Unpleasant emotions and associated factors during the COVID-19 pandemic in a university
Emociones desagradables y factores asociados durante la pandemia del COVID-19 en una universidad

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Abstract: We surveyed the university community to evaluate the prevalence of unpleasant emotions during the COVID-19 pandemic. We gather data on demographics, social connections, psychological factors, and significant lifestyle changes attributed to the pandemic. Our analysis, based on a multivariable logistic regression, included responses from 2,616 participants. We identified an 8-24% prevalence rate for unpleasant emotions within our sample. Exhaustion, boredom, and frustration were the most intensely experienced emotions. The analysis revealed several risk factors for heightened unpleasant emotions: being a student (odds ratio [OR] = 1.85), younger age (OR = 2.91-3.00), poly-drug use (OR = 1.21-6.23), and increased substance consumption attributable to pandemic stress (OR = 3.32). Additionally, gender differences were observed, with female participants reporting higher levels of unpleasant emotions (OR = 1.18). Other significant factors included being single (OR = 1.61), experiencing social isolation (OR = 12.07), psychophysiological changes (OR = 6.59-174), and suicidal ideation (OR = 33.25). Our findings indicate a broad variation in the prevalence of unpleasant emotions among the university community, influenced by a range of demographic and psychosocial factors.
Keywords: boredom; exhaustion; frustration; family satisfaction; social isolation; economic impact; emotional reactivity, health; crisis; emergency.

Resumen: Encuestamos a la comunidad universitaria para evaluar la prevalencia de emociones desagradables durante la pandemia de COVID-19. Recolectamos datos sobre demografía, conexiones sociales, factores psicológicos y cambios significativos en el estilo de vida atribuidos a la pandemia. Nuestro análisis, mediante regresión logística multivariable, incluyó respuestas de 2,616 participantes. Identificamos una prevalencia del 8-24% para emociones desagradables en nuestra muestra. El agotamiento, el aburrimiento y la frustración fueron las emociones experimentadas más intensamente. El análisis reveló varios factores de riesgo para incrementar las emociones desagradables: ser estudiante (tasa de probabilidad [OR] = 1.85), ser joven (OR = 2.91-3.00), el consumo de múltiples drogas (OR = 1.21-6.23) y un aumento en el consumo de sustancias debido al estrés de la pandemia (OR = 3.32). Se observaron diferencias de género, las participantes femeninas reportaron mayores niveles de emociones desagradables (OR = 1.18). Otros factores significativos incluyeron estar soltero (OR = 1.61), experimentar aislamiento social (OR = 12.07), cambios psicofisiológicos (OR = 6.59-174) e ideación suicida (OR = 33.25). Nuestros hallazgos indican una amplia variación en la prevalencia de emociones desagradables en la comunidad universitaria, influenciada por una gama de factores demográficos y psicosociales.
Palabras clave: aburrimiento; agotamiento; frustración; satisfacción familiar; aislamiento social; impacto económico; reactividad emocional, salud; crisis; emergencia.

1. Introduction

The COVID-19 pandemic (COVID-19-P) began in Wuhan, China, in 2019 and quickly spread worldwide. Symptoms associated with the virus, such as pneumonia, acute respiratory syndrome, and sepsis, can be fatal in 0.5-1% of cases (Frick, 2020; Tang et al., 2020). In January 2020, The World Health Organization (WHO) declared the COVID-19-P an international public health emergency, and two weeks later, designated it as a pandemic. Most countries implemented hygiene protocols, healthcare strategies, and social distancing to prevent transmission, infection, and death (Güner et al., 2020).

COVID-19-P had a significant psychological impact (Ahmed et al., 2020; Charoensukmongkol & Phungsoonthorn, 2020; Jacobo-Galicia et al., 2021; Lwin et al., 2020; Nicomedes & Avila, 2020; Pascaru, 2022; Sommer et al., 2021), with common reactions including stress, anxiety, and depression. This led to a higher risk of post-traumatic stress disorder and suicide (Passavanti et al., 2021). Legal and illegal drug use also increased (Roberts et al., 2021).

A study from Germany found minor changes in unpleasant emotions (UE) such as boredom and loneliness but an increase in frustration (Schelhorn et al., 2022); in comparison, others found an increase in fear and sadness during the early stages of COVID-19-P, and anger and disgust subsequently, adding dynamism to these variables (Adikari et al., 2021). In another study in Toronto, emotions such as anger, disgust, and sadness, were marginally predicted by lower emotional intelligence (Hawryluck et al., 2004). Cerbara et al. (2020) suggest that fear, anger, and sadness are related to the perceived risk of being unable to meet basic subsistence needs during this pandemic, which was accentuated in low-income countries (Dragioti et al., 2022).

In Mexico, the pandemic began on February 28, 2020, and non-essential activities were suspended on March 17, 2020, including the closure of educational institutions. This resulted in an 8.0% decline in the country's Gross Domestic Product (GDP) in 2020 (World Bank, n.d.), with up to 18% of people losing their jobs (Instituto Nacional de Estadística y Geografía [INEGI], 2020) and 56% of the population falling into poverty (Casado Izquierdo, 2021). In 2021, there were over 600,000 excess deaths, 38.2% more than expected (Palacio-Mejía et al., 2022), which also affected people emotionally. Furthermore, there was a 9.3% increase in suicides in Mexico in 2020 compared to 2019 (INEGI, 2023), emphasizing the interrelationship with COVID-19-P.

Adolescence and youth are characterized by emotional instability (Dahl, 2004), impulsivity, and a tendency to seek novel sensations (Casey et al., 2008). During youth (15-24 years), brain maturation processes occur, including a decrease in gray matter and an increase in white matter (Giedd et al., 1999; Gogtay et al., 2004), leading to the reconfiguration of brain connectivity (Spear, 2013). The prefrontal cortex matures late in youth (15-24 years old), so variables such as reasoning, risk-reward assessment, planning, and self-control are refined at this stage (Steinberg et al., 2008). Accordingly, during youth, there are higher mortality rates due to car accidents (World Health Organization, 2023b) and greater vulnerability to the effects of addictive substances (Spear, 2000). Moreover, juvenile groups experienced a slight but noticeable increase in UE during this pandemic (Schelhorn et al., 2022).

According to Erikson's theory of 1968, youth explore and commit to various aspects of identity, such as autonomy, affiliation to social groups, and social integration (Kroger & Marcia, 2011). Due to the pandemic, however, face-to-face classes and social interaction were disrupted. The transition to online education resulted in limited social interaction. In our university, activating cameras during classes was optional, inhibiting teachers' ability to develop relationships with their students and foster community within the educational environment. Concerning academic performance, students showed more anger during online classes which might affect execution (Ghaderi et al., 2022). From the professor's perspective, there was disgust related to the lack of program fulfillment and support from the institutions (Chanchí Golondrino et al., 2021).

Emotions in the population are considered an important factor to monitor and attend for an educational institution. When UE are prevalent, they can negatively impact optimal personal and academic performance, posing a risk to achieving the institution's goals. As a matter of fact, COVID-19 has caused a loss of emotional regulation and a prevalence of post-traumatic stress disorders in university students (Elbarazi, 2022). A Mexican study showed the presence of anxiety, boredom, and frustration in a related group of people (Gaeta et al., 2021).

This study investigates the prevalence of UE in the university community, specifically at the end of online classes during the COVID-19-P. We will explore the following risk factors: a) demographic factors, b) social connection, c) psychology and psychophysiology, and d) life changes resulting from the pandemic. The Methods, Techniques, and Instruments section will detail the data collection and analysis approach. We will employ multivariable logistic regression to assess the emotional well-being of 2,616 participants. The Results section will present an analysis of the prevalence and intensity of UE within the university community,

highlighting significant demographic and psychosocial risk factors such as age, drug use, and social isolation. Finally, we will present our conclusions, discussing the broader impact of the COVID-19-P on mental health, the differential effects based on gender, and the importance of targeted interventions to mitigate these emotional challenges.

2. Methods, techniques, and instruments
2.1. Study design and procedure

Our exploratory, cross-sectional study was conducted from October 21, 2021, through January 2022, targeting the entire university community to assess the prevalence of UE during the COVID-19-P. All community members were directly invited via an internal email. This email detailed the study's objectives and included an informed consent form and a link to the online questionnaire. By extending the invitation to every member, we used a snowball sampling technique. Adhering to national and international ethical standards, our research protocol was approved by an ethics committee.

2.2. Study participants and sampling

Students, administrators, and professors from across five academic divisions (Automation and Information Technology, Economics and Administration, Environmental Technology, Industry, and Languages) participated in the study. In addition to these divisions, three administrative offices (Academic Affairs, Community Engagement, and Administration & Finance) and the Chancellor's Office (Rectory) contributed to the research.

We conducted a pilot study within the Environmental Technology Division to evaluate the questionnaire's internal consistency before its university-wide distribution, engaging 444 participants. This preliminary phase ensured the survey's reliability. Following this validation, we broadened the survey's reach, resulting in significant participation: 2,270 out of 5,716 students, 257 out of 418 professors, and 89 out of 199 administrators, for a total of 2,616 participants.

Participation in the study was strictly voluntary, with informed consent being the inclusion criterion. This consent process was designed to ensure that all participants fully understood their involvement and agreed to it willingly. The survey was divided into five sections, requiring participants to complete each item before submission.

2.3. Study instruments

Unpleasant Emotion Variables. The fourteen variables were established using Diaz's (2001) affective system wheel: Terror/Panic, Anger/Irritation, Sadness/Misery, Frustration/Failure, Apathy/Indifference, Boredom/Annoyance, Exhaustion/Tiredness, Hate/Resentment, Aversion/Rejection, Sorrow/Suffering, Disgust/Discomfort, Fear/horror, Tension/Nervousness, and Humiliation/Abasement. The study was based on an analysis of the Spanish lexicon, where semantic fields were established, and representative words belonging to each field were selected. The emotions studied are shown in figure 1. Participants were asked if they had experienced an intensification in UE. Responses were rated on a four-point Likert scale (Not at all=0, Somewhat=1, Quite a bit=2, Very much=3). Reliability analysis for the scale was assessed, and Cronbach's alpha (0.94) was obtained, showing good internal consistency. The internal correlation was 0.55 (Correlational Analysis).

Demographic Variables. Participants provided information about sex (male or female), age range (<19, 20-30, 31-40, 41-50, 51-60, 61-70 >71), position within the university (student, professor, or administrator), disability status (yes or no), residence status (owner or renter), residence zone (urban or rural), and employment (yes or no).

Social Connection Variables. Participants were asked about their relationship status, whether they live alone, experience social isolation, and experience dissatisfaction with their families.

Psychological and Psychophysiological Variables. The study utilized the ASSIST classification (Who Assist Working Group, 2002) to categorize the types of community drug consumption. These included alcohol, amphetamine-type stimulants (including ecstasy), cannabis, cocaine, hallucinogens, inhalants, opioids, sedatives, tobacco, and an open-ended category for 'other drugs'. To assess hazardous alcohol use, the study employed the item "How often do you consume six or more drinks on a single occasion?" from The Alcohol Use Disorders Identification Test (AUDIT) (Babor et al., 2001).

The psychophysiological section included items "I have experience with…": palpitations, throbbing, abdominal discomfort, tics, excessive sweating (item 1); changes in the way I sleep that make it difficult for me (item 2); changes in the way I eat that cause me difficulties (item 3); alertness increased (item 4); so many thoughts coming into my mind that I feel unable to pay attention to the present moment (item 5). They were evaluated using a questionnaire, self-reporting according to a 4-point Likert scale (Not at all=0, Somewhat=1, Quite a bit=2, Very much=3). To assess the internal consistency, a Cronbach's alpha (0.79) was obtained, showing good internal consistency. The internal correlation was 0.26.

Life Changes Related to COVID-19-P Variables. Participants were asked to indicate their income change related to COVID-19-P (a decrease of 10-30%, a reduction of 31-60%, a decrease of more than 60%, no change, or an increase). They were also asked if they increased their drug consumption (yes/no) during COVID-19-P. Finally, participants were asked if their UE increased due to COVID-19-P (Not at all=0, Somewhat=1, Quite a bit=2, Very much=3).

2.4. Statistical analysis

We employed multivariable logistic regression analysis to evaluate the relationship between fourteen UE variables and a set of predictors, including demographic factors, social connection, psychological and psychophysiological variables, and life changes related to COVID-19-P. This statistical method allows for examining the influence of multiple independent variables on a binary or multiple level dependent variable, which, in this case, represents the presence or absence of each unpleasant emotion.

$$\log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n \quad (1)$$

Where p represents the probability of experiencing a specific unpleasant emotion, β_0 is the intercept, $\beta_1, \beta_2, \ldots, \beta_n$ are the coefficients of the predictor variables $X_1, X_2, \ldots, X_n$ which include demographic variables, social connection variables, psychological and psychophysiological variables, and life changes due to COVID-19-P.

The odds ratio (OR) measures the association between an exposure and an outcome. It represents the odds that an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure. In the context of this study, an OR greater than 1 indicates that the presence of a particular variable (e.g., a demographic factor or a life change related to COVID-19-P) increases the odds of experiencing an unpleasant emotion. The OR is calculated as:

$$OR = \frac{\text{odds of experiencing an emotion given exposure}}{\text{odds of experiencing an emotion without exposure}} = \exp(\beta_i) \quad (2)$$

Where $\exp(\beta_i)$ is the exponential function of the coefficient β_i from the logistic regression equation, corresponding to each predictor variable.

All analyses were conducted using the statistical software SPSS. A p-value of less than 0.05 was considered statistically significant for all tests.

3. Results and discussion

From table 1, 71% of students' families own homes. Most students live with their families; 2.3% live with friends, and 6.1% live with a spouse or partner. 71.7% of employees are homeowners. 41.7% of employees live with their family of origin, and a large percentage (42.3%) live with a spouse or partner. We observed that 28.8% of students are from rural areas and 71.2% from urban zones. On the other hand, most professors/administrators are from urban zones (97.4%) (table 1). About half of the students are financially dependent (50.6%). The other half are partially or fully economically independent (49.4%); 43.4% support their families, 8.9% support other people, 11.1% support only themselves, and 33.1% contribute to the support of their families. 34.6 % of students and 18.5 % of employees experienced a decrease in family income of more than 31%.

3.1. Unpleasant emotions intensification

The overall prevalence of UE intensification was 8-24.9% (N=652), and the median score was 6 (SD=8.2). In addition, 23.5% of studies and 10.7 % of employees scored high in UE intensification. Students have higher scores on all fourteen emotions. The analysis showed that students have higher UE scores than employees

($\chi^2(1)$=31.94, p<0.0001), where χ^2 is the Chi-square (degrees of freedom=1), (Students: Mean=8.7, Median=6, SD=8.35; Employees: Mean=5.72, Median=4, SD=6.64), see figure 1. The highest UE scores for students were Exhaustion/Tiredness, Boredom/Annoyance, and Frustration/Failure. For the employee group, the highest scores were Exhaustion/Tiredness, Tension/Restlessness, and Boredom/Annoyance, see figure 1 left. In this case, except Tension/Nervousness, all other emotions are classified as low-intensity emotions, that is, physically relaxed emotions, for example, sadness, as explained by Díaz and Flores (2001).

UE scores increased progressively. Thus, moderately and highly affected people because of COVID-19-P contribute the most to the UE scores, see figure 1 right.
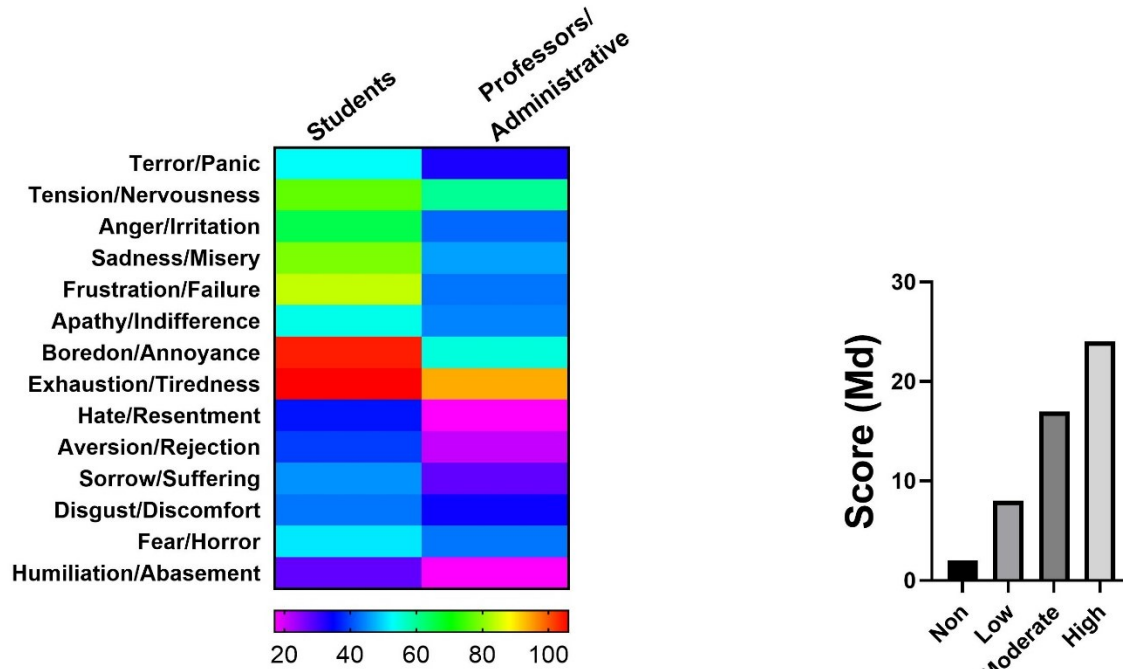

Figure 1. Self-reports of students and professors/administrators' unpleasant emotions during COVID-19-P. (Left) The Heat map showed greater (green-red) or lower (blue-purple) UE intensification and community scores. (Right) shows the score obtained by the sum of the UE of the participants who reported an intensification of emotions directly related to COVID-19-P (Not=43.6%, Low=39.9%, Moderate=11.1%, High=5.4%).

Table 1. Descriptive statistics of the samples and unpleasant emotions prevalence related to demographic, social connection, psychological, and life changes resulting from COVID-19-P.

Category	Total students, (%)	UE Score	Total Profs/Admins (%)	UE Score
Position,				
Students	2270 (39.7)			
Profs./admins.			346 (13.2)	
Sex,				
Women	1073 (47.2)	8	184 (53.2)	5
Men	1198 (52.8)	5	1162 (46.8)	3
Age range,				
17-19	787(34.7)	7		
20-30	1484(65.3)	6	31(9)	5
31-40			61(17.6)	7
41-50			153(44.2)	4
51-60			91(26.3)	3
Handicap,	44 (1.9)	8.5	335 (96.8)	4
No	2227 (98.1)	6	11 (3.2)	1
Residence status,				
Owner	1613 (71)	6	247 (71.4)	6
Rented	658 (29)	7	99 (28.6)	3
Employee status,	1121(49.4)	6	345(99.7)	4
No	1150(50.6)	6	1(0.3)	0
Residence zone,				
Urban	1617 (71.2)	6	338 (97.7)	4
Rural	654 (28.8)	6	8 (2.3)	4.5
Living alone,	101 (4.4)	7	44 (12.7)	3
No	2170 (95.6)	6	302 (87.3)	4
Relationship status,				
Single	2094 (92.2)	6.5	138 (39.9)	4
Cohabiting	80 (3.5)	4	172 (49.7)	3
Married	97 (4.3)	5	36 (10.4)	6.5
Socially isolated,	436(19.2)	17	23(6.6)	14
No	1835(80.8)	5	323(93.4)	3
Family dissatisfaction (%)	68(3)	16	8(2.3)	21
No	2203(97)	6	338(97.7)	4
>6 standard alcoholic beverages,	878 (38.7)	6	128 (37)	3
Never	1076 (47.4)	7	180 (52)	4
Less than monthly	271 (11.9)	9	35 (10.1)	4
Monthly	46 (2.0)	9	3 (0.9)	2
Weekly				
Drugs polyuse,				
Any	950 (41.8)	5	155 (44.8)	3
One drug	881 (38.8)	7	136 (39.3)	4
Two Drugs	362 (15.9)	8	49 (14.2)	6
Three Drugs	57 (2.5)	9	5 (1.4)	20
Four Drugs	6 (0.3)	8	1 (0.3)	18
Psychophysiological alterations,				
None	703(31.0)	1	171(49.4)	1
Low	448(19.7)	4	83(24.0)	5
Moderate	531(23.4)	9	59(17.1)	8
High	589(25.9)	18	33(9.5)	18
Suicidal thoughts,	91(4)	27	4(1.2)	29.5

No	2180(96)	6	342(98.8)	4
Income change,				
Any change	413(18.2)	4	168(48.6)	2.5
10-30% decrease	1039(45.8)	6	104(30.1)	5.5
31-60% decrease	622(27.4)	8	46(13.3)	4.5
>61% decrease	163(7.2)	11	18(5.2)	8.5
Improvement	34(1.5)	7	10(2.9)	6
Drug consumption increase,	146 (6.4)	13.5	34 (9.8)	8
No	2125 (93.6)	6	312 (90.2)	3.5
Emotions intensification,	415(18.3)	18	17(4.9)	21
No	1856(81.7)	5	329(95.1)	3
Routine changes discomfort,	340(15)	17	24(6.9)	18.5
No	1931(85)	5	322(93.1)	3

3.2. Risk Factors for UE Intensification

Table 1 compares students' and professors'/administrators' UE scores, showing their association with demographic factors, social connection factors, psychological and psychophysiological factors, and life changes related to the COVID-19-P. There is a strong relationship between sex and UE; women's scores are higher in comparison with men's ($\chi 2(1)=52.3$, $p<0.0001$). Only 6.5% of the 41–50-year-olds and 5.5% of the 51–60-year-olds reported UE of high intensity, whereas 21-29% of those under 40 reported UE of high intensity. Single people from urban areas showed higher UE scores. UE are less frequent among those who are married and do not have unsatisfactory relationships with their families. UE intensification is more prevalent in people who experience social isolation (17.5%). More often, people who do not live alone (N=2472, 78.2%) perceive themselves as not being socially isolated (82.5%). In fact, 18.7% of people who live alone report feeling isolated. UE are less frequent in people who do not use drugs and more prevalent in polydrug users, see figure 2. There is a substantial UE intensification in participants who showed moderate and high psychophysiological alterations (students: 49.3%, professors/administrators: 26.5%). Moderate and high-intensity suicidal thoughts (3.6% sample) are highly associated with UE. Participants who were moderately to greatly emotionally affected by the pandemic (18.3%) showed a substantial intensification of UE, see figure 1. There is also a greater prevalence of UE in people with decreased income (>61%) during the pandemic (7.2%).

For the multivariate linear model, sixteen variables had a significant association (<0.05) with the outcome. We obtained the adjusted odd ratios, 95% confidence intervals (CI), with a β coefficient (tables 2 & 3).

Table 2. Logistic regression analysis for unpleasant emotions and associated factors.

Category		Generalized Multilinear Model	
	β	OR(CI 95%)	p-value
Position,			
Students	0.62	1.85(1.51-2.27)	0.000*
Profs./admins.	Ref.		
Sex,			
Women	0.59	1.18(1.57-2.08)	0.000*
Men	Ref.		
Age range,			
17-19	1.110	3.033(2.05-4.5)	0.000*
20-30	1.070	2.915(1.9-4.3)	0.000*
31-40	1.147	3.150(1.7-5.7)	0.000*
41-50	0.388	1.474(0.93-2.3)	0.102
51-60	Ref.		
Handicap,	0.086	1.09(0.66-1.8)	0.73
No	Ref		
Residence status,			
Owner	0.22	1.25(1.07-1.46)	0.004*
Rented	Ref		

Employee status,	.162	1.18(1.02-1.35)	0.02*
No	Ref		
Residence zone,			
Urban	-0.09	0.91(0.78-1.07)	0.257
Rural	Ref.		
Living alone,	0.013	1.01(0.75-1.37)	0.931
No	Ref		
Relationship status,			
Single	0.473	1.61(1.27-2.034)	0.000*
Cohabiting	0.234	1.26(0.86-1.9)	0.232
Married	Ref.		
Socially isolated,	2.49	12.07(9.71-15.03)	0.000*
No	Ref.		
Family dissatisfaction,	1.81	6.08(3.76-9.83)	0.000*
No	Ref		
>6 standard alcoholic beverages,	Ref.		
Never	0.64	1.29(1.12-1.51)	0.017*
Less than monthly	0.13	1.13(0.89-1.43)	0.289
Monthly	0.26	1.9(1.12-3.22)	0.001*
Weekly			
Drugs polyuse,			
Any	Ref		
One drug	0.19	1.21(0.79-1.84)	0.381
Two Drugs	0.67	1.95(1.12-3.42)	0.019
Three Drugs	2.08	7.99(1.37-6.68)	0.021
Four Drugs	22.56	6.23exp9	0.999
Psychophysiological alterations,	Ref		
None	1.89	6.59(5.3-8.14)	0.000*
Low	3.49	32.89(25.62-42.21)	0.000*
Moderate	5.16	174.0(130.82-231.4)	0.000*
High			
Suicidal Thoughts,	3.504	33.25(16.65-66.39)	0.000*
No	Ref		
Income change			
Any change	-0.546	0.58(0.33-1.01)	0.05*
10-30% decrease	-0.024	.98(0.57-1.68)	0.93
31-60% decrease	0.202	1.22(0.71-2.12)	0.47
>61% decrease	0.743	2.10(1.15-3.84)	0.02*
Improvement	Ref.		
Drug consumption increase,	1.199	3.32(2.49-4.42)	0.000*
No	Ref.		
Emotions intensification,	3.299	27.08(20.82-35.24)	0.000*
No	Ref.		
Routine changes discomfort,	2.295	9.92(7.84-12.55)	0.000*
No	Ref		

Note: * p < 0.05.

In the comprehensive analysis, only a subset of predictors significantly contributes to the intensification of UE, as detailed in table 3. Particularly, the likelihood of experiencing intensified UE is 1.73 times greater in women compared to men, with a CI=1.46 to 2.04, see table 2. Employment status is inversely related to the likelihood of UE, indicating that being employed may serve as a protective factor against UE. Moreover, the sensation of

social isolation markedly elevates the probability of UE, increasing it threefold (CI=2.29-3.93). Similarly, individuals reporting unsatisfactory family relationships are more prone to heightened UE.

Drug users who use four drugs experienced a four-fold increase in UE (OR=4.9, CI=1.09-21.89). In contrast, we observe lower odd ratios in those who use one to three drugs (OR [one drug]=1.49, OR [two drugs]=1.67, OR [three drugs]=1.71), see figure 2.

A robust increase in UE is associated with high psychophysiological alterations (OR=61.55, CI=45.02-84.13). People with moderate to high suicidal ideation experience UE intensification (OR=5.68, CI=2.39-13.49). Those who report high emotional affectation due to the pandemic experience higher UE (OR=5.78, CI=4.22-7.90). Finally, those who experience routine change report higher UE (OR=3.57, CI=2.66-4.77).

The prevalence of UE in the UTEQ community during the COVID-19-P was between 8-24%. The factors associated with UE will be discussed below.

It was found that students exhibit a greater prevalence of UE than professors/administrators. Most students are in early adulthood (19-25 years old). The World Health Organization (2023a) refers to this age group as youth, while Arnett (2000) suggests the term "emerging adulthood." These young people often pursue higher education, and as a result, they delay certain social responsibilities associated with adulthood.

Figure 2. Self-reports showing drug consumption of students and professors/administrators during the last three months (left) and poly-drug use associated with UE.

We found that 92% of students and 39.9% of faculty are single. Entering university, some students leave their homes for the first time. In addition, 28% come from rural areas and rent in areas surrounding the university. As a result of the pandemic, only 4% of them lived away from their families at the time of the study. Findings indicate that students were disproportionately more affected by the COVID-19-P, showing greater emotional reactivity. Previous findings indicate that adolescence and youth are periods of increased emotional reactivity (Green et al., 2021; Spear, 2009), contributing to the development of mental disorders (Somers et al., 2018; Spear, 2009) and uniquely disadvantaging students during the pandemic. Executive functions such as self-control continue to mature during youth, helping individuals control emotions and contributing to the lower reactivity of older participants, such as professors/administrators. Women showed a threefold increase in UE compared to men across all recorded emotions (Chi-square test p<0.05). The literature indicates that women tend to experience low-intensity emotions to a greater degree, while men exhibit higher-intensity emotions (Fischer et al., 2004).

In our study, women reported a higher intensity of sadness (Women=23%, Men=12%) and fear (Women=13%, Men=6%) than men. Anger (Women=8%, Men=6%) and disgust (Women=9%, Men=6%) showed similar percentages in both groups. Both men and women reported increased Boredom/Annoyance and Exhaustion/Tiredness levels. Among women, Sadness/Misery emerged as the third-most exacerbated UE. For

men, it was Frustration/Failure. This difference might be explained by the fact that men tend to occupy more influential societal roles (Dahl, 2004; Yang et al., 2018). Contemporary men are emotionally inhibited (Jansz, 2000), affecting their mental health. In Mexico, for example, suicide rates of 6.2 per 100 thousand inhabitants are higher in men (82%) than women (INEGI, 2023). Mental health is poorly attended in Mexican culture. In women, there is information that indicates the presence of estrogen beta receptors in the serotonergic neurons of the brain (Bethea et al., 2002). This finding relates to the type of hormones mostly synthesized in women with mood and cognition since, usually, the serotonergic system is the target of antidepressants for mood modulation.

An association exists between a significant decrease in personal and family income and a worsening of UE during the pandemic. The preventive measures implemented to prevent the spread of the COVID-19-P, such as isolation, generated personal, familial, and global economic crises. Several countries, including the United States, Australia, Norway, Germany, and Chile, implemented economic support programs targeting university students to provide financial resources and prevent vulnerable individuals from dropping out of school (Álvarez, 2020). In Mexico, a study on labor income and poverty during the COVID-19-P revealed an increase in salaried work between 2019 and the first quarter of 2020, indicating improvements in labor remuneration during this period. The subsequent economic crisis in Mexico and globally, resulted in an estimated decrease in the country's GDP by -8.3% (Salas et al., 2020). According to the National Survey of Occupation and Employment (ENOE) from the INEGI, 91.78% of economically active people were employed, and 8.22% were unemployed in the most affected quarter of 2020. Based on simulations used to calculate the decrease in working hours, three scenarios were considered: decreases of 25%, 50%, and 75% (Salas et al., 2020). It was concluded that, in parallel, wages were lower. In fact, 80.3% of students and 48.5% of faculty experienced a decrease in household income, with 7.2% of students and 5.2% of faculty experiencing a decrease of more than 60%, suggesting that other household members may have also been affected. Another study conducted in Mexico found that students experienced academic-related stress due to decreased family income (Luque Vilca et al., 2022).

This research indicates that individuals who were unemployed or experienced a significant decrease in their income experienced heightened levels of UE. This underscores the importance of economic factors in meeting basic needs such as school expenses, transportation, and medical care. Financial challenges pose a risk to the well-being of the participants.

Disruption of social relationships and an increased sense of social isolation had an especially significant impact on youth. Students reported higher perceived social isolation (19%) than faculty (6.6%). This was associated with a twelve-fold intensification in UE.

Table 3. Multivariable logistic regression analysis for unpleasant emotions and associated factors.

Category		Generalized Multilinear Model	
	B	OR (CI 95%)	p-value
Sex,			
Women	0.55	1.73(1.46-2.04)	0.000*
Men	Ref.		
Employee status	-0.25	0.78(0.65-0.93)	0.008*
No	Ref		
SOCIAL CONNECTION FACTORS			
Socially Isolated	1.1	3.0(2.29-3.93)	0.000*
No	Ref.		
Family dissatisfaction	0.86	2.37(1.27-4.42)	0.007*
No	Ref		
PSYCHOLOGICAL FACTORS			
Drugs Polyuse			
Any	Ref.		
One drug	1.59	1.49(1.14-1.95)	0.003*
Two Drugs	0.537	1.67(1.20-2.33)	0.003*
Three Drugs	0.514	1.71(0.92-3.20)	0.093
Four Drugs	0.401	4.9(1.09-21.89)	0.037*
Psychophysiological			
Alterations (%)	Ref		
None	1.76	5.80(2.39-13.49)	0.000*
Low	3.06	21.28(16.40-27.61)	0.000*
Moderate	4.12	61.55(45.02-84.13)	0.000*
High			
Suicidal Thoughts	1.74	5.68(2.39-13.49)	0.000*
No	Ref		
LIFE CHANGES RESULTING FROM COVID-19-P FACTORS			
Emotional affectation	1.75	5.78(4.22-7.90)	0.000*
No	Ref.		
Routine changes discomfort	1.27	3.57(2.66-4.77)	0.000*
No	Ref		

The family is the primary social unit and has a critical role as an educating agent (Mazo González et al., 2019) and promoter of development and health. Research suggests family influences values, attitudes, and behaviors (Michaelson et al., 2021). Even though there is sometimes violence within families (11.5%) (Rivera Rivera et al., 2023), family support contributes to life satisfaction during the transition from childhood to adolescence (Willroth et al., 2021). Families contribute to social relationship formation (Blackwell et al., 2022) and communication skills for resilience in adverse situations such as the COVID-19-P (Ramadhana et al., 2022). One study found that families provide internal resources for conflict-resolution. Some families could provide economic support and a degree of insulation from the COVID-19-P (Hanson et al., 2021). During this period, the family became the main social environment (Adler et al., 2021), so the quality of familial relationships determined the regulation of negative emotional states (Larraz Rábanos et al., 2020). Factors such as constant communication, resilience, and support during difficult times enabled individuals to face complicated and painful situations (Ramadhana et al., 2022). We found that people who lived alone and did not have satisfactory family relationships during the pandemic reported higher levels of UE. Furthermore, social isolation measures disrupted the usual social interaction of young people. Consequently, a good quality of family relationships impacted emotions and protected against the stress generated by the pandemic (Adler et al., 2021; Wu et al., 2021).

The prefrontal cortex regulates the hypothalamus-pituitary-adrenal (HPA) axis (Radley et al., 2006), responsible for the body's fight-or-flight stress response. During the COVID-19-P (Ballesio et al., 2022), these stress responses increased, activating the sympathetic system, and releasing neuroendocrine effectors, such as cortisol (Jopling et al., 2021). These cascades of endocrinal changes due to HPA axis activation might have led to sleep disturbances in many individuals (Ballesio et al., 2022; Born et al., 1989). Some participants experienced dietary changes and weight gain. Actually, 32% of the population of Mexico is obese (Rodríguez-Ramírez et al., 2021). A significant portion of the students and faculty reported psychophysiological variables, such as excessive sweating and moderate to high palpitations. In conclusion, the psychophysiological variables showed more robust effects than the other variables on UE.

This study showed that 6.4% of students increased their drug consumption during the COVID-19-P, 56% of participants use alcohol, and 17% use tobacco, both of which are legal in Mexico. Based on our results, 4.2% of the student sample used cannabis three months prior to the study. According to the National Survey of Drug, Alcohol, and Tobacco Use (ENCODAT), 2016-2017, the prevalence of recent alcohol consumption in the Mexican population was 35.9%, and 19.8% engaged in excessive consumption (Villatoro-Velázquez et al., 2017). In the present study, we found that 47.5% of the population engaged in risky consumption of alcohol, and 2.0% reported engaging in such behavior weekly. Regarding tobacco and cannabis national use, the reported prevalence of consumption was 17.6% and 2.1%, respectively (Villatoro-Velázquez et al., 2017).

We found that there is a risk of harm associated with the 18.7% of the population who consume two to four substances of abuse. At the same time, there is a UE intensification of only 1.-4.9 odd ratios compared with people who do not abuse drugs. The use of addictive substances during brain maturation can have detrimental effects on executive functions and increase the risk of developing other mental disorders, such as depression and addiction (Selemon, 2013; Verdejo-García et al., 2005). It is reported that drug use is associated with negative emotional states, which are accentuated during withdrawal (Volkow et al., 2016). Since drug use is rewarding and drugs are used recreationally, people may use drugs to relieve boredom, tension, or sadness. This behavior has long-term consequences.

Finally, we found that 4% of the student population and 1.2% of the faculty reported experiencing suicidal thoughts. A recent study on the Mexican population indicates that this is conceived as a potential solution to relieve emotional pain (Born et al., 1989). Exacerbated emotions such as tension, sadness, panic, anger, suffering, and disgust are indeed associated with suicide (Horesh et al., 1997; Lauslahti Graves & Bedell Thomas, 1991; Schmidt et al., 2001; Sutter et al., 2022).

4. Conclusions

This study finds a statistically significant association between UE and the following variables organized into four categories: (1) demographic factors: sex, position within the UTEQ (students/teachers), residence status, and employment status; (2) social connection factors: living alone, relationship status, social isolation, and family satisfaction; (3) psychological and psychophysiological factors: alcohol consumption, poly-drug use, and suicidal ideation; and (4) life changes resulting from the COVID-19-P: decrease in family income, increase in drug consumption, emotional exacerbation, and discomfort due to routine changes.

Multivariate logistic analyses (adjusted ratios) were carried out, finding greater emotional reactivity risk in women, students, unemployed people, those who perceived themselves as socially isolated, those who have familiar dissatisfaction, those who present psychophysiological alterations, those who experience suicidal thoughts, those who were emotionally affected by the pandemic, and those whose routines changed due to the COVID-19-P.

When observing the results, we note the relevance of coexistence and social relationships on the effects suffered during the pandemic. Human beings cannot live alone due to their political nature (zoon politikón). Sacks (2020) notes that there has been an increase in suicides, especially during the COVID-19-P (Passavanti et al., 2021). As a possible explanation, Sacks (2020) proposes that in the history of philosophical and ethical ideas, we have passed from "we" to "I". This adoration and exaltation of the self has brought many problems, but, mainly, it has broken the intensity and intimacy of our social relationships. The self can no longer be analyzed based on reciprocity with others and ceases to be reciprocal (Balswick et al., 2016). When our relationships weaken, we become vulnerable, which is the effect we noticed during the COVID-19-P. Prosocial traits, solidarity, the logic of gift, responsibility, and collaboration could counteract the COVID-19-P (Tomas et al., 2022). When the bond with others is broken, our self-concept is weakened, and we have more negative feelings and experiences. When social connection is absent, less well-being and fewer meaningful experiences exist.

We practically observe this in carrying out volunteer actions as a strategy to counteract the effects of the pandemic, where those who give themselves generate links that yield personal satisfaction.

This study indicates that COVID-19-P impacted vulnerable groups such as young people, women, people with certain psychosocial characteristics, and those prone to certain physiological reactions to stressful events. This is expressed in personal, family, and social life and, therefore, in school activity and educational performance.

Our educational institution is concerned about the demonstrated impact and the possibility of its lasting effects, especially for those whose formative years coincided with the pandemic. The deterioration of the economic and educational systems may be long-term. We need to develop and implement programs that give rise to solidarity and subsidiarity in the most vulnerable groups, strengthening resilience generators such as family, friendship, psycho-emotional health, and social and community participation.

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Interest conflict

The authors declare that there is no financial, general, or institutional conflict of interest regarding the publication of this article.

References

Adikari, A., Nawaratne, R., De Silva, D., Ranasinghe, S., Alahakoon, O., & Alahakoon, D. (2021). Emotions of COVID-19: Content Analysis of Self-Reported Information Using Artificial Intelligence. Journal of Medical Internet Research, 23(4), e27341. https://doi.org/10.2196/27341

Adler, A., Stančaitienė, G., Grauslienė, I., Nasvytienė, D., Skabeikytė, G., & Barkauskienė, R. (2021). "Everything Seems Unreal": How Adolescents Cope with COVID-19 Quarantine Experience. Psichologija, 64, 53–60. https://doi.org/10.15388/psichol.2021.40

Ahmed, R., Ahmed, A., & Barkat, W. (2020). Behavioral limitations of individuals for coping with COVID-19: A terror management perspective. Journal of Human Behavior in the Social Environment, 31(1–4), 97–118. https://doi.org/10.1080/10911359.2020.1835778

Álvarez, M. (2020). COVID-19 y educación superior: De los efectos inmediatos al día después. Análisis de impactos, respuestas políticas y recomendaciones. Revista Argentina de Educación Superior: RAES, 12(20), 156–158.

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. American Psychologist, 55(5), 469–480. https://doi.org/10.1037/0003-066x.55.5.469

Babor, T. F., Higgins-Biddle, J. C., Saunders, J. B., Monteiro, M. G., Organization, W. H., & others. (2001). *AUDIT: the alcohol use disorders identification test: Guidelines for use in primary health care*. World Health Organization.

Ballesio, A., Zagaria, A., Musetti, A., Lenzo, V., Palagini, L., Quattropani, M. C., Vegni, E., Bonazza, F., Filosa, M., Manari, T., Freda, M. F., Saita, E., Castelnuovo, G., Plazzi, G., Lombardo, C., & Franceschini, C. (2022). Longitudinal associations between stress and sleep disturbances during COVID-19. *Stress and Health*, *38*(5), 919–926. https://doi.org/10.1002/smi.3144

Balswick, J. O., King, P. E., & Reimer, K. S. (2016). *The reciprocating self: Human development in theological perspective* (Second Edition). IVP Academic, an imprint of InterVarsity Press.

Bethea, C. L., Lu, N. Z., Gundlah, C., & Streicher, J. M. (2002). Diverse Actions of Ovarian Steroids in the Serotonin Neural System. *Frontiers in Neuroendocrinology*, *23*(1), 41–100. https://doi.org/10.1006/frne.2001.0225

Blackwell, C. K., Mansolf, M., Sherlock, P., Ganiban, J., Hofheimer, J. A., Barone, C. J., Bekelman, T. A., Blair, C., Cella, D., Collazo, S., Croen, L. A., Deoni, S., Elliott, A. J., Ferrara, A., Fry, R. C., Gershon, R., Herbstman, J. B., Karagas, M. R., LeWinn, K. Z., … Wright, R. J. (2022). Youth Well-being During the COVID-19 Pandemic. *Pediatrics*, *149*(4). https://doi.org/10.1542/peds.2021-054754

Born, J., Späth-Schwalbe, E., Schwakenhofer, H., Kern, W., & Fehm, H. L. (1989). Influences of Corticotropin-Releasing Hormone, Adrenocorticotropin, and Cortisol on Sleep in Normal Man∗. *The Journal of Clinical Endocrinology & Metabolism*, *68*(5), 904–911. https://doi.org/10.1210/jcem-68-5-904

Casado Izquierdo, J. M. (2021). De crisis sanitaria a crisis económica y laboral: Patrones espaciales del impacto de la COVID-19 en el empleo formal de México. *Investigaciones Geográficas*, *104*. https://doi.org/10.14350/rig.60212

Casey, B. J., Getz, S., & Galvan, A. (2008). The adolescent brain. *Developmental Review*, *28*(1), 62–77. https://doi.org/10.1016/j.dr.2007.08.003.

Cerbara, L., Ciancimino, G., Crescimbene, M., La Longa, F., Parsi, M. R., Tintori, A., & Palomba, R. (2020). A nation-wide survey on emotional and psychological impacts of COVID-19 social distancing. *European Review for Medical and Pharmacological Sciences*, *24*(12), 7155–7163. https://doi.org/10.26355/eurrev_202006_21711

Charoensukmongkol, P., & Phungsoonthorn, T. (2020). The Interaction Effect of Crisis Communication and Social Support on The Emotional Exhaustion of University Employees during the COVID-19 Crisis. *International Journal of Business Communication*, *59*(2), 269–286. https://doi.org/10.1177/2329488420953188

Chanchí Golondrino, G. E., Ospino Pinedo, M. E., & García Bolaños, M. Á. (2021). Emotions and feelings in university teachers during the covid-19 pandemic. Revista Venezolana de Gerencia, 26(Special Issue 5). https://doi.org/10.52080/rvgluz.26.e5.9

Dahl, R. E. (2004). Adolescent Brain Development: A Period of Vulnerabilities and Opportunities. Keynote Address. *Annals of the New York Academy of Sciences*, *1021*(1), 1–22. https://doi.org/10.1196/annals.1308.001

Díaz, J. L., & Flores, E. O. (2001). La estructura de la emoción humana: Un modelo cromático del sistema afectivo. *Salud Mental*, *24*(4), 20–35.

Dragioti, E., Li, H., Tsitsas, G., Lee, K. H., Choi, J., Kim, J., Choi, Y. J., Tsamakis, K., Estradé, A., Agorastos, A., Vancampfort, D., Tsiptsios, D., Thompson, T., Mosina, A., Vakadaris, G., Fusar-Poli, P., Carvalho, A. F., Correll, C. U., Han, Y. J., … Solmi, M. (2022). A large-scale meta-analytic atlas of mental health problems prevalence during the COVID-19 early pandemic. *Journal of Medical Virology*, *94*(5), 1935–1949. https://doi.org/10.1002/jmv.27549

Elbarazi, A. S. (2022). Post-traumatic Stress Disorder and Difficulties in Emotion Regulation Among University Students under the COVID-19 Condition. *Journal of Evidence-Based Psychotherapies*, *22*(1), 87–102. https://doi.org/10.24193/jebp.2022.1.5

Fischer, A. H., Rodriguez Mosquera, P. M., van Vianen, A. E. M., & Manstead, A. S. R. (2004). Gender and Culture Differences in Emotion. *Emotion*, *4*(1), 87–94. https://doi.org/10.1037/1528-3542.4.1.87

Frick, T. W. (2020). Education Systems and Technology in 1990, 2020, and Beyond. *TechTrends*, *64*(5), 693–703. https://doi.org/10.1007/s11528-020-00527-y

Gaeta, M. L., Gaeta, L., & Rodriguez, M. D. S. (2021). The Impact of COVID-19 Home Confinement on Mexican University Students: Emotions, Coping Strategies, and Self-Regulated Learning. *Frontiers in Psychology*, *12*, 642823. https://doi.org/10.3389/fpsyg.2021.642823

Ghaderi, E., Khoshnood, A., & Fekri, N. (2022). Achievement emotions of university students in on-campus and online education during the COVID-19 pandemic. *Tuning Journal for Higher Education*, *10*(1), 319–336. https://doi.org/10.18543/tjhe.2346

Giedd, J. N., Blumenthal, J., Jeffries, N. O., Castellanos, F. X., Liu, H., Zijdenbos, A., Paus, T., Evans, A. C., & Rapoport, J. L. (1999). Brain development during childhood and adolescence: A longitudinal MRI study. *Nature Neuroscience*, *2*(10), 861–863. https://doi.org/10.1038/13158

Gogtay, N., Giedd, J. N., Lusk, L., Hayashi, K. M., Greenstein, D., Vaituzis, A. C., Nugent, T. F., Herman, D. H., Clasen, L. S., Toga, A. W., Rapoport, J. L., & Thompson, P. M. (2004). Dynamic mapping of human cortical development during childhood through early adulthood. *Proceedings of the National Academy of Sciences*, *101*(21), 8174–8179. https://doi.org/10.1073/pnas.0402680101

Green, K. H., van de Groep, S., Sweijen, S. W., Becht, A. I., Buijzen, M., de Leeuw, R. N. H., Remmerswaal, D., van der Zanden, R., Engels, R. C. M. E., & Crone, E. A. (2021). Mood and emotional reactivity of adolescents during the COVID-19 pandemic: Short-term and long-term effects and the impact of social and socioeconomic stressors. *Scientific Reports*, *11*(1). https://doi.org/10.1038/s41598-021-90851-x

Güner, R., Hasanoğlu, İ., & Aktaş, F. (2020). COVID-19: Prevention and control measures in community. *Turkish Journal of Medical Sciences*, *50*(SI-1), 571–577. https://doi.org/10.3906/sag-2004-146

Hanson, C. L., Crandall, A., Barnes, M. D., & Novilla, M. L. (2021). Protection Motivation During COVID-19: A Cross-Sectional Study of Family Health, Media, and Economic Influences. *Health Education & Behavior*, *48*(4), 434–445. https://doi.org/10.1177/10901981211000318

Hawryluck, L., Gold, W. L., Robinson, S., Pogorski, S., Galea, S., & Styra, R. (2004). SARS Control and Psychological Effects of Quarantine, Toronto, Canada. *Emerging Infectious Diseases*, *10*(7), 1206–1212. https://doi.org/10.3201/eid1007.030703

Horesh, N., Rolnick, T., Iancu, I., Dannon, P., Lepkifker, E., Apter, A., & Kotler, M. (1997). Anger, Impulsivity and Suicide Risk. *Psychotherapy and Psychosomatics*, *66*(2), 92–96. https://doi.org/10.1159/000289115

Instituto Nacional de Estadística y Geografía. (2020). *Mexico—Encuesta Nacional de Ocupación y Empleo 2019, Cuestionario básico, datos correspondientes al segundo, tercero y cuarto trimestre*. https://www.inegi.org.mx/rnm/index.php/catalog/512

Instituto Nacional de Estadística y Geografía. (2023). *Defunciones registradas por suicidio por entidad federativa y grupos de edad según sexo, serie anual de 2010 a 2022*. https://www.inegi.org.mx/app/tabulados/interactivos/?pxq=Salud_Mental_06_0ce246dc-784f-4198-807b-4375a1612693

Jacobo-Galicia, G., Máynez-Guaderrama, A. I., & Cavazos-Arroyo, J. (2021). Miedo al Covid, agotamiento y cinismo: Su efecto en la intención de abandono universitario. *European Journal of Child Development, Education and Psychopathology*, 1–18. https://doi.org/10.32457/ejep.v14i1.1432

Jansz, J. (2000). Masculine identity and restrictive emotionality. *Gender and Emotion*, 166–186. https://doi.org/10.1017/cbo9780511628191.009

Jopling, E., Rnic, K., Tracy, A., & LeMoult, J. (2021). Impact of loneliness on diurnal cortisol in youth. *Psychoneuroendocrinology*, *132*, 105345. https://doi.org/10.1016/j.psyneuen.2021.105345

Kroger, J., & Marcia, J. E. (2011). The Identity Statuses: Origins, Meanings, and Interpretations. In S. J. Schwartz, K. Luyckx, & V. L. Vignoles (Eds.), *Handbook of Identity Theory and Research* (pp. 31–53). Springer New York. https://doi.org/10.1007/978-1-4419-7988-9_2

Larraz Rábanos, N., Urbon Ladrero, E., & Antoñanzas Laborda, J. L. (2020). La satisfacción con la familia y su relación con la agresividad y la inteligencia emocional en adolescentes. *Know and Share Psychology*, *1*(4). https://doi.org/10.25115/kasp.v1i4.4247

Lauslahti Graves, P., & Bedell Thomas, C. (1991). Habits of Nervous Tension and Suicide. *Suicide and Life-Threatening Behavior*, *21*(2), 91–105. https://doi.org/10.1111/j.1943-278x.1991.tb00458.x

Luque Vilca, O. M., Bolivar Espinoza, N., Achahui Ugarte, V. E., & Gallegos Ramos, J. R. (2022). Estrés académico en estudiantes universitarios frente a la educación virtual asociada al covid-19. *Puriq*, *4*, e200. https://doi.org/10.37073/puriq.4.1.200

Lwin, M. O., Lu, J., Sheldenkar, A., Schulz, P. J., Shin, W., Gupta, R., & Yang, Y. (2020). Global Sentiments Surrounding the COVID-19 Pandemic on Twitter: Analysis of Twitter Trends. *JMIR Public Health and Surveillance*, *6*(2), e19447. https://doi.org/10.2196/19447

Mazo González, Y. I., Mejía Ruiz, L. A., & Muñoz Palacio, Y. P. (2019). Calidad de vida: La familia como una posibilidad transformadora. *Poiésis*, *36*, 98–110. https://doi.org/10.21501/16920945.3192

Michaelson, V., Pilato, K. A., & Davison, C. M. (2021). Family as a health promotion setting: A scoping review of conceptual models of the health-promoting family. *PLOS ONE*, *16*(4), e0249707. https://doi.org/10.1371/journal.pone.0249707

Nicomedes, C. J. C., & Avila, R. M. A. (2020). An analysis on the panic during COVID-19 pandemic through an online form. *Journal of Affective Disorders*, *276*, 14–22. https://doi.org/10.1016/j.jad.2020.06.046

Palacio-Mejía, L. S., Hernández-Ávila, J. E., Hernández-Ávila, M., Dyer-Leal, D., Barranco, A., Quezada-Sánchez, A. D., Alvarez-Aceves, M., Cortés-Alcalá, R., Fernández- Wheatley, J. L., Ordoñez-Hernández, I., Vielma-Orozco, E., Muradás-Troitiño, M. de la C., Muro-Orozco, O., Navarro-Luévano, E., Rodriguez-González, K., Gabastou, J. M., López-Ridaura, R., & López-Gatell, H. (2022). Leading causes of excess mortality in Mexico during the COVID-19 pandemic 2020–2021: A death certificates study in a middle-income country. *The Lancet Regional Health - Americas*, *13*, 100303. https://doi.org/10.1016/j.lana.2022.100303

Pascaru, M. (2022). Fear during the Covid-19 Pandemic. *Bulletin of the Transilvania University of Braşov. Series VII: Social Sciences • Law*, 21–30. https://doi.org/10.31926/but.ssl.2022.15.64.1.2

Passavanti, M., Argentieri, A., Barbieri, D. M., Lou, B., Wijayaratna, K., Foroutan Mirhosseini, A. S., Wang, F., Naseri, S., Qamhia, I., TangerÃ¥s, M., Pelliciari, M., & Ho, C.-H. (2021). The psychological impact of COVID-19 and restrictive measures in the world. *Journal of Affective Disorders*, *283*, 36–51. https://doi.org/10.1016/j.jad.2021.01.020

Radley, J. J., Arias, C. M., & Sawchenko, P. E. (2006). Regional Differentiation of the Medial Prefrontal Cortex in Regulating Adaptive Responses to Acute Emotional Stress. *The Journal of Neuroscience*, *26*(50), 12967–12976. https://doi.org/10.1523/jneurosci.4297-06.2006

Ramadhana, M. R., Soedarsono, D. K., & Setyorini, R. (2022). The role of family communication: Family health and welfare during pandemic covid. *Jurnal Kajian Komunikasi*, *10*(1), 121. https://doi.org/10.24198/jkk.v10i1.39251

Rivera Rivera, L., Séris Martínez, M., Reynales Shigematsu, L. M., Gómez García, J. A., Austria Corrales, F., Toledano-Toledano, F., Jiménez Tapia, A., Tejadilla Orozco, D. I., & Astudillo García, C. I. (2023). Violence against Women during the COVID-19 Pandemic in Mexico. *Healthcare*, *11*(3), 419. https://doi.org/10.3390/healthcare11030419

Roberts, A., Rogers, J., Mason, R., Siriwardena, A. N., Hogue, T., Whitley, G. A., & Law, G. R. (2021). Alcohol and other substance use during the COVID-19 pandemic: A systematic review. *Drug and Alcohol Dependence*, *229*, 109150. https://doi.org/10.1016/j.drugalcdep.2021.109150

Rodríguez-Ramírez, S., Gaona-Pineda, E. B., Martínez-Tapia, B., Romero-Martínez, M., Mundo-Rosas, V., & Shamah-Levy, T. (2021). Inseguridad alimentaria y percepción de cambios en la alimentación en hogares mexicanos durante el confinamiento por la pandemia de Covid-19. *Salud Pública de México*, *63*(6, Nov-Dic), 763–772. https://doi.org/10.21149/12790

Sacks, J. (2020). *Morality: Restoring the common good in divided times* (First US edition). Basic Books.

Salas, C., Quintana, L., Mendoza, M. Á., & Valdivia, M. (2020). Distribución del ingreso laboral y la pobreza en México durante la pandemia de la Covid-19. Escenarios e impactos potenciales. *El Trimestre Económico*, *87*(348), 929–962. https://doi.org/10.20430/ete.v87i348.1148

Schelhorn, I., Schlüter, S., Paintner, K., Shiban, Y., Lugo, R., Meyer, M., & Sütterlin, S. (2022). Emotions and emotion up-regulation during the COVID-19 pandemic in Germany. *PLOS ONE*, *17*(1), e0262283. https://doi.org/10.1371/journal.pone.0262283

Schmidt, N. B., Woolaway-Bickel, K., & Bates, M. (2001). Evaluating panic-specific factors in the relationship between suicide and panic disorder. *Behaviour Research and Therapy*, *39*(6), 635–649. https://doi.org/10.1016/s0005-7967(00)00034-6

Selemon, L. D. (2013). A role for synaptic plasticity in the adolescent development of executive function. *Translational Psychiatry*, *3*(3), e238–e238. https://doi.org/10.1038/tp.2013.7

Somers, J. A., Borelli, J. L., & Hilt, L. M. (2018). Depressive Symptoms, Rumination, and Emotion Reactivity Among Youth: Moderation by Gender. *Journal of Clinical Child & Adolescent Psychology*, *49*(1), 106–117. https://doi.org/10.1080/15374416.2018.1466304

Sommer, D., Velasco, J. R., & Abarca, M. (2021). Bored: A Pandemic of Domestic Violence. *Partner Abuse*, *12*(1), 80–93. https://doi.org/10.1891/pa-2020-0022

Spear, L. P. (2000). The adolescent brain and age-related behavioral manifestations. *Neuroscience & Biobehavioral Reviews*, *24*(4), 417–463. https://doi.org/10.1016/s0149-7634(00)00014-2

Spear, L. P. (2009). Heightened stress responsivity and emotional reactivity during pubertal maturation: Implications for psychopathology. *Development and Psychopathology*, *21*(1), 87–97. https://doi.org/10.1017/s0954579409000066

Spear, L. P. (2013). Adolescent Neurodevelopment. *Journal of Adolescent Health*, *52*(2), S7–S13. https://doi.org/10.1016/j.jadohealth.2012.05.006

Steinberg, L., Albert, D., Cauffman, E., Banich, M., Graham, S., & Woolard, J. (2008). Age differences in sensation seeking and impulsivity as indexed by behavior and self-report: Evidence for a dual systems model. *Developmental Psychology*, *44*(6), 1764–1778. https://doi.org/10.1037/a0012955

Sutter, C. C., Stickl Haugen, J., Campbell, L. O., & Tinstman Jones, J. L. (2022). School and electronic bullying among adolescents: Direct and indirect relationships with sadness, sleep, and suicide ideation. *Journal of Adolescence*, *95*(1), 82–96. https://doi.org/10.1002/jad.12101

Tang, D., Comish, P., & Kang, R. (2020). The hallmarks of COVID-19 disease. *PLOS Pathogens*, *16*(5), e1008536. https://doi.org/10.1371/journal.ppat.1008536

Tomas, C. M. M., Gutiérrez-González, M. A., & Amsler, A. (2022). Leading for the Common Good: An Act of Service? In U. Thomas (Ed.), *Advances in Logistics, Operations, and Management Science* (pp. 208–225). IGI Global. https://doi.org/10.4018/978-1-6684-5812-9.ch013

Verdejo-García, A. J., López-Torrecillas, F., Aguilar de Arcos, F., & Pérez-García, M. (2005). Differential effects of MDMA, cocaine, and cannabis use severity on distinctive components of the executive functions in polysubstance users: A multiple regression analysis. *Addictive Behaviors*, *30*(1), 89–101. https://doi.org/10.1016/j.addbeh.2004.04.015

Villatoro-Velázquez, J. A., Resendiz-Escobar, E., Mujica-Salazar, A., Bretón-Cirett, M., Cañas-Martínez, V., Soto-Hernández, I., Fregoso-Ito, D., Fleiz-Bautista, C., Medina-Mora, M., & Gutiérrez-Reyes, J. (2017). Encuesta Nacional de Consumo de Drogas, Alcohol y Tabaco 2016-2017: Reporte de Drogas. *Instituto Nacional de Psiquiatría Ramón de La Fuente Muñiz, Instituto Nacional de Salud Pública, Comisión Nacional Contra Las Adicciones and Secretaría de Salud*.

Volkow, N. D., Koob, G. F., & McLellan, A. T. (2016). Neurobiologic Advances from the Brain Disease Model of Addiction. *New England Journal of Medicine*, *374*(4), 363–371. https://doi.org/10.1056/nejmra1511480

Who Assist Working Group. (2002). The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST): Development, reliability and feasibility. *Addiction*, *97*(9), 1183–1194. https://doi.org/10.1046/j.1360-0443.2002.00185.x

Willroth, E. C., Atherton, O. E., & Robins, R. W. (2021). Life satisfaction trajectories during adolescence and the transition to young adulthood: Findings from a longitudinal study of Mexican-origin youth. *Journal of Personality and Social Psychology*, *120*(1), 192–205. https://doi.org/10.1037/pspp0000294

World Bank. (n.d.). *World Bank Open Data*. GDP Growth (Annual %) - Mexico. Retrieved April 2, 2024, from https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=MX

World Health Organization. (2023a). *Adolescent and young adult health*. https://www.who.int/news-room/fact-sheets/detail/adolescents-health-risks-and-solutions

World Health Organization. (2023b). *Road traffic injuries*. https://www.who.int/news-room/fact-sheets/detail/road-traffic-injuries

Wu, Z., Zou, Z., Wang, F., Xiang, Z., Zhu, M., Long, Y., Tao, H., Palaniyappan, L., & Liu, Z. (2021). Family functioning as a moderator in the relation between perceived stress and psychotic-like experiences among adolescents during COVID-19. *Comprehensive Psychiatry*, *111*, 152274. https://doi.org/10.1016/j.comppsych.2021.152274

Yang, L., Comninos, A. N., & Dhillo, W. S. (2018). Intrinsic links among sex, emotion, and reproduction. *Cellular and Molecular Life Sciences*, *75*(12), 2197–2210. https://doi.org/10.1007/s00018-018-2802-3