastly, the main motives reported for using electronic cigarettes were because a friend or family member uses them (1.4%, *n* = 6), because they can use it at times or places where smoking tobacco is not permitted (.7%, *n* = 3), because they enjoy it (2.4%, *n* = 10), to avoid returning to smoking (.2%, *n* = 1), and because it offers a range of flavors they like (2.1%, *n* = 9).

In contrast, only 7.6% (*n* = 32) reported smoking tobacco on some days, whereas 1.7% (*n* = 7) smoked daily. The mean age at initiation of lifetime tobacco use, even if only once, was 15.86 years (*SD* = 2.563), whereas the mean age for starting daily tobacco use was 9.87 years (*SD* = 8.677). The mean number of cigarettes smoked per week was 1.78 (*SD* = 4.546).

In regard to mental health, the mean scores obtained from the DASS-21 were 11.50 (*SD* = 9.18), 9.36 (*SD* = 8.46), and 9.28 (*SD* = 8.94) points for stress, anxiety, and depression, respectively. The mean mental well-being score obtained from the WEMWBS was 49.18 (*SD* = 9.93) points.

Spearman correlation analyses showed associations between stress scores and substance use within the past 3 months for tobacco (*rs* .191, $p < .001$), alcohol (*rs* .144, $p < .003$), cannabis (*rs* .102, $p < .037$), cocaine (*rs* .098, $p < .044$), sedatives or sleeping pills (*rs* .205, $p < .000$), and other substances (*rs* .104, $p < .033$; see Table 2).

Similarly, associations were found between anxiety scores and the use in the past 3 months of tobacco (*rs* = .126, $p < .010$), sedatives or sleeping pills (*rs* = .196, $p < .001$) and other substances (*rs* = .116, $p < .017$; see Table 3).

Table 1

Distribution of psychoactive substances use (n = 422).

Substance	*Never f (%)*	*Once or twice f (%)*	*Monthly f (%)*	*Weekly f (%)*	*Daily f (%)*
Tobacco	344 (81.5)	45 (10.5)	11 (2.6)	13 (3.1)	9 (2.1)
Alcohol	189 (44.8)	144 (34.1)	64 (15.2)	24 (5.7)	1 (.2)
Cannabis	383 (90.8)	28 (6.6)	6 (1.4)	2 (.5)	3 (.7)
Cocaine	416 (98.6)	6 (1.4)	0 (0)	0 (0)	0 (0)
Amphetamine-type stimulants	417 (98.8)	4 (.9)	0 (0)	0 (0)	1 (.1)
Inhalants	418 (99.1)	4 (.9)	0 (0)	0 (0)	0 (0)
Sedatives or sleeping pills	393 (93.4)	20 (4.7)	2 (.5)	3 (.7)	3 (.7)
Hallucinogens	415 (98.3)	5 (1.2)	1 (.2)	1 (.2)	0 (0)
Opiates	417 (98.8)	4 (.9)	1 (.2)	0 (0)	0 (0)
Other	415 (98.3)	4 (.9)	1 (.2)	0 (0)	2 (.5)

Table 2

Results of Spearman correlation analysis, between stress score and substances use variables.

Variable 1	*Variable 2*	*n*	r_s	*p*
Stress	Age	422	.005	.919
	At what age did you first smoke tobacco, even if only once? (enter age in years)	103[a]	.069	.487
	At what age did you start smoking daily?	103[a]	-.064	.523
	In a typical week, how many cigarettes do you currently smoke per week?	103[a]	-.004	.969
	In the past 3 months, how often have you used any of the following substances? × Tobacco	422	.191	.001*
	In the past 3 months, how often have you used any of the following substances? × Alcohol	422	.144	.003*
	In the past 3 months, how often have you used any of the following substances? × Cannabis	422	.102	.037*
	In the past 3 months, how often have you used any of the following substances? × Cocaine	422	.098	.044*
	In the past 3 months, how often have you used any of the following substances? × Amphetamine-type stimulants	422	.086	.078
	In the past 3 months, how often have you used any of the following substances? × Inhalants	422	.000	1
	In the past 3 months, how often have you used any of the following substances? × Sedatives or sleeping pills	422	.205	.001*
	In the past 3 months, how often have you used any of the following substances? × Hallucinogens	422	.069	.156
	In the past 3 months, how often have you used any of the following substances? × Opioids	422	.028	.562
	In the past 3 months, how often have you used any of the following substances? × Other substances	422	.104	.033*

Note: *Statistically significant at the $p < .05$ level; ** statistically significant at the $p < .005$ level; [a] Only participants who provided responses to the DASS-21 and reported tobacco use were included.

Table 3

Results of Spearman correlation analysis between anxiety score and substance use variables.

Variable 1	*Variable 2*	*n*	r_s	*p*
Anxiety	Age	422	-.006	.897
	At what age did you first smoke tobacco, even if only once? (enter age in years)	103[a]	.102	.304
	At what age did you start smoking every day?	109[a]	.005	.959
	In a typical week, how many cigarettes do you currently smoke per week?	109[a]	.017	.866
	In the past 3 months, how often have you used any of the following substances? × Tobacco	422	.126	.010*
	In the past 3 months, how often have you used any of the following substances? × Alcohol	422	.071	.146
	In the past 3 months, how often have you used any of the following substances? × Cannabis	422	.026	.596
	In the past 3 months, how often have you used any of the following substances? × Cocaine	422	.038	.442
	In the past 3 months, how often have you used any of the following substances? × Amphetamine-type stimulants	422	.087	.075
	In the past 3 months, how often have you used any of the following substances? × Inhalants	422	-.045	.360
	In the past 3 months, how often have you used any of the following substances? × Sedatives or sleeping pills	422	.196	.001*
	In the past 3 months, how often have you used any of the following substances? × Hallucinogens	422	.033	.494
	In the past 3 months, how often have you used any of the following substances? × Opioids	422	-.049	.310
	In the past 3 months, how often have you used any of the following substances? × Other	422	.116	.017*

Note: * Statistically significant at the $p < .05$ level; ** statistically significant at the $p < .005$ level. [a] Only participants who provided responses to the DASS-21 and reported tobacco use were included.

Table 4

Results of Spearman correlation analysis, between depression score and substance use variables.

Variable 1	*Variable 2*	*n*	r_s	*p*
Depression	Age	422	-.026	.596
	At what age did you first smoke tobacco, even if only once? (enter age in years)	103[a]	.018	.859
	At what age did you start smoking every day?	103[a]	-.013	.892
	In a typical week, how many cigarettes do you currently smoke per week?	103[a]	-.024	.811
	In the past 3 months, how often have you used any of the following substances? × Tobacco	422	.130	.008*
	In the past 3 months, how often have you used any of the following substances? × Alcohol	422	.044	.365
	In the past 3 months, how often have you used any of the following substances? × Cannabis	422	.057	.242
	In the past 3 months, how often have you used any of the following substances? × Cocaine	422	.099	.041*
	In the past 3 months, how often have you used any of the following substances? × Amphetamine-type stimulants	422	.051	.295
	In the past 3 months, how often have you used any of the following substances? × Inhalants	422	.008	.872
	In the past 3 months, how often have you used any of the following substances? × Sedatives or sleeping pills	422	.214	.001*
	In the past 3 months, how often have you used any of the following substances? × Hallucinogens	422	.066	.174
	In the past 3 months, how often have you used any of the following substances? × Opioids	422	.039	.421
	In the past 3 months, how often have you used any of the following substances? × Other	422	.155	.001*

Note: *Statistically significant at the $p < .05$ level; ** statistically significant at the $p < .005$ leve; [a] Only participants who provided responses to the DASS-21 and reported tobacco use were included.

An association was found between depression scores and the use in the past 3 months of tobacco (*rs* = .130, $p < .008$), cocaine (*rs* = .099, $p < .041$), sedatives or sleeping pills (*rs* = .214, $p < .000$), and other substances (*rs* =.155, $p < .001$; see Table 4).

Significant associations were observed between mental well-being and the use in the past 3 months of alcohol (*rs* =.101, $p < .038$), cocaine (*rs* = -.103, $p < .034$), amphetamine-type stimulants (*rs* = -.108, $p < .026$), sedatives or sleeping pills (*rs* = -.160, $p < .001$) and other substances (*rs* = -.094, $p < .100$; see Table 5).

The analysis of the ETA data revealed that the level of satisfaction with using electronic cigarettes or other types of vapers, together with the reasons for using e-cigarettes or another type of vaper, were the factors most closely linked to mental health, across its various aspects including stress, anxiety, depression, and mental well-being. (see Supplementary Table 6).

Simple linear regression analyses showed that substance use in the past 3 months was a predictor of mental health scores, tobacco, alcohol, sedatives, and other substances appearing as the main predictors. The detailed results of the simple linear regression analyses carried out are given in Table 7 (see Supplementary Table 7). Multiple regression analyses indicated that both lifetime use of electronic cigarettes

Table 5
Results of Spearman correlation analysis, between mental well-being score and substance use variables.

Variable 1	*Variable 2*	*n*	*r*	*p*
Well-being	Age	422	.019	.690
	At what age did you first smoke tobacco, even if only once? (enter age in years)	103[a]	-.049	.621
	At what age did you start smoking every day?	103[a]	.012	.907
	In a typical week, how many cigarettes do you currently smoke per week?	103[a]	.076	.497
	In the past 3 months, how often have you used any of the following substances? × Tobacco	422	-.012	.809
	In the past 3 months, how often have you used any of the following substances? × Alcohol	422	.101	.038*
	In the past 3 months, how often have you used any of the following substances? × Cannabis	422	-.024	.621
	In the past 3 months, how often have you used any of the following substances? × Cocaine	422	-.103	.034*
	In the past 3 months, how often have you used any of the following substances? × Amphetamine-type stimulants	422	-.108	.026*
	In the past 3 months, how often have you used any of the following substances? × Inhalants	422	-.029	.553
	In the past 3 months, how often have you used any of the following substances? × Sedatives or sleeping pills	422	-.160	.001*
	In the past 3 months, how often have you used any of the following substances? × Hallucinogens	422	-.064	.191
	In the past 3 months, how often have you used any of the following substances? × Opioids	422	-.014	.772
	In the past 3 months, how often have you used any of the following substances? × Other	422	- .100	.041*

Note: * Statistically significant at the $p < .05$ level; ** statistically significant at the $p < .005$ level. [a] Only participants who provided responses to the DASS-21 and reported tobacco use were included.

and current use of e-cigarettes or other vaping devices significantly predicted all assessed mental health aspects, with the exception of mental well-being (see Supplementary Table 8).

DISCUSSION AND CONCLUSIONS

The purpose of this research was to analyze the association between mental health and the consumption of e-cigarettes and drugs among Mexican university students. The results showed that tobacco use during the past 3 months was associated with the stress, depression, and anxiety subscales; alcohol use in the past 3 months was associated with the stress subscale and the mental well-being scale; cannabis use in the past 3 months was associated with the stress subscale; cocaine use in the past 3 months was associated with the stress and depression subscales as well as the mental well-being scale; stimulant use in the past 3 months was associated only with the mental well-being scale; and the use of sedatives and other drugs in the past 3 months was associated with the stress, depression, anxiety, and mental well-being subscales; Furthermore, having ever used e-cigarettes was associated with stress, anxiety, and depression. These results are in agreement with those reported by Qeadan and Egbert (2025), in which a significant correlation was identified between substance use and mental health.

Additionally, the results showed that the use of tobacco was linked to the depression subscale, which matches the findings by Jacobs et al. (2024); however, in that latter study, other aspects such as discrimination and cannabis use were evaluated. Furthermore, Clendennen et al. (2023) found an association between tobacco use and depression and anxiety, which is consistent with the results observed in this study, but not with regard to stress.

In this research the frequency of alcohol use was found to be connected with stress and mental well-being. This contrasts with Chang et al. (2022) findings, which linked heavy alcohol consumption in university students to a higher risk of presenting moderate to severe anxiety and depression. Similarly, a meta-analysis by Esmaeelzadeh et al. (2018) found an association between alcohol consumption and depression.

The fact that the results differ from those of earlier studies can be explained by the fact that the operational definitions of consumption behaviours vary. Specifically, this study looked at the frequency of use rather than excessive consumption (intensity), and the temporal window of assessment differed (infrequent exposure versus chronic consumption patterns). Moreover, the manifestation of anxiety and depression may be situational among university students, in contrast to stress, which is a sustained emotional reaction throughout much of this academic stage. Finally, cultural differences may also play a role, as social consumption norms in Latin American populations differ from those in Canada and the United States.

Regarding the use of e-cigarettes, having ever used them was linked to stress, anxiety, and depression, but not to mental well-being, which partially

coincides with the results obtained by Clendennen et al. (2023) in which e-cigarette use was associated only with anxiety, and where depression and comorbid anxiety and depression were associated with the use of both nicotine and THC in electronic cigarettes.

The importance of this study is shown in two aspects that have not been covered in earlier literature. First, it included the consumption of other drugs such as sedatives, stimulants, cocaine, and other illicit substances. Second, it incorporated the evaluation of additional variables, specifically stress and mental well-being.

In conclusion, the findings show that both the use of legal and illegal substances has important effects on mental health. Therefore, the results of this study should contribute to the creation of strategies aimed at early prevention, detection, diagnosis, and intervention in university settings. Achieving this requires implementing effective mental health and substance use care programs in universities, while simultaneously fostering an environment where students can access evaluation, prevention, and treatment services free of stigma.

Future Directions

Future research could explore other variables associated with mental well-being that may be relevant to the mental health of university students, such as academic workload (the point in the academic calendar at which the population was assessed and whether this period was characterized by more intense stressors), sleep quality, and the size and functionality of social support networks.

Limitations of the Study

Among the identified limitations is that, in a cross-sectional study, results must be taken with caution since variables that may be related to the participants' responses were not controlled. Additionally, it is important to take the results carefully because, although a significant association was identified between lifetime e-cigarette use and stress, anxiety, and depression, the explained variance was very low, ranging between .6 and 5%. For that reason, it is suggested that a longitudinal study be conducted where statistical analyses including other variables such as sex, drug use risk level, consumption pattern, age, among others, can be performed. Furthermore, even though data confidentiality and participant anonymity were ensured, the variables were measured by self-report; therefore, memory and social desirability biases are latent, especially in the reporting of substance use.

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CONFLICT OF INTEREST

The authors declare no conflict of interest. They also declare not having used artificial intelligence assistants in the drafting and/or generation of this document. All content was verified and edited by the authors, who assume full responsibility for the final version of the manuscript.

AUTHOR CONTRIBUTIONS

Jennifer Lira-Mandujano: conceptualization, methodology, writing, supervision, project administration.
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Supplementary Tables

The authors of this article provided supplementary tables:

https://riiad.org/index.php/riiad/article/view/452/539

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