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ORIGINAL

Mental health, suicide risk and the important role of self-esteem in Adolescents before and during coexistence with COVID-19 in Ecuador

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Abstract Introduction/Objectives: COVID-19 has had a significant emotional impact on people's lives, especially adolescents. Therefore, the aim was to assess the predictors of suicide risk during the COVID-19 pandemic in adolescents in Ecuador by means of a longitudinal study. **Method:** The application of a longitudinal design with two measures: before the start of the pandemic and one year afterwards. The sample consisted of 137 adolescents between 12-18 years of age. The variables analysed were mental health, the risk of suicide and self-esteem. Statistical analyses were performed using mean comparison, correlations, QCA models and mediation models. **Results:** The results indicated higher levels of anxiety and stress after one year of the pandemic. In addition, a higher risk of suicide following the pandemic was observed in those adolescents with higher scores in emotional symptomatology and low self-esteem. QCA models and mediation models highlighted the importance of self-esteem as a protective variable between pre-COVID-19 suicide risk and emotional symptomatology and post-COVID-19 suicide risk. **Conclusions:** This study highlights adolescents' level of vulnerability to the pandemic and its significant psychological impact. It is important to detect which factors function as risks and which as protection against COVID-19 in order to implement intervention programmes that target these aspects and ensure better adolescent well-being.

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PALABRAS CLAVE

Riesgo de suicidio,
salud mental,
adolescentes,
autoestima,
longitudinal,
COVID-19

Salud mental, riesgo de suicidio y el importante papel de la autoestima en adolescentes antes y durante la convivencia con COVID-19 en Ecuador

Resumen Introducción/Objetivos: La COVID-19 tuvo un impacto emocional en la vida de las personas, especialmente en la adolescencia. El objetivo fue evaluar los predictores de riesgo de suicidio en adolescentes en Ecuador por medio de un estudio longitudinal. **Método:** Se trata de un diseño longitudinal con dos medidas: antes del inicio de la pandemia y un año después.

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La muestra fue de 137 adolescentes entre 12 y 18 años. Las variables analizadas fueron la salud mental, el riesgo de suicidio y la autoestima. Los análisis estadísticos se realizaron mediante comparación de medias, correlaciones, modelos QCA y modelos de mediación. **Resultados:** Los resultados indicaron mayores niveles de ansiedad y estrés después de un año de la pandemia. Se observó un mayor riesgo de suicidio tras la pandemia en aquellos adolescentes con puntuaciones más altas en sintomatología emocional y baja autoestima. Los modelos QCA y los modelos de mediación destacaron la importancia de la autoestima como variable protectora en el riesgo postsuicidio. **Conclusiones:** Este estudio pone de manifiesto el nivel de vulnerabilidad de los adolescentes ante la pandemia y su importante impacto psicológico. Es importante detectar qué factores funcionan como riesgos y cuáles como protección frente al COVID-19 para implementar programas de intervención.

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Approximately 700000 people commit suicide every year, with the number of suicide attempts being ten times higher (World Health Organisation, 2021a). Suicide is a global health problem that affects all cultures, genders, ages, and countries; however, 77% of suicides occur in low- and middle-income countries (World Health Organisation, 2021a). Accordingly, in the year 2020, almost 1000 people committed suicide in Ecuador (Policía Nacional del Ecuador, 2020).

Suicide is the second leading cause of death among adolescents and young people, making them a particularly vulnerable population (World Health Organisation, 2021b). Among the main risk factors for suicide in adolescence are stressful life events and mental health problems (Kang et al., 2021). In this regard, living with the COVID-19 pandemic is proving to be a significant potential stressor for this group. The prevalence of mental health problems, especially those related to stress, anxiety, and mood, increased in the infant and juvenile population during the pandemic (Lacomba-Trejo et al., 2020; Racine et al., 2021). This increase has also been related to increased suicide risk among adolescents and young adults (Hutchinson et al., 2021), among other aspects, due to their lower amount of personal and emotional resources to handle highly stressful situations (Lacomba-Trejo et al., 2020).

A recent meta-analysis of the impact of the pandemic on mental health, which included 80,879 children and adolescents, concluded that the rates of anxiety (25.20%) and depression (20.50%) had doubled pre-pandemic estimates. These rates have been particularly high in girls and older adolescents (Racine et al., 2021). These data appear to be higher in countries with lower economic status, as is the case in Ecuador. Ecuador is a country that suffered one of the worst coronavirus outbreaks in the world (Gobierno de Ecuador, 2020). Schools in Ecuador were closed on March 13, 2020, and a national lockdown and quarantine period was imposed. The first case of COVID-19 was confirmed in Ecuador on February 29, 2020 (Gobierno de Ecuador, 2020), and the first death occurred on March 13. On this date (March 13), the government suspended classes at all school levels in the country, and stay-at-home orders were issued on March 16. This interrupted classes in the middle of the school year, which was due to end in June. Cases continued to increase, and on Monday, April 6, the Ministry of Education announced that students would not return to school for that school year. Difficulties in the socioeconomic context

have been pointed to as an important risk factor for suffering from mental health problems in general, especially during the COVID-19 pandemic (Campo-Arias & Mendieta, 2021). Considering the social stress theory, socially disadvantaged people will present more stressors and greater vulnerability to stress and other emotional difficulties since they have fewer psychosocial resources for coping (Aneshensel, 1992).

In the face of adversity scenarios, it is essential to consider both the risk aspects and the factors that can help subjects protect themselves from adverse circumstances that impact them. In this sense, self-esteem plays a crucial protective role among adolescents and young adults (Chen et al., 2022). A recent meta-analysis on self-esteem has concluded that, during adolescence, self-esteem tends to remain stable (Orth et al., 2018). Based on a unidimensional conceptualisation, self-esteem is a set of thoughts and feelings regarding self-worth and importance. It is a subjective assessment of their self-concept that results in an overall positive or negative attitude towards themselves (Rosenberg, 1965). Self-esteem is the confidence in one's strengths, which considers two main dimensions: personal worth and the feeling of personal capacity (Undurranga & Avendaño, 1997). This construct is fundamental to assessing psychological adjustment throughout life (Sánchez-Queija et al., 2016). It is particularly relevant to consider how poorly adaptive management of the physical and psychological changes that come with adolescence seems to be related to a decrease in self-esteem (Orth et al., 2018). The literature indicates how self-esteem is one of the main protective factors against psychopathology and suicide during adolescence (de la Barrera et al., 2022; Fonseca-Pedrero et al., 2020; Lin, 2019). According to the Scar Model or Personality Complication Model (Tackett, 2006), experiencing personal difficulties (such as those associated with living with the COVID-19 pandemic), can modify personality. These modifications may be due to role changes, daily life challenges, and stressful life events (Williams, 2000).

COVID-19 has had a significant emotional impact on people's lives, especially adolescents. However, the role of risk and protective factors for suicide in adolescents has not been sufficiently studied from a longitudinal perspective, analysing their impact in depth by comparing them before and during the COVID-19 pandemic. Therefore, the present study aimed to assess the predictors of suicide risk during the COVID-19 pandemic in adolescents in Ecuador by means

of a longitudinal study. It is expected that (H1) emotional state (anxious, depressive, and stress symptoms) and suicide risk will increase during the pandemic, but self-esteem will remain stable. (H2) Those adolescents who had higher risk factors (more symptoms of anxiety, depression, stress, and lower self-esteem) will be at higher risk of suicide during the pandemic. (H3) Emotional state (anxious, depressive, and stress symptoms) and pre-pandemic suicide risk are expected to predict the risk of suicide in adolescents in Ecuador during the pandemic. (H4) This relationship will be mediated by self-esteem as a protective factor. (H5) The presence of previous high self-esteem is expected to be one of the most relevant variables for predicting low suicide risk interacting with previous emotional states. Accordingly, its absence will indicate a high suicide risk.

Method

Participants

A total of 137 adolescents from Ecuador participated in our study after meeting our inclusion and exclusion criteria. 51.10% were boys. Participants were between 12 and 18 years of age ($M = 14.62$; $SD = 1.50$). The majority had not suffered from COVID-19 (74.45%) or were unaware of it (16.07%). However, the majority had relatives who had suffered from COVID-19 (81.75%). Only 13.14% had no family members who had been infected, and 5.11% were unsure. In this context, 31.25% had suffered the loss of a family member due to COVID-19. The selection criteria were: (1) Having signed informed consent form together with their parents, (2) Completion of the full set of pre- and post-pandemic questionnaires, (3) Having lived in Ecuador before and during the pandemic, (4) Between 12 and 18 years of age, and (5) Scoring less than 25% on the Oviedo Infrequency Scale.

Measures

- *Sociodemographic variables*: by means of an ad hoc questionnaire. The variables were: gender and age of the participants, whether COVID-19 had infected them or their family members, and if they had lost a family member or a close person due to COVID-19.
- *Risk of suicide*: was assessed using the Adolescent Suicidal Behaviour Assessment Scale (SENTIA) (Díez-Gómez et al., 2020). The SENTIA assesses suicide risk in adolescents by means of 16 dichotomous responses (*yes* or *no*) items. This tool has shown adequate psychometric properties in previous studies (Díez-Gómez et al., 2020). In our study the SENTIA has shown adequate internal consistency in the first ($\alpha = .88$) and second ($\alpha = .84$) assessments.
- *Emotional Distress*: was assessed using the Depression, Anxiety and Stress Scale in its reduced version adapted to Spanish (DASS-21; Fonseca-Pedrero, Paino et al., 2010; Lovibond & Lovibond, 1995). The DASS-21 assesses the anxious, depressive, and stress symptoms suffered during the preceding week by means of 21 items answered from 0 (“It does not describe anything that happened to me or that I felt during the week”) to 3 (“Yes, this happened to me frequently, or almost always”). The instrument had previously shown adequate psychometric properties

(Daza et al., 2002; Fonseca-Pedrero, Paino, et al., 2010). In the present study, the scale showed adequate internal consistency in the first (stress $\alpha = .79$; anxiety $\alpha = .77$; depression $\alpha = .84$) and second assessment (stress $\alpha = .79$; anxiety $\alpha = .85$; depression $\alpha = .87$).

- *Self-esteem*: was assessed using the Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965) adapted to the Spanish context (Atienza et al., 2000). The RSE consists of 10 items [a Likert format, ranging from 1 (*Strongly disagree*) to 4 (*Strongly agree*)], and focuses on feelings of self-respect and self-acceptance. The tool has cut-off values that divide scores between low self-esteem (< 29) and adequate self-esteem (≤ 30). This tool has shown adequate psychometric properties in previous studies with adolescents (Oliva et al., 2011). The psychometric properties in this study seem to be adequate before ($\alpha = .87$) and during ($\alpha = .87$) the pandemic.
- *Infrequency of responses*: was assessed using The Oviedo Infrequency Scale (INF-OV; Fonseca-Pedrero, Wells et al., 2010). The INF-OV assesses random, pseudorandom, or dishonest responses by means of 12 items using a Likert scale. Four scale items were selected, and participants who scored more than 25% were excluded from the study.

Procedure

At the beginning, the research was going to be a longitudinal study for the application of an emotional education programme in adolescents in Ecuador, for which the data prior to the pandemic was recorded in 2019- 2020 (December, January and February). For this purpose, different schools in the Azuay Region were contacted. This research sample comprised a total of 418 adolescents. However, when the pandemic occurred in March 2020, the planned research was interrupted and finished. However, due to the interest in conducting research on the impact of COVID-19 in adolescents from different countries, the same participating centres from the previous study were contacted again to carry out a post-COVID assessment (one year later, 2021, between May and June) in this case, the total number of adolescents was 207. Since codes were used to maintain anonymity, the surveys from both time periods were grouped together, resulting in the total number of adolescents presented here ($n = 137$).

The assessments were performed using the *Limesurvey* platform. This study followed the guidelines of the ethical code of the Declaration of Helsinki (World Medical Association, 2013) and was approved by the ethics committee of the Universitat de València (Ref. n°: 1595575567385).

Statistical analysis

First, using SPSS version 28, descriptive analyses, Student's t-tests for related samples, mediation analysis with the PROCESS macro (Hayes, 2022), and fuzzy set qualitative comparative analysis (FsQCA) calibration values were calculated. Regarding mediation models, the mediating capacity of pre-pandemic self-esteem is determined by the relationship between previous emotional state (anxious, depressive, and stress symptoms, and suicide risk) and the subsequent suicide risk. Finally, fuzzy-set qualitative com-

parative analyses were conducted by means of the FsQCA software (fuzzy-set qualitative comparative analysis, version 2.5, ©Raging, and David, 1999-2008 (Claude & Christopher, 2014). For this purpose, the raw data from participants' responses were converted into fuzzy-set responses. Thus, the missing data were removed, and the variables (or constructs) were calculated by multiplying the items of each subscale (Villanueva et al., 2019). Subsequently, the variables that had more than two options were recalibrated by considering the following values: 0 for low levels of agreement (the observation is totally outside the set); 0.5 for intermediate levels of agreement (the score is neither inside nor outside the set); and 1 for high levels of agreement (the score is totally within the set). These thresholds correspond to the 10th, 50th, and 90th percentiles when considering continuous or abstract variables such as psychological factors (Woodside, 2013). Claude and Christopher's (2014) fsQCA 2.5 software recalibrated values for stress, anxious and depressive symptoms, pre-pandemic and post-pandemic suicide risk and self-esteem.

Results

Descriptive statistics of suicide risk, self-esteem, and emotional adjustment pre-pandemic and post-pandemic

Suicide risk. The scores obtained for the pre-pandemic period (T1) indicate generally low suicide risk scores considering that the range was 0 to 5 ($M=1.59$; $SD=0.95$), and for the post-pandemic period (T2), scores were very similar to those found previously ($M=1.49$; $SD=0.96$).

Emotional adjustment. The scores on emotional adjustment at time point 1 were as follows: symptoms of depression ($M=13.07$; $SD=9.87$), anxiety ($M=12.07$; $SD=9.75$) and stress ($M=15.84$; $SD=8.92$). At time point 2, scores were slightly higher in all 3 dimensions: depression ($M=13.62$; $SD=10.23$), anxiety ($M=14.39$; $SD=10.85$), and stress ($M=18.93$; $SD=9.17$). When categorising these scores according to the scales, as shown in Figure 1, it is found that there is a higher prevalence of anxious symptomatology than stress and depression at both time points. A slight increase in scores was observed when comparing both time points. At time point 2, anxious symptomatology was greater in the groups (in the moderate and very severe categories). Regarding depressive symptomatology, there was also an increase in symptomatology at time point 2, especially in the slight category. Finally, regarding stress, the scores at time point 2 are again slightly higher, as shown in the figure, with the increase being concentrated in the moderate and severe categories.

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Self-esteem. Self-esteem scores at time point 1 were moderate ($M=29.17$; $SD=6.05$), and at time point 2, scores were very similar ($M=29.18$; $SD=5.50$). When categorising the scores into low self-esteem or high self-esteem, as indicated by the scales, it was found that at time point 1, 56.2% had low self-esteem, and 43.8% had high self-esteem. However, at time point 2, the percentage of low self-esteem was slightly higher (60.6%), with 39.4% presenting high self-esteem.

Comparison of means in relation to time. When comparing the scores of all the dimensions analysed, differences were found between time points 1 and 2 in the following variables: anxiety ($t_{136}=-2.478$; $p=.015$) and stress ($t_{136}=-3.647$; $p<.001$). Thus, living with the pandemic seems to have increased anxious symptomatology and stress scores (Table 1).

Table 1. Difference in means as a function of time points

Variable	T1 (Pre-pandemic) <i>M(SD)</i>	T2 (Post-pandemic) <i>M(SD)</i>	<i>t</i>
Anxiety	12.07 (9.75)	14.39 (10.85)	-2.472*
Depression	13.06 (9.87)	13.62 (10.24)	-0.587
Stress	15.84 (8.92)	18.93 (9.17)	-3.647***
Self-esteem	29.17 (6.05)	29.18 (5.50)	0.108
Suicide risk	1.59 (0.95)	1.49 (0.96)	0.050

Note. * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

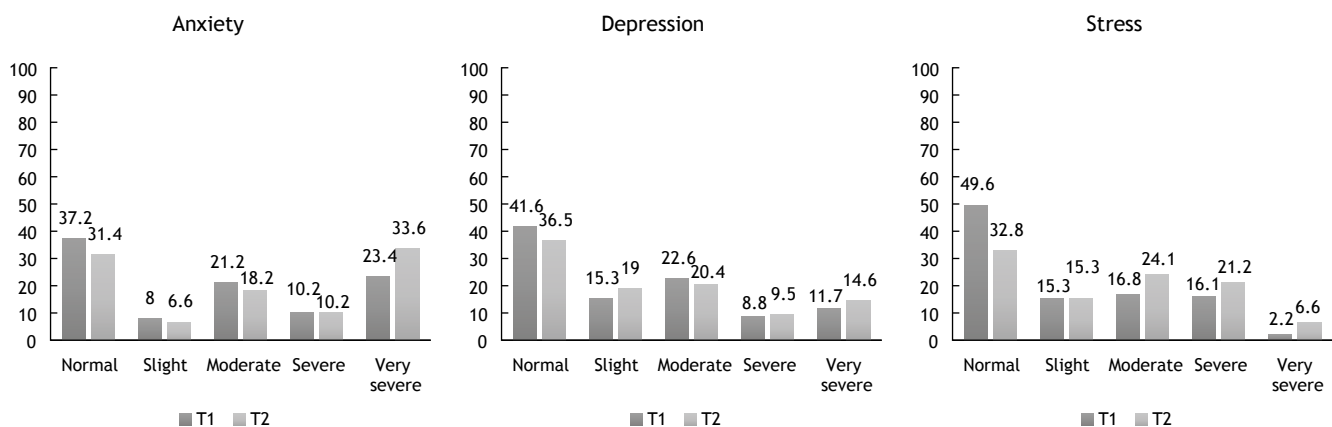


Figure 1. Levels of anxious, depressive and stress symptomatology at different time points

Mean comparison of post-pandemic suicide risk as a function of emotional adjustment and self-esteem

When comparing the suicide risk scores at time point 2 (post-pandemic) according to emotional symptomatology, the classification by groups is considered according to the level of severity at time point 1 (pre-pandemic), differences are found in the following areas: anxiety between the normal or slight groups compared to the very severe group, finding a higher risk of suicide in the second group ($F_4 = 6.38$; $p \leq .001$; $\eta^2 = 0.13$). For depression, differences were observed between the normal and slight and the severe group, indicating that in this group the level of suicide risk after the pandemic was higher compared to the other two groups ($F_4 = 4.11$; $p \leq .01$; $\eta^2 = 0.11$). Finally, regarding stress, similar differences were found, in this variable, the normal group showed differences compared to moderate, severe, and very severe, and the slight group compared to very severe, showing that the higher the severity, the higher the risk scores compared to those of the normal or slight groups ($F_4 = 7.59$; $p \leq .001$; $\eta^2 = 0.12$).

When the same procedure was carried out, but by means of a t-test, according to high or low self-esteem levels, the results indicated significant differences between the two groups, as adolescents with lower scores before the pandemic presented a higher risk of suicide compared to those with high self-esteem. ($t_{130} = 4.89$; $p \leq .001$; $d = 0.86$) as shown on Table 2.

Relationships between variables at different time points

Relationships in the pre-pandemic period. Regarding suicide risk, significant and moderate positive associations were found with anxiety ($r = .59$; $p \leq .001$), also with depression ($r = .50$; $p \leq .001$) and stress ($r = .41$; $p \leq .001$). In turn, significant negative and high-moderate associations appeared between suicide risk and self-esteem ($r = -.67$; $p \leq .001$), anxiety and self-esteem ($r = -.61$; $p \leq .001$), depression and self-esteem ($r = -.74$; $p \leq .001$) and stress and self-esteem ($r = -.56$; $p \leq .001$).

Relationships in the post-pandemic period. Significant and moderate positive associations were found between suicide risk and anxiety ($r = .41$; $p \leq .001$), depression ($r = .54$; $p \leq .001$), and stress ($r = .41$; $p \leq .001$). And negative associations between suicide risk and self-esteem ($r = -.51$; $p \leq .001$), anxiety and self-esteem ($r = -.48$; $p \leq .001$), depression and self-esteem ($r = -.64$; $p \leq .001$) and stress and self-esteem ($r = -.44$; $p \leq .001$).

Relationships between pre-pandemic and post-pandemic periods. Positive associations were found between suicide risk (post-pandemic) and the following conditions: anxiety (pre-pandemic) ($r = .38$; $p \leq .001$), depression (pre-pandemic) ($r = .33$; $p \leq .001$) and stress (pre-pandemic) ($r = .28$; $p \leq .001$) and suicide risk (pre-pandemic) ($r = .38$; $p \leq .001$). And negative associations between suicide risk (post-pandemic) and self-esteem (pre-pandemic) ($r = -.47$; $p \leq .001$).

Table 2. Mean difference in suicide risk (post-pandemic) according to self-esteem and emotional adjustment (pre-pandemic) levels

Variable	Category	Suicide risk Post <i>M(SD)</i>	F/t	Group differences	η^2/d
Anxiety	Normal	0.34 (0.78)	6.38***	Normal-Very severe Slight-Very severe	0.13
	Slight	0.22 (0.67)			
	Moderate	0.84 (1.57)			
	Severe	0.92 (1.54)			
	Very severe	1.74 (1.73)			
Depression	Normal	0.68 (1.21)	4.11**	Normal-Severe Slight-Severe	0.11
	Slight	0.33 (0.48)			
	Moderate	1.16 (1.70)			
	Severe	2.08 (1.93)			
	Very severe	1.50 (1.93)			
Stress	Normal	0.20 (0.66)	7.59***	Normal- Moderate Normal- Severe Normal-Very severe Slight-Very severe	0.12
	Slight	0.76 (1.30)			
	Moderate	1.18 (1.49)			
	Severe	1.59 (1.74)			
	Very severe	2.33 (2.18)			
Self-esteem	Low	1.42 (1.70)	4.89***	Low-High	0.86
	High	0.24 (0.64)			

Note. * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

Predictors of post-pandemic suicide risk QCA models

First, the main descriptors and calibration values for the study variables are presented (Appendix I).

Analysis of necessity. Based on the results obtained on the analysis of necessity, it appears that there is no necessary condition for the high or low levels of post-pandemic suicide risk, both were under .90 (Ragin, 2008).

Analysis of sufficiency. Regarding the analysis of sufficiency, the combination of conditions that led to high and low levels of post-pandemic suicide risk (Table 3) was calculated. Based on the premise that in fsQCA, a model is informative when the consistency is around or above .74 (Eng & Woodside, 2012), all models obtained were consistent.

High levels of suicide risk (post-pandemic). The intermediate solution indicated seven combinations of causal explained high levels of suicide risk during the post-pandemic period that accounted for 83% of cases (Overall Consistency = .89; Overall Coverage = .83) (Appendix 1). In predicting high levels of post-pandemic suicide risk, the most relevant pathway was the result of the interaction between high suicide risk and low stress levels both in the pre-pandemic period (Raw coverage = .67; Consistency = .97).

Low levels of suicide risk (post-pandemic). On the other hand, in predicting low levels of suicide risk during the post-pandemic period, three pathways were observed that explained 72% of the cases with low levels (Overall Consistency = .91; Overall Coverage = .72). In the prediction of low levels of post-pandemic suicide risk, the most relevant pathway was the result of the interaction between low suicide risk, low levels of anxiety, depression and stress, and high levels of self-esteem, all of them in the pre-pandemic period (Raw coverage = .64; Consistency = .93) explaining 64%.

The mediating role of self-esteem. Based on the associations between variables, only those variables that showed significant relationships with each other were selected for mediation analysis.

The first mediation analysis (Figure 2) explores the impact of pre-pandemic suicide risk in relation to post-pandemic suicide risk. Pre-pandemic suicide risk presents a direct positive effect on post-pandemic suicide risk ($\beta = .39$; $p \leq .001$), but this relationship disappears when incorporating pre-pandemic self-esteem as a predictor ($\beta = .15$; $p \geq .05$). The indirect effects of pre-pandemic suicide risk on post-pandemic suicide risk through self-esteem were found to be significant (Effect = .242; CI = [0.116, 0.379]). Thus, the relationship between a higher risk of pre-pandemic suicide and a higher risk of post-pandemic suicide was influenced by the person's level of self-esteem. Together, the direct and indirect effects predicted a total variance of 22%.

The second mediation analysis (Figure 2) explores the impact of pre-pandemic anxiety on post-pandemic suicide risk. Pre-pandemic anxiety had a direct positive effect on post-pandemic suicide risk ($\beta = .38$; $p \leq .001$), but this relationship disappears when incorporating pre-pandemic self-esteem as a predictor ($\beta = .15$; $p \geq .05$). In this way, it was observed that the indirect effects of anxiety on post-pandemic suicide risk through self-esteem were significant (Effect = .23; CI = [0.106, 0.370]). Hence, the relationship between greater pre-pandemic anxious symptomatology and a higher risk of post-pandemic suicide was influenced by the person's pre-pandemic level of self-esteem. Together, the direct and indirect effects predicted a total variance of 24%.

In the third and fourth mediation analyses (Figure 2), findings were similar to those of the previous models when exploring the impact of pre-pandemic depression on post-pandemic suicide risk. Pre-pandemic depression had a direct positive effect on post-pandemic suicide risk ($\beta = .35$; $p \leq .001$), but this relationship disappeared when incorporating pre-pandemic self-esteem as a predictor ($\beta = .01$; $p \geq .05$). It was observed that the indirect effects of pre-pandemic

Table 3. Summary of the main sufficient conditions for the intermediate solution of suicide risk (post-pandemic)

Frequency cut-off: 1;	High levels of post-pandemic suicide risk Consistency cut-off: .99			Low levels of post-pandemic suicide risk Consistency cut-off: .93		
	1	2	3	1	2	3
Self-esteem- pre-pandemic		○	○	●	●	●
Anxiety- pre-pandemic			○	○		●
Depression- pre-pandemic				○	●	●
Stress-pre-pandemic	○	○		○		
Suicide risk- pre-pandemic	●			○		
Raw coverage	.67	.49	.47	.64	.34	.29
Unique coverage	.11	.01	.02	.32	.01	.02
Consistency	.97	.92	.92	.93	.93	.90
Overall solution consistency			.89			.91
Overall solution coverage			.83			.72

● = presence of condition. ○ = absence of condition. Expected vector for high levels of suicide risk: 0.1.1.1.1 (0: absent; 1: present). Expected vector for low levels of suicide risk 1.0.0.0.0 using the format of. (Fiss, 2011).

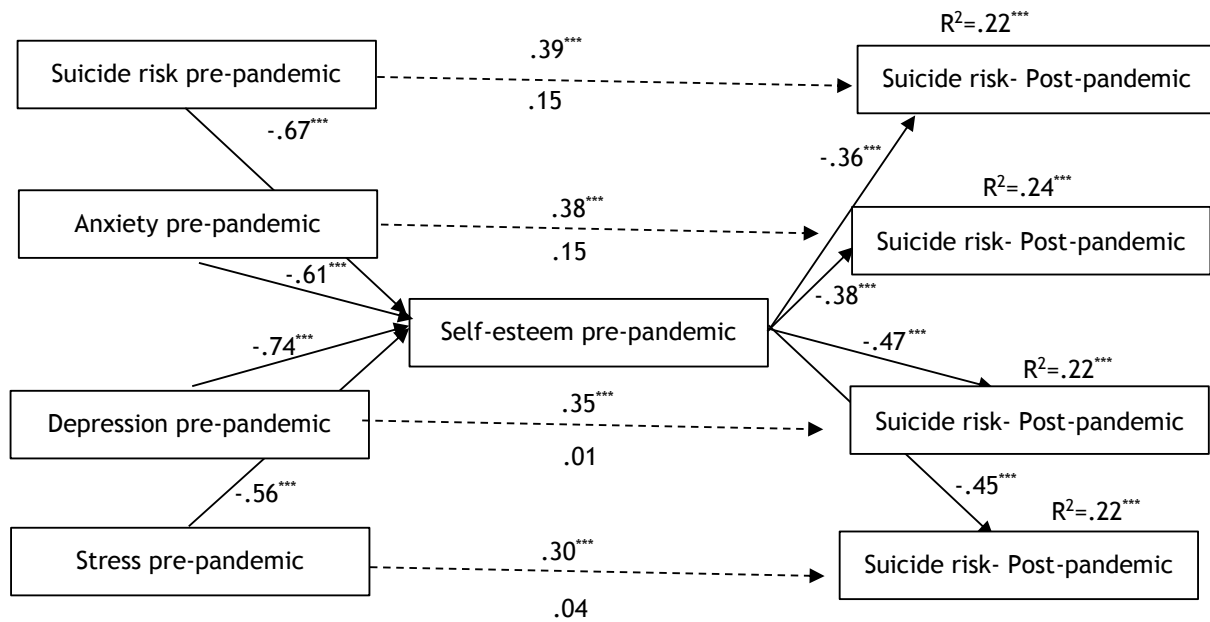


Figure 2. Mediation analysis of the relationship between pre-pandemic suicide risk and anxious-depressive symptomatology and pre-traumatic stress and post-pandemic suicide risk, mediated self-esteem (total mediation)

depression on post-pandemic suicide risk through pre-pandemic self-esteem were significant (Effect = .35; CI = [0.170, 0.516]). In this way, the relationship between greater pre-pandemic depressive symptomatology and a higher risk of post-pandemic suicide was influenced by the person's level of pre-pandemic self-esteem. Together, the direct and indirect effects predicted a total variance of 22%. Finally, when exploring the impact of pre-pandemic stress on post-pandemic suicide risk, pre-pandemic stress had a positive direct effect on post-pandemic suicide risk ($\beta = .30$; $p \leq .001$), but this relationship disappears when incorporating pre-pandemic self-esteem as a predictor ($\beta = .04$; $p \geq .05$). The indirect effects of pre-pandemic stress on post-pandemic suicide risk through pre-pandemic self-esteem were found to be significant (Effect = .25; CI = [0.135, 0.371]). Thus, the individual's level of pre-pandemic self-esteem influenced the relationship between greater symptomatology associated with pre-pandemic stress and an increased risk of post-pandemic suicide. Together, the direct and indirect effects predicted a total variance of 22%.

Discussion

The current pandemic situation has caused many psychological repercussions at all developmental stages worldwide. However, adolescents are one of the most vulnerable groups in this situation. The present study aimed to assess predictors of suicide risk during the COVID-19 pandemic in adolescents in Ecuador by means of a longitudinal study.

Regarding the hypotheses proposed, H1 suggested that emotional symptomatology and the risk of suicide would increase after experiencing a stressful life event such as the COVID-19 pandemic, as indicated by previous studies

(Hutchinson et al., 2021; Racine et al., 2021). The results found were along these lines: it was observed that during the pandemic, adolescents experienced more significant anxiety and stress symptoms than before the pandemic. However, no differences were observed for suicide risk or depressive symptomatology, contrary to the findings of previous studies (Hutchinson et al., 2021; Racine et al., 2021), so H1 would be partially accepted. One possible explanation is that when faced with a continuous stressor, the adolescent's first response is characterised by fear, anticipation, or experiencing it as a situation beyond their control, but if this situation persists over time, depressive symptoms and the risk of suicide may appear. Therefore, it would be interesting in future research to assess whether there is a greater presence of depressive symptomatology when the stressful event is prolonged for a more extended period. The increase may be due to a stressor such as the pandemic, or after all the time spent there may be other personal, family, or contextual variables that may affect the development of higher levels of stress and anxiety, but this is a limitation beyond the scope of our study.

These results are also in line with other studies in Latin America (Caballero-Domínguez et al., 2022; Hermsillo-de la Torre et al., 2020; Hermsillo-de la Torre et al., 2021; Valdez-Santiago et al., 2022), where an increase in suicide rates was found, especially in adolescents, as in the case of this study. In turn, the different studies in Latin America (Caballero-Domínguez et al., 2022; Hermsillo-de la Torre et al., 2021; Moya-Vergara et al., 2023) also show an impact on mental health, with increased levels of stress, anxiety, and depression.

Regarding H2, it was expected that there would be no differences in the self-esteem variable between both time

points. The results indicate very similar values before and during the pandemic in adolescents; although it is observed that during the second period, there is a slight increase in adolescents who perceive their self-esteem as low, that increase is not significant. Thus, as indicated by several studies (Orth et al., 2018) we would accept H2. Although self-esteem is a variable that can be reduced in adolescence, it generally tends to remain stable over time despite experiencing highly stressful situations. As for the results found for H3, these posed a positive association between risk factors with suicide risk during the pandemic. The results indicate a positive association between emotional symptomatology and suicide risk, as indicated in a previous study (Kang et al., 2021), where the relationship between suicide rates and increased mental health problems was analysed. It was also observed that when comparing by groups according to the degree of symptomatology, those adolescents who suffered from severe or very severe levels of anxiety, depression, and stress reported a higher risk of suicide, this being especially relevant when detecting those young people who are highly vulnerable. In addition, self-esteem was negatively associated with suicide risk, meaning that higher self-esteem was associated with a lower risk of suicide. These results are corroborated when comparing the high and low self-esteem groups finding differences between the two, the latter presenting higher levels of suicide risk, which would be in line with previous studies that note the importance of self-esteem as a protective variable in adolescence (Chen et al., 2022; Orth et al., 2018) so H3 would be accepted. The QCA models conducted would complement what was found in the linear analyses of the correlations, these results being an essential contribution of this study. These models, therefore, show the particular importance of variables such as self-esteem and previous suicide risk, which means that in the adolescent the presence of emotional symptomatology may or may not be present, but depending on their pre-pandemic self-esteem and suicide risk levels, the levels of suicide risk during the pandemic may be increased or reduced. Therefore, as previous studies indicate, self-esteem may be a buffering variable for the association between mental health problems and suicide risk (de la Barrera et al., 2022, Fonseca-Pedrero et al., 2020, Lin et al., 2019). However, it would be interesting to continue working along these lines in future research to learn how emotional impact combined with other variables may increase suicide risk.

In line with the idea previously stated, the last hypothesis, H4, was proposed, which expected to find that self-esteem was a mediating variable between the emotional state and the risk of suicide prior to the pandemic and the risk of suicide after the pandemic. The results seem to indicate that in all cases, self-esteem mediated the relationship between emotional symptomatology and suicide risk during the pandemic and the relationship between pre-pandemic and post-pandemic suicide risk, hence H4 would be accepted. The data found would be in line with previous studies with adolescents (de la Barrera et al., 2022, Fonseca-Pedrero et al., 2020). Therefore, previous high self-esteem is one of the most relevant variables for predicting low suicide risk in interaction with previous emotional states.

Despite its contributions, the current study is not without limitations that will be considered in future research.

The results found cannot be fully generalised given the sample size, as this would require another type of statistical analysis requiring a larger sample. However, it would be interesting to increase the number of participants and even perform more measurements over time to determine the real impact of COVID-19 in the long term. It should be noted that experimental mortality is a characteristic associated with this type of longitudinal design and that may affect the results, however, this is a difficulty associated with this type of design. Another limitation would be the focus on a single region of Ecuador, so it would be necessary to expand it to include more areas of the country and even other Latin American countries in order to compare the impact that the pandemic has had in similar countries and assess other variables such as socioeconomic level.

In conclusion, coexistence with the COVID-19 pandemic appears to have increased the presence of emotional symptomatology in the adolescents studied, especially in relation to anxiety and stress, in addition to having increased the risk of suicide in this group. Consequently, this type of study highlights adolescents' level of vulnerability to the pandemic and its significant psychological impact. It is therefore essential to detect which factors function as risks and which as protection against COVID-19.

Declarations

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Consent to participate (include appropriate statements): the participants signed the informed consent form before participating.

Consent for publication (include appropriate statements): the participants signed the informed consent form before participating. They allowed the use of the data obtained for scientific purposes such as disclosure or publication, provided their anonymity was preserved. The data were properly safeguarded at all times.

References

- Aneshensel, C. S. (1992). Social stress: Theory and research. *Annual Review of Sociology*, 18(1), 15-38. <https://doi.org/10.1146/ANNUREV.SO.18.080192.000311>
- Atienza, F. L., Moreno, Y., & Balaguer, I. (2000). Análisis de la dimensionalidad de la Escala de Autoestima de Rosenberg en una muestra de adolescentes valencianos. *Revista de Psicología Universitas Tarraconensis*, 22,1-2.
- Caballero-Domínguez, C. C., Jiménez-Villamizar, M. P., & Campo-Arias, A. (2022). Suicide risk during the lockdown due to coronavirus disease (COVID-19) in Colombia. *Death Studies*, 46(4), 885-890. <https://doi.org/10.1080/07481187.2020.1784312>

- Campo-Arias, A., & Mendieta, C. T. De. (2021). Social determinants of mental health and the COVID-19 pandemic in low-income and middle-income countries. *The Lancet. Global Health*, 9(8), E1029-E1030. [https://doi.org/10.1016/S2214-109X\(21\)00253-9](https://doi.org/10.1016/S2214-109X(21)00253-9)
- Chen, S.-S., He, Y., Xie, G.-D., Chen, L.-R., Zhang, T.-T., Yuan, M.-Y., Li, Y.-H., Chang, J.-J., & Su, P.-Y. (2022). Relationships among adverse childhood experience patterns, psychological resilience, self-esteem and depressive symptoms in Chinese adolescents: A serial multiple mediation model. *Preventive Medicine*, 154, 106902. <https://doi.org/10.1016/J.YPMED.2021.106902>
- Claude, R., & Christopher, R. (2014). *Acq [Computer Programme]* (Version 2.1.12.).
- Daza, P., Novy, D., Stanley, M., & Averill, P. (2002). The Depression Anxiety Stress Scale-21: Spanish translation and validation with a hispanic sample. *Journal of Psychopathology and Behavioral Assessment*, 24, 195-205. <https://doi.org/10.1023/A:1016014818163>
- De la Barrera, U., Montoya-Castilla, I., Pérez-Albéniz, A., Lucas-Molina, B., & Fonseca-Pedrero, E. (2022). Mental health difficulties related to suicidal behavior in adolescents: The moderating role of self-esteem. *Archives of Suicide Research*, 26(2), 716-730. <https://doi.org/10.1080/13811118.2020.1823918>
- Díez-Gómez, A., Pérez-Albéniz, A., Ortuño-Sierra, J., & Fonseca-Pedrero, E. (2020). Sentia: An adolescent suicidal behavior assessment scale. *Psicothema*, 32(3), 382-389. <https://doi.org/10.7334/PSICOTHEMA2020.27>
- Eng, S., & Woodside, A. G. (2012). Configural analysis of the drinking man: Fuzzy-set qualitative comparative analyses. *Addictive Behaviors*, 37(4), 541-543. <https://doi.org/10.1016/j.addbeh.2011.11.034>
- Fiss, P. C. (2011). Building better causal theories: A fuzzy set approach to typologies in organizational research. *Academy of Management Journal*, 54(2), 393-420. <https://doi.org/10.5465/AMJ.2011.60263120>
- Fonseca-Pedrero, E., Díez-Gómez, A., de la Barrera, U., Sebastian-Enesco, C., Ortuño-Sierra, J., Montoya-Castilla, I., Lucas-Molina, B., Inchausti, F., & Pérez-Albéniz, A. (2020). Suicidal behaviour in adolescents: A network analysis. *Revista de Psiquiatría y Salud Mental*. In Press. <https://doi.org/10.1016/J.RPSM.2020.04.007>
- Fonseca-Pedrero, E., Paino, M., Lemos-Giráldez, S., & Muñiz, J. (2010). Propiedades psicométricas de la escala de depresión, ansiedad y estrés versión 21 (DASS-21) en universitarios españoles. *Ansiedad y Estrés*, 16(2-3), 215-226.
- Fonseca-Pedrero, E., Wells, C., Paino, M., Lemos-Giráldez, S., Villazón-García, Ú., Sierra, S., González, M. P. G.-P., Bobes, J., & Muñiz, J. (2010). Measurement invariance of the Reynolds depression adolescent scale across gender and age. *International Journal of Testing*, 10(2), 133-148. <https://doi.org/10.1080/15305050903580822>
- Gobierno de Ecuador (2020). *Actualización de casos de coronavirus en Ecuador*. <https://www.salud.gob.ec/actualizacion-de-casos-de-coronavirus-en-ecuador/>
- Hayes, A. F. (2022). *Introduction to mediation, moderation and conditional. A regression-based approach* (3th ed.). Guilford Press.
- Hermosillo-de-la-Torre, A. E., Arteaga-de-Luna, S. M., Acevedo-Rojas, D. L., Juárez-Loya, A., Jiménez-Tapia, J. A., Pedroza-Cabrera, F. J., González-Forteza, C., Cano, M., & Wagner, F. A. (2021). Psychosocial correlates of suicidal behavior among adolescents under confinement due to the COVID-19 pandemic in Aguascalientes, Mexico: A cross-sectional population survey. *International Journal of Environmental Research and Public Health*, 18(9), 4977. <https://doi.org/10.3390/ijerph18094977>
- Hermosillo-de-la-Torre, A. E., González-Forteza, C., Rivera-Heredia, M. E., Méndez-Sánchez, C., González-Betanzos, F., Palacios-Salas, P., Jiménez, A., & Wagner, F. A. (2020). Understanding suicidal behavior and its prevention among youth and young adults in Mexico. *Preventive Medicine*, 138, 106177. <https://doi.org/10.1016/j.ypmed.2020.106177>
- Hutchinson, E. A., Sequeira, S. L., Silk, J. S., Jones, N. P., Oppenheimer, C., Scott, L., & Ladouceur, C. D. (2021). Peer connectedness and pre-existing social reward processing predicts U.S. Adolescent girls' suicidal ideation during COVID-19. *Journal of Research on Adolescence*, 31(3), 703-716. <https://doi.org/10.1111/JORA.12652>
- Kang, C., Zheng, Y., Yang, L., Wang, X., Zhao, N., Guan, T. F., Qiu, S., Shi, J., & Hu, J. (2021). Prevalence, risk factors and clinical correlates of suicidal ideation in adolescent patients with depression in a large sample of Chinese. *Journal of Affective Disorders*, 290, 272-278. <https://doi.org/10.1016/J.JAD.2021.04.073>
- Lacomba-Trejo, L., Valero-Moreno, S., Postigo-Zegarra, S., Pérez-Marin, M., & Montoya-Castilla, I. (2020). Family adjustment during the COVID-19 pandemic: A dyad study Ajuste familiar durante la pandemia de la COVID-19. un estudio de díadas. *Revista de Psicología Clínica con Niños y Adolescentes*, 7(3), 66-72. <https://doi.org/10.21134/rpcna.2020.mon.2035>
- Lin, C. (2019). Gratitude and suicidal ideation in undergraduates in Taiwan: The mediating role of self-esteem and meaning in life. *Omega-Journal of Death and Dying*, 84(1), 177-193. <https://doi.org/10.1177/0030222819882845>
- Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy*, 33(3), 335-343. [https://doi.org/10.1016/0005-7967\(94\)00075-u](https://doi.org/10.1016/0005-7967(94)00075-u)
- Moya-Vergara, R., Portilla-Saavedra, D., Castillo-Morales, K., Espinoza-Tapia, R., & Sandoval Pastén, S. (2023). Prevalence and risk factors associated with mental health in adolescents from Northern Chile in the context of the COVID-19 Pandemic. *Journal of Clinical Medicine*, 12(1), 269. <https://doi.org/10.3390/jcm12010269>
- Oliva, A., Antolin, L., Pertegal, M. Á., Ríos, M., Parra, A., Hernaldo, Á., & Reina, M. C. (2011). *Instrumentos para la evaluación de la salud mental y el desarrollo positivo adolescente y los activos que lo promueven*. (Eds.) Consejería de Salud de la Junta de Andalucía.
- Orth, U., Yasemin, Y., & Luciano, E. C. (2018). Development of self-esteem from age 4 to 94 years: A meta-analysis of longitudinal studies. *Psychological Bulletin*, 144(10), 1045-1080. <https://doi.org/10.1037/BUL0000161>
- Policía Nacional del Ecuador. (2020). *Dinased presentó cifras de suicidios y formas de prevención*. Policía Nacional del Ecuador.
- Racine, N., McArthur, B. A., Cooke, J. E., Eirich, R., Zhu, J., & Madigan, S. (2021). Global prevalence of depressive and anxiety symptoms in children and adolescents during COVID-19: A meta-analysis. *JAMA Pediatrics*, 175(11), 1142-1150. <https://doi.org/10.1001/JAMAPEDIATRICS.2021.2482>
- Ragin, C. C. (2008). *Redesigning social inquiry: Fuzzy sets and beyond*. University of Chicago Press.
- Rosenberg, M. (1965). *Society and the Adolescent Self-Image - Morris Rosenberg* - Google Libros. Princeton University Press.
- Sánchez-Queija, I., Oliva, A., & Parra, Á. (2016). Stability, change, and determinants of self-esteem during adolescence and emerging adulthood. *Journal of Social and Personal Relationships*, 34(8), 1277-1294. <https://doi.org/10.1177/0265407516674831>
- Tackett, J. L. (2006). Evaluating models of the personality-psychopathology relationship in children and adolescents. *Clinical Psychology Review*, 26(5), 584-599. <https://doi.org/10.1016/J.CPR.2006.04.003>
- Undurranga, C., & Avendaño, C. (1997). Dimensión psicológica de la pobreza. *Psykhé*, 6(1), 57-63.

- Valdez-Santiago, R., Villalobos, A., Arenas-Monreal, L., González-Forteza, C., Hermosillo-de-la-Torre, A. E., Benjet, C., & Wagner, F. A. (2022). Comparison of suicide attempts among nationally representative samples of Mexican adolescents 12 months before and after the outbreak of the Covid-19 pandemic. *Journal of Affective Disorders*, 298(Pt A), 65-68. <https://doi.org/10.1016/j.jad.2021.10.111>
- Villanueva, L., Valero-Moreno, S., Cuervo, K., & Prado-Gascó, V. J. (2019). Sociodemographic variables, risk factors, and protective factors contributing to youth recidivism. *Psicothema*, 31(2), 128-133. <https://doi.org/10.7334/psicothema2018.257>
- Williams, S. (2000). Chronic illness as biographical disruption or biographical disruption as chronic illness? Reflections on a core concept. *Sociology of Health & Illness*, 22(1), 40-67. <https://doi.org/10.1111/1467-9566.00191>
- Woodside, A. G. (2013). Moving beyond multiple regression analysis to algorithms: Calling for adoption of a paradigm shift from symmetric to asymmetric thinking in data analysis and crafting theory. *Journal of Business Research*, 66(4), 463-472. <https://doi.org/10.1016/j.jbusres.2012.12.021>
- World Health Organization. (2021a). *Suicidio*. <https://www.who.int/es/news/item/17-06-2021-one-in-100-deaths-is-by-suicide>
- World Health Organization. (2021b). *Salud del adolescente y el joven adulto*. <https://www.who.int/es/news-room/fact-sheets/detail/adolescents-health-risks-and-solutions>
- World Medical Association. (2013). World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects. *Journal of American Medical Association (JAMA)*, 310(20), 2191-2194.

Appendix 1

Main descriptions and calibration values

	SENTIA-Post	RSE-pre	DASS-21-pre			SENTIA-pre
	Suicide Risk Post	Self-esteem-pre	Depression	Anxiety	Stress	Suicide Risk Pre
M	4.22	118859.10	692.06	548.27	593.89	4.63
SD	7.64	195183.66	2237.97	1809.19	1257.47	8.50
Min.	1	16	1	1	1	1
Max	32	1048576	16384	12288	9216	32
<i>Calibration values</i>						
P10	1	437	1	2	4	1
P50	1.25	34992	34	18	96	1.25
P90	9.60	331776	1836	806	1944	16

Note. M: mean; SD: standard deviation; Min: minimum; Max: maximum; P10 = :10th percentile; P50 = 50th percentile; P90 = :90th percentile.