

# Mental Health Symptoms, Binge Drinking, and the Experience of Abuse during the COVID-19 Lockdown in Mexico

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**Background.** The health contingency caused by the COVID-19 pandemic is causally linked to negative mental health symptoms in the same way as other diseases such as Ebola and can trigger episodes of post-traumatic stress.

**Objective.** The purpose of this paper is to describe the relationship between mental health symptoms, binge drinking, and the experience of abuse during the COVID-19 lockdown.

**Method.** We surveyed 9,361 participants, all Mexican, with an average age of 33 ( $SD=10.86$ ). In this group of people, we found that 59% were single (5,523), 71% were women (6,693), 46% were complying with lockdown procedures (4,286), 50% were partially complying (4,682), and 4% were not complying at all (393). An ex post facto correlational study was used, administered via a **Survey for the assessment of mental health risk factors due to the COVID-19 pandemic**. The survey was available through a WebApp designed by Linux®, PHP®, HTML®, CSS®, and JavaScript®.

**Findings.** The results indicated that reported attitudes such as **avoidance**, **sadness**, **withdrawal**, **anger**, and **anxiety** were a byproduct of **acute stress**, which, in turn, were linked to a condition of **anxiety** caused by uncertainty over being able to achieve or maintain overall good **health**.

**Discussion and Prospects.** People who reported complying with lockdown procedures mentioned a sudden increase in alcohol consumption and lived episodes of both physical and emotional abuse, in contrast with those who declared that they did not go into lockdown or consume alcohol or experience abuse.

**Limitations.** Further studies should diagnose mental health conditions as part of the impact of COVID-19, ensure their follow-up, and assess the impact of providing remote psychological care. There is a need to explore methods for helping to curb the increase in the number of people affected by post-traumatic stress disorder.

**Keywords:** Mental health symptoms, stress, anxiety, binge drinking, experience of abuse, COVID-19

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## Background

The risk of becoming infected by the SARS-CoV-2 virus, which causes COVID-19, soared in late 2019 in Hubei, China. The virus gradually spread across the globe. By May 4, 2020, 3,516,240 people had been diagnosed with the virus, of which 249,092 died and 1,086,620 recovered (OPS, 2020). The disease, which mainly affects the respiratory system, has a higher mortality rate than seasonal flu. By May 4, 2020, Mexico had 23,471 cases of COVID-19, 12,664 suspected cases and 59,704 had tested negative. In addition, 13,447 people had recovered, and 2,154 had died (Secretaría de Salud, Mexico, 2020). The death rate was 9.2 per 100,000 population.

*The Lancet* (2020) subsequently established that most countries in the world are experiencing some disruption of mental, neurological, and substance use services, with community-based programs being significantly impacted. According to this publication, 17% of 116 counties had earmarked additional funding for mental health and psychological support related to the COVID-19 pandemic, to improve the world population's mental health and wellbeing.

*The Lancet* (2020) also reported that, historically, 33-42% of those admitted to hospital for severe acute respiratory syndrome or Middle East respiratory syndrome during Ebola outbreaks suffered from depressed mood, anxiety, impaired memory, and insomnia, which continued beyond recovery. It appears that in the case of COVID-19, non-pharmaceutical interventions have led to the abuse of substances, particularly alcohol, while the attendant health symptoms are more likely to affect lower-income countries. In a systematic review and meta-analysis, Rogers et al. (2020) assessed the psychiatric and neuropsychiatric presentations of SARS, MERS, and COVID-19. They searched MEDLINE, Embase, PsycINFO, the Cumulative Index to Nursing and Allied Health Literature, and the medRxiv, bioRxiv, and PsyARXiv databases and selected studies with data on individuals with suspected or laboratory-confirmed coronavirus infection. They found psychiatric signs or symptoms, symptom severity, diagnoses based on ICD-10, DSM-IV, quality of life, and employment across illness stages: acute vs. post-illness. The authors selected 65 peer-reviewed studies, seven preprints from 1963 reviews and 87 preprints. The number of coronavirus cases in the studies included was 3559, with subjects aged between 12.2 and 68, while the follow-up time for the post-illness studies varied between 60 days and 12 years. The findings indicated that people suffered from confusion, depressed mood, anxiety, impaired memory, and insomnia. These symptoms had been associated with acute illness, and common symptoms among patients admitted to hospital for SARS or MERS. At the post-illness stage, the authors found depressed mood, insomnia, anxiety, irritability, memory impairment, fatigue, traumatic memories, and sleep disorder, and post-traumatic stress disorder in the study subjects.

Given this context and the very real threat of death, a series of procedures must be put in place to prevent the spread of COVID-19 while maintaining a certain level of mental health. It is important to note that decision-making at the government level can enhance or diminish citizens' physical and psychological health (Li, Ge, Yang, Feng, Qiao et al., 2020).

The first wave of consequences includes acute stress and emotional situations. Stress is an adaptative response our body developed to prepare us for critical situations. However, stress is accompanied by a series of physiological, motor, behavioral, cognitive, and emotional reactions, such as the *fight or flight* response or shut down, depending on the individual (Lazarus & Folkman, 1984; 1986). Depending on the risk level, people will tend to feel overwhelmed both psychologically and emotionally, reporting a loss of appetite, fatigue, insomnia, irritability, attention deficit, and fear. These symptoms can lead to binge drinking and violent outbursts (Li et al., 2020a).

Regarding the hazards of contracting COVID-19, Li, and his collaborators (2020a) have assessed a series of mental health risks using a WebApp, measuring them through a scale of vicarious trauma. The survey was conducted during the first week of lockdown in China. Findings included a persistent vicarious trauma level among respondents: specific physiological, psychological, emotional, behavioral, and cognitive responses based on the context, their fear of contagion, and anxiety caused by lockdown itself. The authors concluded that the levels of vicarious trauma could be effectively handled through specific prevention guidelines if correctly adopted by the authorities.

According to De Camargo (2010), people in general can respond to a traumatic or stressful event through a general adaptation syndrome, composed of an awake phase, a resistance phase, and an exhaustion phase. The awake phase is akin to being in an alert state, but it also includes a moment of freezing in response to the stressful event. During this phase, a biological mechanism diverts all an individual's attention towards this situation, enabling them to assess their options. People usually respond poorly during this phase. The resistance phase is marked by high stress levels that enable our systems to be active for weeks or months if not years. When its duration is shorter, the body tends to return to its usual living conditions. In the exhaustion phase, people report tiredness that is usually persistent if the traumatic or stressful event is periodically repeated. This is when the following reactions occur: insomnia, fatigue, lack of concentration, cardiovascular and metabolic reactions, endocrine responses, emotional problems; gastrointestinal issues and vascular events, among others (Cuevas et al., 2018; Lazarus & Folkman, 1984; 1986; Moos, 1995).

It is therefore evident that people can display a wide array of negative emotions (rejection, anxiety; Mortensen et al., 2010) and a negative cognitive evaluation of the COVID-19 pandemic (Li et al., 2020). Li and collaborators (2020b) assessed negative and cognitive emotions (anxiety, depression, outrage and unhappiness, social risk assessment, and satisfaction) during the first three weeks of lockdown by screening 17,865 individuals, seventy-five per cent of whom were girls or women aged between eight and 56 ( $M=33$ ). After conducting an online survey, the authors observed a spike in the negative emotions people felt (anxiety, depression, and outrage). There was a decrease in positive emotions (happiness) that correlated with being at risk of contagion. Regarding cognitive indicators, negative attitudes increased, and life satisfaction levels decreased. Even though lockdown increased, household interaction, social and recreational activities decreased.

Another study conducted in China (Ho et al., 2020) showed that 54% of those under lockdown experienced a high, severe psychological impact, with 16.5% reporting moderate to severe depression symptoms, 29% signs of anxiety, and 8% mild to extreme, higher than

normal stress levels. These authors also found that people are more fearful than they were during the SARS pandemic in 2008. Exposure to the risk of contagion creates high anxiety levels due to the possible outcome, such as severe illness, death, hopelessness, misery, or guilt linked to the infection of other people and the use of alcohol and violence.

In Mexico, Morales-Chainé et al. (in press) evaluated stress levels, emotions, and negative thoughts during the second stage of the COVID-19 pandemic, when lockdown began (March 30 - April 9, 2020), using sociodemographic variables. The authors surveyed 1,906 individuals ( $M=29$ ;  $SD=9.53$ ) between the ages of 14 and 69, 65% of whom reported complying with lockdown procedures. Participants answered the **Screening of Mental Health during Emergencies Survey** (via a WebApp available for Android®, iOS®, Symbian®, Windows®, WebOS®). The authors concluded that people in lockdown were more prone to develop **negative emotions** (lack of interest, self-harm intentions, insomnia, and difficulty concentrating). Conversely, people who were not in lockdown did not report these kinds of symptoms.

Recently, Morales-Chainé et al. (2020) described mental health symptoms associated with a diagnosis of COVID-19, the death of people close to one, or a previous depression diagnosis. They surveyed 15,335 Mexicans with a mean age of 26 ( $SD=11.95$ ), 44% of whom were under lockdown (6,769), using a causal correlational study throughout the WebApp application of the Questionnaire on Mental Health Screening in COVID-19 (Alpha= 0.96; 62% explained variance). Results indicated an association between avoidance symptoms, acute stress, generalized anxiety, sadness, and related anger in people during the COVID-19 pandemic. Self-isolation, a COVID-19 diagnosis, and reported comorbidity due to physical illness or depression were associated with the risk of mental health symptoms.

People feeling vulnerable to becoming infected with COVID-19 experience a similarly stressful event to those described by Selye (1956). In this respect, the COVID-19 pandemic will produce post-traumatic stress disorder in those affected by it (TEPT; APA, 2013; Rogers et al., 2020). PTSD episodes are known for reports of memories, and recurring thoughts of a triggering event manifested as night terrors, intense fear, and involuntary recollection of the traumatic event. Mental health conditions associated with the risk of being infected with COVID-19 also include thought avoidance processes to prevent the triggering. As such, the COVID-19 pandemic poses a constant emotional threat placing vulnerable individuals in a continuous state of alert with their emotional responses. Given the duration of the pandemic, PTSD situations could affect an ever-increasing number of individuals.

We argue that both the risk of becoming infected with COVID-19 and the living conditions imposed by lockdowns are associated with mental health threats, specifically those related to acute stress, negative thoughts, emotions, and anxiety. All these symptoms can develop into acute stress. Other risks associated with lockdowns include binge drinking and the experience of abuse, which increase the odds of developing PTSD. (OPS, 2017). Accordingly, the purpose of this paper was to **describe the relationship between mental health symptoms, binge-drinking, and the experience of abuse during the COVID-19 lockdown**. The research undertaken to write this paper enabled us to identify a set of

variables regarding acute stress, avoidance-sadness, distancing-anger, generalized anxiety, health-related anxiety, binge-drinking, and the experience of abuse in Mexico.

## Method

### Participants

To conduct our research, we surveyed 9,361 participants (see Table 1), with an average age of 33 ( $SD=10.86$ , ranging from 9 to 86). Twenty participants were pre-adolescents under 15, so we asked them to provide their parent's email to authorize their participation. Fifty-nine per cent of respondents were single, and 71% female (6,693). We invited the general population to participate through a public announcement on the official Health Ministry website and the institutional website of the leading public university in Mexico. They had to log into the system with their Unique Population Registry Code, or their university account number, or their email to ensure traceability of participation. The call for submissions was open from April 24 to 30 during the second stage of the pandemic in Mexico, in 2020, which was characterized by lockdown. Stage one consisted of keeping a healthy distance from people and taking care yet without going into lockdown. The Mexican Undersecretary of Health declared the second phase of the pandemic on March 23, 2020, describing it as the community spread stage in Mexico. During the week the survey was administered, lockdown had lasted between 30 and 37 days. All respondents were volunteers, which is why the sample is not homogeneous: 57% were employed (5,375), 46% were in complete lockdown (4,286) and did not leave home for any reason, 50% were in partial lockdown (4,682) meaning that they self-isolated but went out for groceries, and 4% were not following any lockdown procedures (393), since they had to go out to work). Ninety-two per cent of respondents did not report COVID-19 symptoms, (just eight percent reported symptoms or suspicions of COVID-19 infection), while 87% said they were living with their relatives. The exclusion criterion was to be a healthcare provider.

*Table 1. Number of respondents, with lockdown status during the COVID-19 pandemic, gender, employment status, and clinical characteristics including sex.*

Sex	Lockdown/Sex															
	In lockdown				In Partial Lockdown				Not in Lockdown				Total			
	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men
Sex n (%)	3198 (75%)	1088 (25%)	3212 (69%)	1470 (31%)	283 (72%)	110 (28%)	6693 (71%)	2668 (29%)								
Employment	Un-employed	Employed	Un-employed	Employed	Un-employed	Employed	Un-employed	Employed	Un-employed	Employed	Un-employed	Employed	Un-employed	Employed	Un-employed	Employed
Employment n (%)	1887 (59%)	1311 (41%)	566 (52%)	522 (48%)	996 (31%)	2216 (69%)	382 (26%)	1088 (74%)	110 (39%)	173 (61%)	45 (41%)	65 (59%)	2993 (45%)	3700 (55%)	993 (37%)	1675 (63%)
Acute Stress $M$ ( $SD$ )	42.77 (25.42)	36.84 (25.16)	43.82 (26.16)	35.44 (25.33)	39.31 (28.02)	33.93 (26.48)	43.13 (25.90)	35.95 (25.32)								
Avoidance-Sadness $M$ ( $SD$ )	36.47 (22.32)	32.26 (20.99)	31.67 (22.35)	26.10 (21.00)	28.28 (23.41)	24.94 (22.34)	33.83 (22.53)	28.16 (21.20)								
Distancing-Anger $M$ ( $SD$ )	41.98 (26.29)	38.04 (26.45)	35.80 (25.27)	30.28 (24.73)	30.37 (24.47)	26.96 (25.84)	38.54 (25.96)	33.31 (25.79)								
Generalized Anxiety $M$ ( $SD$ )	48.85 (32.28)	39.65 (31.89)	42.49 (31.84)	31.96 (30.51)	36.99 (31.94)	30.43 (32.37)	45.31 (32.25)	35.03 (31.38)								
Health-related Anxiety $M$ ( $SD$ )	44.98 (31.03)	39.72 (30.64)	43.68 (31.36)	35.72 (30.07)	39.31 (31.96)	31.46 (31.61)	44.12 (31.24)	37.18 (30.44)								
Binge drinking $n$ (%)	352 (11%)	180 (16%)	383 (12%)	294 (2%)	48 (17%)	32 (29%)	783 (12%)	506 (19%)								
Emotional abuse $n$ (%)	962 (30%)	253 (23%)	860 (27%)	285 (19%)	75 (27%)	28 (25%)	1897 (28%)	566 (21%)								
Physical abuse $n$ (%)	217 (7%)	33 (3%)	159 (5%)	71 (5%)	14 (5%)	8 (7%)	390 (6%)	112 (4%)								
Sex n (%)	3198 (75%)	1088 (25%)	3212 (69%)	1470 (31%)	283 (72%)	110 (28%)	6693 (71%)	2668 (29%)								
Lockdown Status n (%)	4286 (46%)				4682 (50%)				393 (4%)				9361 (100%)			

Respondents agreed with the terms of our survey regarding privacy and information gathering. The terms of agreement explicitly mentioned that all personal information would

be confidential and used to formulate statistic averages. We also informed them that we would use the results for research, and that we would publish the findings. We told them they could choose to opt-out of the study at any time and did not offer financial incentives to answer the survey. Nevertheless, we offered feedback results in which we provided various educational resources on COVID-19 and mental health education, such as infographics, videos, and Moodle® online courses. We also informed participants of a hotline where they could receive psychological support if they so wished. The INPRFM Research Ethics Committee approved the study on April 16, 2020, because we met the criteria for internet E-surveys such as informed consent, data protection, development, testing, contact mode, advertising the survey, mandatory, voluntary, completion rate, cookies used, IP check, log file analysis, registration, and atypical timestamp considerations (Eysenbach, 2004).

## Research Instruments

We administered the **Questionnaire for the detection of risks to mental health COVID-19** (Goldberg et al., 2017; González, 2015; Velasco et al., 2006; Arrieta et al., 2017; Arroll et al., 2010; Mitchel et al., 2016; Morales-Chainé et al., 2019) online, through a WebApp designed by Linux®, PHP®, HTML®, CSS®, and JavaScript®, using the latest encryption methods to comply with safety and privacy standards. The survey consisted of four sections: status due to COVID-19, socioeconomic self-report, mental health status, and discrete nominal conditions. The complete questionnaire obtained a Cronbach's alpha of 0.95. A factor loading analysis indicated a common factor for each question above 0.30, with an explained variance of 66.97%.

The **Self-report on status due to COVID-19** included two questions: What is your current situation? Participants can choose one of six possible answers: I have no COVID-19 symptoms; I have an acute respiratory illness; I suspect I have COVID-19; I have no symptoms, but the person closest to me has COVID-19; I was diagnosed with COVID-19 with no symptoms; I was diagnosed with COVID-19 with symptoms. The second question was: Have you lost someone you love because of the COVID-19? Participants can choose one of seven response options: No, I haven't lost anyone; Yes, I lost a daughter or a son; Yes, I lost a wife or a husband; Yes, I lost my mother or father; Yes, I lost a beloved close relative; Yes, I lost my best friend; Yes, I lost my closest colleague. Factor Analysis with the Mineigen criterion 1, iterating criterion 25, Principal Components extraction, Varimax Kaiser Rotation, and correlation Method yielded an explained variance of 54%.

In the **Socio-economic self-report, we asked** where the person lives, who they live with, their lockdown status, and details about their basic profile, sex, age, marital status, educational attainment, current occupation, current health status, and current physical condition (diabetes, hypertension, obesity, or depression). The self-report on socio-economic status factor loading analysis yielded an explained variance of 52.

We compiled 27 questions to screen for **mental health symptoms** (see Figure 1). *Acute Stress* is a 7-item sub-scale referring to the past month, with a Cronbach's alpha of 0.89 and an explained variance of 61%, which we based on the Posttraumatic Stress Disorder

Checklist for DSM-5 (Blevins et al., 2015). In addition, we used the Model Test User Model with Test statistics and obtained factor loadings of between 0.612 and 0.832, with 75 iterations and 29 parameters ( $t[21]=34,065$ ,  $p=0.000$ ). We obtained the following index: CFI=1.000, TLI=1.000, RMSEA=0.000 (0.000-0.012), and SRMR=0.002. *Avoidance-Sadness* is a 5-item sub-scale referring to the past month, with a Cronbach's alpha of 0.73 and an explained variance of 72%, taken from the PTSD-Checklist (Blevins et al., 2015). We obtained factor loadings of between 0.300 and 0.840, with 68 iterations and 18 parameters ( $t[10]=15,913.02$ ,  $p=0.000$ ). We obtained the following index: CFI=1.000, TLI=0.999, RMSEA=0.014 (0.000-0.028), and SRMR=0.005. *Distancing-Anger* is a 7-item sub-scale with a Cronbach's alpha of 0.88 and an explained variance of 58%, drawn from the 17-item PTSD-Checklist (Blevins et al., 2015) referring to the past month, and the Patient Health Questionnaire (PHQ; Arrieta et al., 2017; Arroll et al., 2010; Mitchel et al., 2016) referring to the past two weeks. We obtained factor loadings of between 0.542 and 0.818, with 89 iterations and 30 parameters ( $t[21]=29,360.57$ ,  $p=0.001$ ), and the following index: CFI=1.000, TLI=1.000, RMSEA=0.000 (0.000-0.009), SRMR=0.002. *Generalized Anxiety* is a 4-item sub-scale referring to the past two weeks, with a Cronbach's alpha of 0.93 and an explained variance of 82%, taken from the field study for the Classification of Mental Disorders for Primary Health Care (ICD-11 PHC; Goldberg et al., 2017). We obtained factor loadings of between 0.836 and 0.889, with 37 iterations and 14 parameters ( $t[6]=30,032$ ,  $p=0.000$ ), with the following index: CFI=1.000, TLI=1.000, RMSEA=0.000 (0.000-0.000), and SRMR=0.000. *Health-related Anxiety* is a 4-item sub-scale with a Cronbach's alpha of 0.89 and an explained variance of 76%. We take the first item from the ICD-11 PHC (Golberg et al. 2017) referring to the past two weeks, and three items from the Somatic Symptoms without Organic or Medical Cause Current Status Assessment Questionnaire (SSOM; Gonzalez, 2015; Velasco et al., 2006) referring to the present. We obtained factor loadings of between 0.815 and 0.862, with 37 iterations and 14 parameters ( $t[6]=23,006$ ,  $p=0.000$ ), with the following index: CFI=1.000, TLI=1.000, RMSEA=0.000 (0.000-0.000), and SRMR=0.000. The whole 27-item scale used a 1 to 10 response scale, in which 10 means "strongly describes what I feel," which became an average percentage. The Cronbach's alpha from the whole 27-item scale was 0.95, with an explained variance of 62%.

**In addition, we used three discrete nominal items to explore binge drinking and experience of abuse status.** *Binge alcohol consumption* is a question, according to Golberg et al., 2017, which determines whether in the past month, participants have drunk more than five beers, cups, or straight shots, or cocktails with liquor such as tequila, whiskey, mezcal, and rum in less than two hours. Participants could answer Yes, I did, No, I didn't, or I prefer not to answer. We explored the Experience of Abuse with two questions about the past month, based on Morales-Chaine et al. (2019). Participants answered whether someone had deliberately harmed them emotionally through verbal humiliation, verbal abuse, physical threats, ignoring them, having restrictions placed on them, or being jealous of them. Participants could answer yes or no. In addition, they reported whether someone intentionally physically hurt them through punches, pushes, pinching, forceful grabbing, or in some other way. Factor loading analysis yielded an explained variance of 52%.



## Procedure

At the start of stage 2 of the COVID-19 pandemic in Mexico, when lockdown was imposed (April 24-30, 2020), we asked participants to answer the questionnaire with the following instructions:

*The risk of COVID-19 contagion constitutes an unprecedented event for all of us. The current situation requires us to face our feelings. Doing so will enable us to identify what to do about our feelings and how to seek the professional help we may need. Depending on your answers, you will receive feedback telling you how to handle your emotions, thoughts, and behavior related to the pandemic. Your participation is voluntary, and the information you provide will be confidential, as noted in our privacy agreement.*

## Data Analysis

We calculated Means, Standard Deviations, Variance Analysis SSTYPE (3), Sheffe Post Hoc Test, Cronbach's Alpha, and Factor Loading (Mineigen criterion 1, iterate criterion 25, Principal Components extraction, Kaiser Varimax Rotation, and Method correlation) analysis, using the IBM Corporation Released 2010 IBM SPSS Statistics for Windows, Version 19.0. In addition, we used Lavaan 0.6-6 after reporting number iterations to calculate the confirmatory factor loading analysis and the structural equation modeling. We then calculated the Model Optimization Method, and the number of free parameters, observations, and missing patterns. We used the Model Test User Model with Test statistics, its degrees of freedom, P-value (Chi-square), and the Model Test Baseline Model. We compared the User Model to the Baseline Model using the Comparative Fit Index (CFI). We calculated the Root Mean Square Error of Approximation (RMSEA) with 90 percent confidence interval-lower – upper  $\leq 0.05$ . We calculated the Standardized Root Mean Square Residual (SRMR), and its Parameter Estimates with Standard Error Standard, and Hessian Observed Information. Afterwards, we used Linear Regression Analysis with the square R to predict relationships between latent variables using the Enter Method and Durbin residuals procedure. For these last analyses, we used Rstudio®, ver. 1.3.959 software.

## FINDINGS

In this section, we report the result of the data analysis. First, we provide the structural equation modeling adjustment ratios to identify the factor loads within each latent variable question and the predictive relationship between variables. Secondly, we describe the distribution of the mean scores obtained by the participants, according to the level of threat of mental health problems related to lockdown, binge-drinking, and experience of abuse.

Figure 1 indicates the relationship between each latent variable and its item factor load, obtained through structural modeling equations, derived from 179 iterations and 207 parameters ( $t[1171] = 28,079.418$ ,  $p < 0.001$ ), CFI = 0.947, TLC = 0.940, RMSEA = 0.049 (0.049 – 0.050), SRMR = 0.048. Results indicate that Acute Stress predicted **Avoidance-sadness, distancing-anger, and general anxiety** ( $R^2=0.768$ ;  $R^2=0.755$ ; and  $R^2=0.828$ , respectively), while **Health-related anxiety predicted Acute Stress** ( $R^2=0.933$ ).

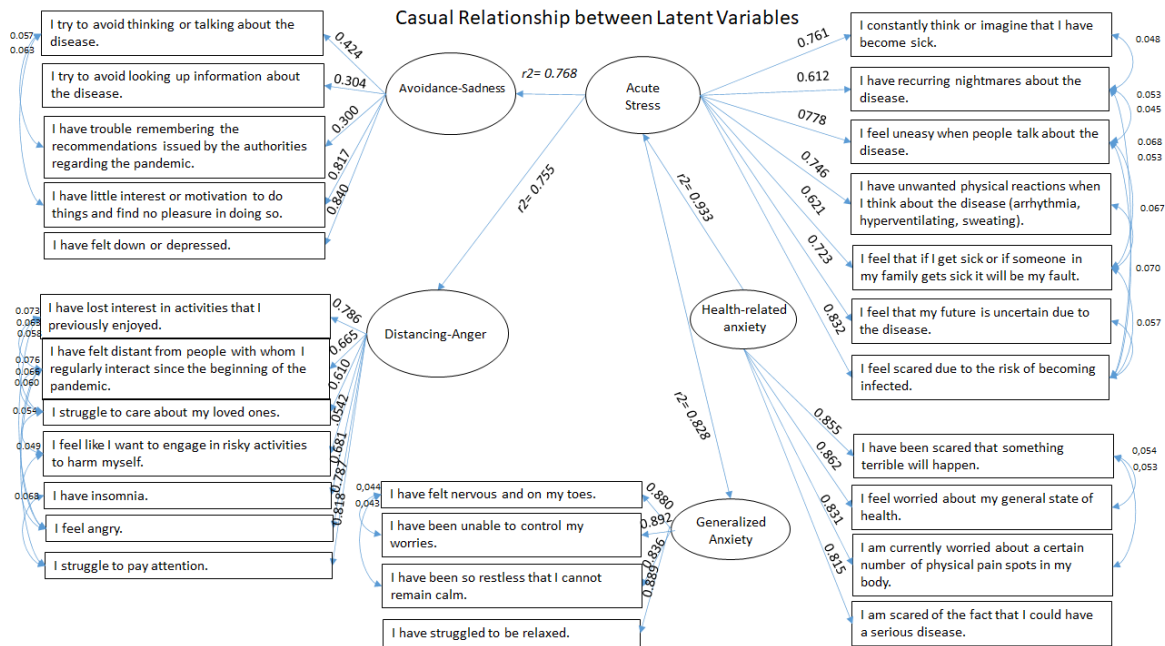


Figure 1. Structural equations model on mental health symptoms: Acute Stress, Avoidance-Sadness, Distancing-Anger, as reported by survey respondents

Consequently, in Table 2, we report participants' mental health average percentages and their **lockdown** status. In this respect, the variance analysis (ANOVA) indicates that there are statistically significant differences for **acute stress, avoidance-sadness, distancing-anger, generalized anxiety, and anxiety related to physical health** levels due to respondents' lockdown status. For example, Table 2 shows the generalized anxiety levels when people reported being in lockdown ( $M=46.52$ ;  $SD=32.43$ ), partial lockdown ( $M=39.19$ ,  $SD=31.80$ ) or not being in lockdown ( $M=35.14$ ,  $SD=32.16$ ;  $F[2, 9436]=6.41$ ,  $p=0.036$ ). Table 2 also shows how many participants reported binge drinking or the experience of abuse according to lockdown conditions. A total of 26% of the sample reported experiencing emotional abuse, while 5% reported physical abuse.

Table 2. Number of respondents by lockdown status during the COVID-19 pandemic and their clinical characteristics.

	Lockdown/Sex			F (2, 9,436)= p<0.036	Total
	In lockdown	In partial lockdown	Not in lockdown		
Acute Stress <i>M</i> ( <i>SD</i> )	41.27 (25.49)	41.19 (26.19)	37.79 (27.67)	3.33	41.09 (25.94)
Avoidance/ Sadness <i>M</i> ( <i>SD</i> )	35.15 (22.11)	29.92 (22.09)	27.34 (23.14)	73	32.21 (22.31)
Distancing/ Anger <i>M</i> ( <i>SD</i> )	40.98 (26.38)	34.07 (25.23)	29.41 (24.88)	99.52	37.05 (26.02)
Generalized Anxiety <i>M</i> ( <i>SD</i> )	46.52 (32.43)	39.19 (31.80)	35.14 (32.16)	69.41	42.39 (32.34)

Health related Anxiety <i>M (SD)</i>	43.65 (31.01)	41.18 (31.17)	37.10 (32.02)	12.49	42.14 (31.17)
Binge drinking <i>n (%)</i>	532 (12%)	677 (14%)	80 (20%)		1289 (14%)
Emotional abuse <i>n (%)</i>	1215 (3%)	1145 (24%)	103 (26%)		2463 (26%)
Physical abuse <i>n (%)</i>	250 (6%)	230 (5%)	22 (6%)		502 (5%)
<b>Lockdown Status <i>n (%)</i></b>	<b>4286 (46%)</b>	<b>4682 (50%)</b>	<b>393 (4%)</b>		<b>9361 (100%)</b>

Table 3 shows the results of the variance analysis indicating statistically significant differences between participants' mental health symptoms regarding their binge drinking and experience of abuse. For example, people who reported binge drinking had higher levels of **acute stress** ( $M= 47.92$ ,  $SD=25.62$ ) than those who did not engage in this type of drinking ( $M= 39.98$ ,  $SD=25.78$ ;  $F[2, 9,436]=56.45$ ,  $p<0.001$ ). It is worth mentioning that those who chose not to answer ( $n=62$ , 1%) reported higher average stress levels ( $M= 52.30$ ,  $SD=28.79$ ) than the first two groups mentioned. One key statistical difference concerns **generalized anxiety** ( $F[2, 9,436]= 79.48$ ,  $p<0.001$ ). People who binge drank also had higher average generalized anxiety scores ( $M= 52.51$ ,  $SD=32.40$ ) than those who did not ( $M= 40.74$ ,  $SD=32.01$ ;  $F[2, 9,436]= 79.48$ ,  $p<0.001$ ). Importantly, regarding **physical health anxiety**, those who engaged in binge drinking had higher physical health anxiety levels ( $M= 49.57$ ,  $SD=30.47$ ) than those who did not ( $M= 40.92$ ,  $SD=31.09$ ;  $F[2, 9,436]= 47.73$ ,  $p<0.001$ ).

*Table 3. Mental health symptom averages regarding binge drinking, and experience of abuse status during the COVID-19 pandemic, and clinical characteristics.*

Mental health symptoms Average	Binge drinking			F (2, 9,436)= p<0.001
	Yes, I did <i>M (SD)</i>	No, I didn't <i>M (SD)</i>	I would prefer not to answer <i>M (SD)</i>	
<b>n= 9361 (100%)</b>	<b>1289 (14%)</b>	<b>8010 (85%)</b>	<b>62 (1%)</b>	<b>56.45</b>
Acute Stress <i>M (SD)</i>	47.92 (25.62)	39.98 (25.78)	52.30 (28.79)	56.45
Avoidance/ Sadness <i>M (SD)</i>	39.42 (22.33)	31.01 (22.04)	47.97 (24.65)	92.95
Distancing/ Anger <i>M (SD)</i>	47.73 (26.40)	35.28 (25.47)	58.57 (30.56)	147.61
Generalized Anxiety <i>M (SD)</i>	52.51 (32.40)	40.74 (32.01)	58.51 (33.52)	79.48
Health related Anxiety <i>M (SD)</i>	49.57 (30.47)	40.92 (31.09)	56.17 (32.82)	47.73

Mental health symptoms Average	Experience of Emotional abuse		F (2, 9,436)= p<0.001
	Yes <i>M (SD)</i>	No <i>M (SD)</i>	
<b>n= 9361 (100%)</b>	<b>2463 (26%)</b>	<b>6898 (74%)</b>	
Acute Stress <i>M (SD)</i>	49.16 (24.90)	38.42 (25.74)	311.53
Avoidance/ Sadness <i>M (SD)</i>	41.78 (21.76)	29.06 (21.58)	609.13
Distancing/ Anger <i>M (SD)</i>	51.81 (25.58)	32.18 (24.27)	1120.6
Generalized Anxiety <i>M (SD)</i>	57.51 (30.58)	37.40 (31.34)	733.56
Health-related Anxiety <i>M (SD)</i>	52.60 (29.94)	38.70 (30.80)	363.42
Mental health symptoms Average	Physical abuse experience		F (2, 9,436)= p<0.001
	Yes <i>M (SD)</i>	No <i>M (SD)</i>	
<b>n= 9361 (100%)</b>	<b>502 (5%)</b>	<b>8859 (95%)</b>	
Acute Stress <i>M (SD)</i>	47.82 (26.48)	40.75 (25.87)	32.36
Avoidance/ Sadness <i>M (SD)</i>	42.71 (22.81)	31.68 (22.15)	107.14
Distancing/ Anger <i>M (SD)</i>	53.15 (26.82)	36.23 (25.71)	187.08
Generalized Anxiety <i>M (SD)</i>	57.77 (31.23)	41.60 (32.20)	109.78
Health related Anxiety <i>M (SD)</i>	52.08 (29.73)	41.64 (31.16)	48.91

Regarding the report on victims of emotional abuse, variance analysis indicated statistically significant differences between all mental health symptom averages. For example, Table 3 shows that participants reporting the experience of emotional abuse had higher average levels of distancing/anger ( $M = 51.81$ ,  $SD = 25.58$ ) than those who did not ( $M = 32.18$ ,  $SD = 24.27$ ;  $F[2, 9,436] = 1120.60$ ,  $p < 0.001$ ). As for **general anxiety** and emotional abuse, victims of the latter also had higher average scores ( $M = 57.51$ ,  $SD = 30.58$ ) than those who had not been victims of this ( $M = 37.40$ ,  $SD = 31.34$ ;  $F[2, 9,436] = 733.56$ ,  $p < 0.001$ ).

As for the experience of physical abuse, variance analysis also revealed statistically significant differences between all the mental health symptom averages. Those who reported this type of abuse had higher average levels of **acute stress** ( $M = 47.82$ ,  $SD = 26.48$ ) than those who did not ( $M = 40.75$ ,  $SD = 25.87$ ;  $F[2, 9,436] = 32.36$ ,  $p < 0.001$ ; Table 3). Lastly, those who

had suffered **general anxiety** and physical abuse had higher average scores ( $M= 57.77$ ,  $SD=31.23$ ) than those who did not ( $M= 41.60$ ,  $SD=32.20$ ; ( $F[2, 9,436]= 109.78$ ,  $p<0.001$ ).

## DISCUSSING OUR FINDINGS

The purpose of this paper was to describe the relationship between mental health symptoms, binge drinking, and experience of abuse during lockdown. We expected to find similar mental health symptoms to those observed during and in the aftermath of other traumatic events, such as the Ebola epidemic (Rogers et al., 2020). The survey was administered when the second stage of the COVID-19 pandemic was declared. This stage consisted of the lockdown recommendation announced by the Mexican Health Undersecretary on March 23. One month into lockdown during Stage 2 of the COVID-19 pandemic, we found reported symptoms of acute stress, avoidance, sadness, distancing, anger, and anxiety (Zhue et al., 2020).

We found what appear to be a series of general symptoms and actions closely related to feelings of **avoidance and sadness**, such as subjects not wishing to deal with the situation, suppressing their feelings, or failing to acknowledge the pandemic and lockdown. Other subjects also reported a declining state of mind and morale, while still others struggled with following the recommendations issued by the health authorities. Some reported losing interest in things they used to enjoy, as if they were in a general state of depression and hopelessness and sadness) Li et al., 2020; Morales-Chainé et al., 2020; Rogers et al., 2020).

Acute stress was characterized by recurring thoughts of becoming sick, night terrors related to being sick, a constant state of worry, unwelcome physical reactions, guilt, uncertainty, and fear (Blevins et al., 2015; Goldberg et al., 2017) during stage 2 of the COVID-19 pandemic (Ho et al., 2020). Acute stress also explained many of our findings in the **conditions of distancing and anger** report, such as loss of interest, becoming distant from others, struggling to be empathetic, and wishing to self-harm, insomnia, anger, and attention deficit situations (De Camargo, 2010; Morales et al., in press; Morales et al., 2020; Rogers et al., 2020; Selye, 1956). We found that the acute stress caused by the COVID-19 lockdowns created an overall feeling of **general anxiety**, observable in the following behaviors: nervousness, feelings of anxiety, being unable to control worry, uneasiness, and difficulty relaxing (Blevins et al., 2015; Goldberg et al., 2017; Li et al., 2020a). These symptoms are closely related to a widespread feeling of general anxiety regarding physical health (Gonzalez, 2015; Velasco et al., 2006), observable through specific behaviors such as the fear people have of their loved ones becoming infected or suffering the effects of physical pain or other types of severe illness during the pandemic (Li et al., 2020).

Being in lockdown during the COVID-19 pandemic has affected the psychological state of a large sector of the population. People have reported feelings of stress, avoidance, sadness, distancing, anger, anxiety, and other unpleasant mental states, mostly fear, attention issues, self-harm thoughts, binge drinking, and experienced abuse. All these symptoms have been reported by Li and collaborators during situations in which there is vicarious trauma (2020). Our survey respondents under lockdown reported suffering episodes of avoidance, sadness, distancing, anger, and anxiety, because of the acute stress produced during the

COVID-19 pandemic and lockdown. These findings match those found by Ho and collaborators (2020) and Mortensen and collaborators (2010), who also reported negative thoughts (such as repulsion and anxiety), and Li, Wang et al. (2020), whose study uncovered negative cognitive situations among respondents (mainly dominated by anxiety and profound sadness), during the early weeks of COVID-19 lockdowns.

Regarding binge drinking, it is essential to highlight the role this behavior could be playing in exacerbating the mental health symptoms already mentioned (Goldberg et al., 2017; Ho et al., 2020; Zhue et al., 2020). Even though we already knew drinking could be an inefficient way of coping with stress, findings suggest this behavior is related to higher levels of stress expressed as avoidance, sadness, distancing, anger, and generalized or health-related anxiety, as noted in *The Lancet* (2020).

All the findings meet Selye (1956), Blevins et al. (2015), and De Camargo's criteria for the future presence of Post-Traumatic Stress Disorder (2010). Specifically, symptoms associated with what Selye and De Camargo call the "resistance" phase, in which victims remain socially and emotional active for weeks after the traumatic event, enable them to function with a certain physiological equilibrium (Lazarus & Folkman, 1984; 1986; Moos, 1995; Selye, 1956). Nevertheless, we began to register certain symptoms characteristic of the exhaustion phase. People reported symptoms as being persistent if the traumatic or stressful event was periodically repeated, which is when insomnia, fatigue, lack of concentration and emotional problems occur (Cuevas et al., 2018; Lazarus & Folkman, 1984; 1986; Moos, 1995). Nonetheless, further studies should analyze the evolution of these conditions to the exhaustion stage, which constitutes an actual PTSD condition, as described by De Camargo (2010) and Selye (1956).

The stress levels and mental health symptoms found during this research project are like those that occur during vicarious trauma and could be a result of the risk conditions described in this document. They could also be a reaction to other conditions attributable to the authorities during the second stage of the COVID-19 pandemic in Mexico, such as discrediting mask use. Future research projects should be able to determine whether the Mexican authorities helped alleviate the psychological impact of lockdowns and whether they did their part in helping to allay the effects of the pandemic (Li et al., 2020b).

Further efforts should also take into consideration the role friends and family networks play in regulating the effects of acute stress caused by lockdowns (Li et al., 2020). Morales-Chainé et al. (in press) reported that being in lockdown while single usually leads to higher levels of acute stress. Further research should analyze the relationship between these variables, given that the results found in this paper refer to participants who were confined with their families, which might have been an attenuating factor.

The conditions of acute stress found in this paper occurred during the second stage of the COVID-19 pandemic, but other risk factors also come into play, such as abuse and binge drinking. Mental health conditions are the result of a stressful event that has the potential to become traumatic in the medium term since it poses a similar risk to other events that cause PTSD (Li et al., 2020).

The COVID-19 pandemic seems to have been a traumatic event for people in the same way as other traumatic situations such as war, extreme abuse incidents, and other disturbing

events. The psychological responses are similar, as Ho et al. reported (2020): **avoidance, sadness, distancing, anger, and anxiety**, leading to a situation of **acute stress**. Although other factors such as binge drinking and abuse experiences also contribute to this, fear of contracting COVID-19 combined with lockdowns can have a severe impact on mental health. This issue warrants the full attention of the medical authorities.

Early risk detection will allow us to prevent high morbidity situations associated with emotions, cognition, and the mechanisms whereby people deal with life-threatening situations, such as the risk of becoming infected with COVID-19. Hence the importance of developing strategies based on empirical data (Wang et al., 2020), intended to intervene in the most appropriate way to reduce the risk of stress, anxiety, and sadness, using remote methods, as recommended by Zhue and collaborators (2020). It is essential to conduct proper research tailored to each community to deliver the most effective response.

This paper provides a tool for the early detection of health risks derived from stress, anxiety, and sadness during the COVID-19 pandemic, with an approach based on the use of Smartphones that will allow us to identify mental health symptoms while people are in lockdown. It will supply the data needed to act accordingly (Zhang et al., 2014). We therefore recommend remote psychological care (Zhue et al., 2020), based on scientific evidence, to cope with emotional, cognitive, and behavioral attitudes towards loss, acute stress, negative thoughts and emotions, anxiety, PTSD, alcohol consumption, and the experience of abuse.

The authorities also have an impact on reducing stress and anxiety levels. We would recommend prevention policies and campaigns to promote mental health at the national level to contribute to the reduction of stress levels, avoidance, sadness, distancing, anger, anxiety, substance use, and abuse experience during and after the COVID-19 pandemic. All this could be achieved through a series of systematic multi- and inter-disciplinary systematic strategies, at all levels of care, to make the best use of the human and economic resources in Mexico.

Our findings are in line with the recommendations issued by Li and collaborators (2020b) for developing a consistent policy. Further studies should contribute to early risk detection strategies and ways to promote remote psychological education to improve mental health by understanding the different illnesses, mechanisms of action, and their evolution. It is also necessary to consider the timeframe in which mental health symptoms are measured since reaction times vary and are tied to each country's social conditions and the current mental health status of respondents.

## LIMITATIONS

Even though the current study made it possible to describe mental health symptoms during lockdown, it has several limitations. One suggestion for overcoming this involves using a cross-sectional design. Longitudinal studies could be used evaluate, diagnose, and follow up on mental health conditions and their evolution during and after the COVID-19 pandemic. Although it is important to detect early mental health risks, there is a need for procedures that will make it possible to follow up on the identification of symptoms and their social determinants to effectively interrupt their progression or the development of illness.

Even though an online survey has its advantages, it also has certain limitations. Findings are not generalizable to the whole population, and it is necessary to evaluate the robustness of the survey for diagnosing mental disorders or risk levels. Although looking for signs is an early screening procedure recommended by the Pan-American Health Organization to interrupt their progression, it is essential to reduce symptoms and diagnose disorders to reduce the treatment gap. Accordingly, subsequent studies should conduct a follow-up assessment of the symptoms addressed in this paper and prioritize research on the role of acute stress over other mental health conditions.

Another recommendation concerns the exclusion criteria limiting respondents to those over 16. We should attempt to include a broader age group to study mental health symptoms. Our final recommendation would be to include social determinants as control variables. This study failed to control for the role of employment and how it contributes to the early emergence of mental health symptoms, binge drinking or the experience of abuse. Future research should consider studying the way social determinants regulate the emergence of mental health symptoms.

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