



ORIGINAL ARTICLE

# Explanatory model of symptoms of stress, anxiety and depression in the general population: Cross-sectional study during the COVID-19 pandemic

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**ABSTRACT:** COVID-19 pandemic has had a great impact worldwide, specially affecting mental health and has undoubtedly taken part in human behaviour modification, increasing global health burden and with stress, anxiety and depression being the main contributors to this load. Because of the importance of this issue, the objective of this study was the creation of an explanatory model for the causal relationship of the main psychological variables: stress, anxiety and depression in the COVID-19 pandemic context. A cross-sectional study was carried out with a sample of 709 volunteers, sociodemographic variables and psychological symptoms were measured through a virtual DASS-21 questionnaire, during the COVID-19 pandemic, dated from November 2 to 6, 2020. A structural equation model using the weighted least squares means and the adjusted variance was employed for the creation and adjustment of the explanatory relational model. The results showed the presence of stress, anxiety and depression symptoms among the general population. The model showed an adequate fit (CFI = 0.94; TLI = 0.94; RMSEA = 0.06; P = 0.000) and was able to explain more than 80% of depressive symptoms ( $R^2 = 0.86$ ) and more than 70% of anxiety symptoms ( $R^2 = 0.72$ ), in addition to showing a unidirectional causal relationship of long-term stress on anxiety, and anxiety on depressive symptoms, showing a linked behaviour of the same, in the adjusted model. It was also outlined that this model was characterized by being expressed mainly in women, with lower quality of sleep and at a younger age.

**KEY WORDS:** anxiety, COVID-19, cross-sectional, depression, mental health, stress psychological.

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**Declaration of conflict of interest:** There are no conflicts of interest to report for this study.

**Authorship statement:** All the authors contributed substantially to the creation and design and/or data collection, or analysis and interpretation, in the construction of the manuscript or in its critical review, in accordance with the latest guidelines of the International Committee of Medical Journal Editors, all the authors agree with the manuscript.

**Funding:** No external funding was received for this study.

**Ethics approval:** This study was approved by the ethics committee; approval N° CEC 31–20. All the subjects had to accept the informed consent and the voluntariness of the research before answering the virtual survey. All the procedures for safeguarding and protecting personal data were carried out in accordance with national law 19.628.

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Accepted July 26 2022.

## INTRODUCTION

In 2020, the World Health Organization (WHO) declared SARS-CoV-2 infection as COVID-19 pandemic (World Health Organization 2020) with an international impact, redefining all of our social stratum, accentuated by the measures adopted by most countries, governments have declared the world in strict confinement (Hale *et al.* 2021), clearly generating a significant impact on modern daily life, a situation that definitely projects the need to study the human and psychological behaviour (Bates *et al.* 2020) in order to identify positive and negative effects on population health.

It has been shown that in scenarios of radical changes in human behaviour, such as natural disasters, mental health is an issue that has received the greatest impact at the population level (Reifels *et al.* 2019). In the case of the COVID-19 pandemic, the constant and disruptive modifications have generated an increase in the levels of stress, anxiety and depression (Prevalence: 29.6%, 31.9% and 33.7%; CI 95%) compared with the period prior to the pandemic. (Salari *et al.* 2020; Wu *et al.* 2021). In 2020, mental illnesses were the main causes of global health burden; with anxiety and depression being the main contributors to this burden (Santomauro *et al.* 2021).

## ANTECEDENTS

Psychological behaviour has shown a great significance in its role regarding global health during the COVID-19 pandemic (Shah *et al.* 2021), that is why it is relevant to be aware of how it is linked in its causal relationship, being depression and anxiety disorders of greater complexity in their causal explanation. According to the Diagnostic and Statistical Manual of Mental Disorders DSM-5, depression is characterized by impaired mood, thinking, and function, including persistent sadness, lack of interest and/or pleasure in activities that were previously rewarding or pleasant, affecting the quality of sleep, appetite, tiredness and lack of concentration (American Psychiatric Association 2013). Furthermore, Holland (2020) approaches his definition to a relationship between two of our study variables, referring that anxiety is characterized by fear of the unknown, that is, the body's natural response to stress, linking a causal effect. The relationship of this definition shows us stress as an initial door for triggering, at least initially, of psychological variables, logically with exception of mental illnesses with

specific etiologies far from a general cause given by the pandemic. If we refer to stress, this could not be defined in a habitual way, as McEwen defines a type of long-term stress, for pandemic context effects, mentioning that this is a feeling of tension with emotional and physiological impact experienced during a prolonged period of time, that arises before any event which may threaten our homeostasis, whereby the individual feels having little or no control at all. (McEwen & Akil 2020).

Some studies have shown a positive relationship between psychological variables (Rehman *et al.* 2021; Shah *et al.* 2021), but these factors have not been able to establish their causal modelling. From a physiological approach, Chesnut *et al.* (2021) has proposed some approaches to comorbidity explanations and concludes that physiological markers of stress characterize states of depression and anxiety, showing maladaptive responses to stress in these states, given by sustained exposure to global changes because of this pandemic situation. This could give some insight into what long-term stress is and if its emotional impact may be an initial trigger of depression-anxiety generation (McEwen & Akil 2020). In the case of anxiety-depression, a certain causal directionality of anxiety over depression has been shown, since this could generate cognitive biases, such as overestimation and greater perception of a threat, in addition to an increase in attention towards it, and the consequent growth in negative interpretations (Knowles & Olatunji 2020); biases that mediate an increase in maladaptive safety experiences and behaviours, maintaining long-term anxiety symptoms (Groen *et al.* 2020; Toyoshima *et al.* 2021). Persistent cognitive biases and impaired executive functioning in anxiety mediate towards the expression of depressive symptoms (Wang *et al.* 2019), while threat overestimation and subsequent generation and maintenance of negative emotions maintained over time, have been linked to major depression (Joormann & Michael Vanderlind 2014; Sanwald *et al.* 2022). But despite existing evidence of the possible causal relationship, it is the comorbidity present in anxiety symptoms and depression which transpose their symptomatology, generating little specificity in of causal relationship direction (Knowles & Olatunji 2020), while stress has shown similar comorbidity, but this indicates a clearer causal directional trend, being stress an active factor (Boluarte-Carbajal *et al.* 2021), being difficult to clearly establish this relationship, its directionality and causal modelling, especially considering its behaviour among general population during the pandemic. This is

undoubtedly a key factor for necessary health measures towards the intervention and construction of an action plan aiming at one of the great problems worldwide: mental health (Brooks *et al.* 2020; Shah *et al.* 2021). This is why our study is intended to create an explanatory model for stress, anxiety and depression psychological symptoms among the general population, in order to be informed about the causal relationship between them, and their behaviour during the COVID-19 pandemic.

## METHODS

### Design

A cross-sectional study using a self-administered online questionnaire was carried out for the causal relational study of psychological symptoms among the general population during the COVID-19 pandemic. Stress, anxiety, and depression variables were inspected, they were recollected through a validated scoring system, in addition to social and demographic data registration. Data collection was performed for a 1 week period among the  $\geq 18$  years old general population belonging to Talca city, Chile, from November 2 to 6, 2020, during the COVID-19 pandemic confinement period.

### Participants

The sample consisted of 709 subjects,  $\geq 18$  years of age from the city of Talca, Chile. To determine the sample size, a finite population (339 864 inhabitants; CASEN Census 2017, Talca, Chile) was considered, with a maximum variance of 0.25, a prior error of 5%, a power of 0.85 and a 95% confidence level, with an adjustment for age-weighted weights; The result was a minimum sample of 388 volunteers. To guarantee the sample size, surveys were sent to 730 participants. Finally, 709 volunteers participated contributing with valid results.

### Variables and measurement instruments

A self-administered Google Forms virtual questionnaire was used, including virtual informed consent, social-demographic characteristics and the psychological variables scale.

### Sociodemographic characteristics

Data on sex, place of residence and educational level were collected; associated with the pandemic: level of

confinement, frequency of information about the pandemic, physical symptoms and perception of sleep quality, as well as scale physical activity frequency. Most of the data were classified by categories (Table 1), while sex, physical symptoms and place of residence were registered in a dichotomous.

### Psychological symptoms

The self-administered questionnaire Depression Anxiety Stress Scales (DASS-21) was used to measure the levels of psychological symptoms, which considers the evaluation of the depression, anxiety and stress subscales. It has 21 items, with four response alternatives in Likert format, ranging from 0 “It does not describe anything that has happened to me, or I have felt during the week” to 3 “Yes, this has happened to me a lot, or almost always”. The cohort scores according to the severity degrees in the subscales were: Anxiety with four points was considered mild, moderate from 5 to 7, severe from 8 to 9, and extremely severe from 10 or more. Stress ranging from 8 to 9 as mild, 10 to 12 as moderate, from 13 to 16 as severe, and 17 or more as extremely severe. Depression ranging from 5 to 6 were considered mild, 7 to 10 moderate, 11 to 13 severe, and 14 or more extremely severe depression. Demonstrating satisfactory reliability (alpha values, from 0.87 to 0.88 for the depression scale, from 0.72 to 0.79 for the anxiety scale and from 0.82 to 0.83 for the stress scale) (Lee 2019; Román *et al.* 2016).

### Data collection

Given the situation of confinement and minimum contact measure generated by the COVID-19 outbreak and its bigger population scope, it was decided that the sample data collection would be performed by disseminating a link granting access to a virtual survey. This link was sent via email from virtual platforms belonging to educational, labor and social institutions that had their geographical location within the province of Talca. Regarding data collection methods, the findings shown by studies comparing self-administered virtual data collection methods and traditional paper-pencil data collection methods were taken into account. This mechanism proved to be consistent with the findings of traditional methods for the population characteristics distribution, adjustment and data quality (Gosling *et al.* 2004; Tan *et al.* 2022; Woodyatt *et al.* 2016).

**TABLE 1** Sociodemographic characteristics

Characteristics	Frequency	%
Sex		
Feminine	468	66
Male	241	34
Confinement level		
Without confinement	19	2.75
Minimum confinement	209	29.5
Moderate confinement	378	53.3
Greater confinement	103	14.5
Physical activity		
Yes	386	54.4
No	323	45.6
Physical symptoms		
Yes	421	59.4
No	288	40.6
Sleep		
Very bad	53	7.5
Bad	153	21.6
Acceptable	329	46.4
Good	141	19.9
Very good	33	4.7
Place of residence		
Urban	628	88.5
Rural	82	11.5
Educational level		
Non-university	187	26.3
University	431	60.7
Postgraduate	92	13.0
Frequency of information on the pandemic		
I never get informed	39	5.5
Sometimes I inform myself	312	43.9
I frequently report	237	33.4
I inform myself every day	122	17.2

## Ethics

This study was approved by the ethics committee, approval No CEC 31–20. All the subjects had to accept the informed consent and the willingness of the research before answering the virtual survey. All safeguarding and protecting personal data procedures were carried out according to national law 19.628. This study followed the guidelines of “Strengthening Reports of Observational Studies in Epidemiology” (STROBE) guidelines (von Elm *et al.* 2008).

## Data analysis

Central tendency and percentages measures were used for the descriptive analysis. The Pearson Correlation Coefficient was used to value the psychological symptoms bivariate relationship and in the case of the categorical variables Chi-square. Factor determination

index (IDF) and Cronbach’s Alpha for stress, anxiety and depression were used as item indicators of reliability and concurrent validity.

A basal model was generated for the analysis of results, maintaining the theoretical relationships between stress, anxiety and depression and subsequently the adjusted model was developed. In the case of psychological symptoms explanatory models validation during COVID-19 outbreak, a structural equation model was used, employing weighted least squares means and adjusted variance. Testing of the measurement model was carried out based on several indexes: Chi-square: values associated with non-significant *P*-values indicate a model good fit (El-Sheikh *et al.* 2017); the comparative fit index (CFI): values >0.95 indicate a model good fit (Hu & Bentler 1998); adjusted goodness-of-fit index (AGFI): values greater than 0.80 indicate a good fit (Backhaus *et al.* 2021); root mean square error of approximation or root mean square error of approximation (RMSEA): Values less than 0.05 indicate a model good fit (Browne & Cudeck 1993).

## RESULTS

### Characteristics of the participants

The subject total number who participated in the study was 709, corresponding to a validated response rate (97.1%); 21 surveys (2.9%) were considered invalid and were not analysed in this study. The average age was 33; standard deviation (SD) = 13.1 years committed between 18 and 77 years. With a majority women participation (66.2%) in relation to men (34.8%). Most of them lived in urban areas (88.5%), performed physical activity (54.4%) and were in a moderate confinement situation (53.3%) (Table 1). The number of respondents who reported a diagnosis of mental illness was only 3.5% of the sample; and it did not show significant differences ( $P > 0.05$ ) with the study population. Only 2.1% of the sample participants had COVID-19, without hospitalization and mild symptoms. Furthermore, there were no cases of COVID 19 losses among their relatives or loved ones.

### Severity of results in psychological symptoms and associated factors

The psychological variables mean scores (DASS-21) showed a mild degree of severity (mean stress (M) = 8.59; SD = 5.34, anxiety M = 4.7; SD = 4.79,

depression  $M = 5.7$ ;  $SD = 5.3$ ) for total population, being this same degree of severity (mild), the highest frequency one in the three dimensions when being categorized by degree of severity (Table 2). Regarding to biological sex analysis, it was shown that in all dimensions there was a higher percentage in favour of female, a difference that increases as the degree of severity increases, becoming more acute in the last degrees (female stress = 88.10%; anxiety = 91.20%; depression = 87.30%). The difference by biological sex, without difference by degrees of severity, showed significant differences in the three dimensions (stress  $P = 0.000$ ;  $SD = 0.078$ , Anxiety  $P = 0.000$ ;  $SD = 0.086$  and Depression  $P = 0.000$ ;  $SD = 0.079$ ) in favour of female sex (Table 2).

### Relationship between outcome variables

A high ( $r > 0.70$ ;  $P = 0.000$ ) positive relationship was found between stress–depression ( $r = 0.792$ ;  $P = 0.000$ ), anxiety–depression ( $r = 0.796$ ;  $P = 0.000$ ) and stress–anxiety ( $r = 0.770$ ;  $P = 0.000$ ), indicating that the greater the dimension symptomatic expression is, the other tends to increase.

In the case of other associated variables, the global scores of psychological variables had a moderate relationship with sleep quality self-perception, being: the lower the quality of sleep, the greater the presence of psychological symptoms (stress  $r = -0.436$ ; anxiety  $r = -0.364$ , depression  $r = -0.383$ ,  $P < 0.05$ ). With age (stress  $r = -0.160$ ; anxiety  $r = -0.121$ ; depression  $r = -0.207$ ;  $P = 0.01$ ) and weight (stress  $r = -0.087$ ; anxiety  $r = -0.071$ ; depression  $r = -0.064$ ;  $P = 0.01$ ), it was identified that the lower the weight-age is, the greater the expression of psychological symptoms, but its explained variance is categorized as very low correlation, despite being significant. Upon categorically associating psychological symptoms (categories by severity levels), it was only found an association with physical activity, physical symptoms and sleep (Chi-square;  $P < 0.05$ ). No association was found regarding place of residence, educational level, level of confinement, or frequency of information about the pandemic.

### Structural equation model

The relationship of stress, anxiety and depression base model (Table 3) showed an adequate goodness-of-fit index in all the indexes. Thus, Chi-square presents a non-significant associated value of  $P$  ( $\chi^2 = 857.3$ ;  $df = 186$ ;  $P = 0.000$ ;  $CMIN = 4.67$ ), CFI presented a

value of 0.932, AGFI was 0.857 with an RMSEA of 0.071. Therefore, modelling for the purpose of explaining psychological symptoms will be evaluated using this model as a basis (Fig. 1).

### Concurrent reliability and validity indicators

When analysing the validity coefficients which form each psychological variable (stress, anxiety and depression) in this model, it is shown that most loading validity coefficients are greater than 0.60 (Table 3). Therefore, these results indicate that the indicators used to empirically explain the psychological variables are adequate.

In the three dimensions reliability analysis, it was identified that they were adequate: higher than 0.8 (anxiety = IDF 0.876; Cronbach's alpha = 0.876, stress IDF = 0.910; Cronbach's alpha = 0.899, depression IDF = 0.884; Cronbach's alpha = 0.917). Moreover, fit indicators, where the variance extracted (AVE) is greater than 0.50 (stress = 0.56; anxiety = 0.51; depression = 0.61) (Table 3), show a model good fit in relation to the psychological variables representation (latent) with their respective items. The base model analysis, as well as factor determination indexes and internal consistency reliability, are considered appropriate for adjusting the explanatory model of the relationship between psychological variables.

### Adjustment study for relational model among Stress-Anxiety-Depression

Models A and B were identified to explain how psychological variables are causally related. Both showed adequate goodness-of-fit indexes (Table 4). In model A (Fig. 2), a bidirectional relationship between stress and anxiety was shown; while stress–depression and anxiety–depression relationship presented a unidirectional relationship with an explained variance of  $R^2 = 0.858$ . Model B represented an unidirectional relationship in all its relationships, showing a more suitable approximation to theoretical models and properly oriented to causality, including stress-anxiety relationship. This model also showed a high explained variance for depression  $R^2 = 0.858$ , but also allowed adding the explained variance in anxiety (stress–anxiety;  $R^2 = 0.721$ ); with a higher correlation coefficient in model B between the stress–anxiety variables in a unidirectional way, than the bidirectional one in model A.

In adjusted model B theoretical analysis, for the general population during the COVID-19 pandemic, a significant relationship between the latent factor of

**TABLE 2** Severity of psychological symptoms

Psychological symptoms COVID-19		Total dimensions by degrees		Dimensions by grades according to sex %		Differences between sexes/Without degrees	Total dimensions/Without degrees	
Dimensions	Severity grades	Fr.	%	F	M	P-value	Mean	SD
Stress	Mild stress	412	58	54.6	45.4	0.000	8.6	5.34
	Moderate stress	127	17.9	82.7	17.3			
	Severe stress	103	14.5	76.7	23.3			
	Extremely severe stress	67	9.44	88.1	11.9			
Depression	Mild depression	452	63.7	59.3	40.7	0.000	5.7	5.3
	Moderate depression	126	17.7	69.0	31			
	Severe depression	52	7.32	84.6	15.4			
	Extremely severe depression	79	11.1	87.3	12.7			
Anxiety	Mild anxiety	428	60.3	55.6	44.4	0.000	4.7	4.76
	Moderate anxiety	110	15.5	74.5	25.5			
	Severe anxiety	57	8.03	77.2	22.8			
	Extremely severe anxiety	114	16.1	91.2	8.8			

F, feminine; M, male; SD, standard deviation.

**TABLE 3** Measurement model adjustment indicators

Items	Factor	Standardized estimate	SE	C.R.	P-value
A.1	Anxiety	0.54			
A.2		0.57	0.06	12.13	0.000
A.3		0.7	0.08	13.71	0.000
A.4		0.78	0.1	14.66	0.000
A.5		0.84	0.1	15.18	0.000
A.6		0.72	0.09	13.95	0.000
A.7		0.82	0.1	15.01	0.000
D.1	Depression	0.77	0.05	20.93	0.000
D.2		0.7	0.06	18.9	0.000
D.3		0.84	0.06	22.84	0.000
D.4		0.83	0.06	22.55	0.000
D.5		0.83	0.05	22.81	0.000
D.6		0.78	0.05	21.11	0.000
D.7		0.74			
E.1	Stress	0.75	0.05	20.41	0.000
E.2		0.75	0.05	20.7	0.000
E.3		0.69	0.05	18.72	0.000
E.4		0.76	0.05	21.02	0.000
E.5		0.82	0.05	22.67	0.000
E.6		0.71	0.04	19.18	0.000
E.7		0.76			
		CR	AVE	MSV	ASV
Indicators Reliability,	Stress	0.899	0.560	0.774	0.748
Concurrent Validity	Anxiety	0.879	0.514	0.81	0.765
	Depression	0.916	0.609	0.81	0.792

ASV, Average Shared Variance; AVE, variance extracted; C.R., Critical Ratio; MSV, Maximum Shared Variance squared; SE, Standard Error.

stress and symptoms of anxiety ( $P < 0.001$ ;  $r = 0.605$ ) was identified (Table 4). In addition, anxiety presented a direct relationship with depression ( $P < 0.001$ ). The

relationship of the direct effect analysed was not bidirectional, maintaining the stress–anxiety unidirectionality; anxiety–depression (Fig. 2).

## DISCUSSION

The reports by severity levels among general population compiled by this study with a population of 709 subjects, confirmed the findings at international level (Salari *et al.* 2020; Santomauro *et al.* 2021; Wu *et al.* 2021), showing a high presence of psychological symptoms among the population exposed to the COVID-19 pandemic. The psychological variables explanatory model during the pandemic showed a similar behaviour compared to alike studies (Boluarte-Carbajal *et al.* 2021), maintaining a high level of correlation between them and the theoretical explanatory lines (Groen *et al.* 2020; Shah *et al.* 2021); but in our results it was oriented more specifically, a certain tendency to an initial causal behaviour from stress to anxiety and depression independently and unidirectionally. In the case of anxiety, this showed a greater unidirectional effect-cause on depression than stress, confirming the modelling performed by other authors (Knowles & Olatunji 2020; Wang *et al.* 2019), but differing at chained relational, showing that for the high-relational effect of anxiety on depression, a previous effect of stress on anxiety is needed, since the explanatory level of depression was lower when we observe its relationship directly from stress; allowing to guide a clearer chain of stress on anxiety and this on depression, unidirectionally in a pandemic context.

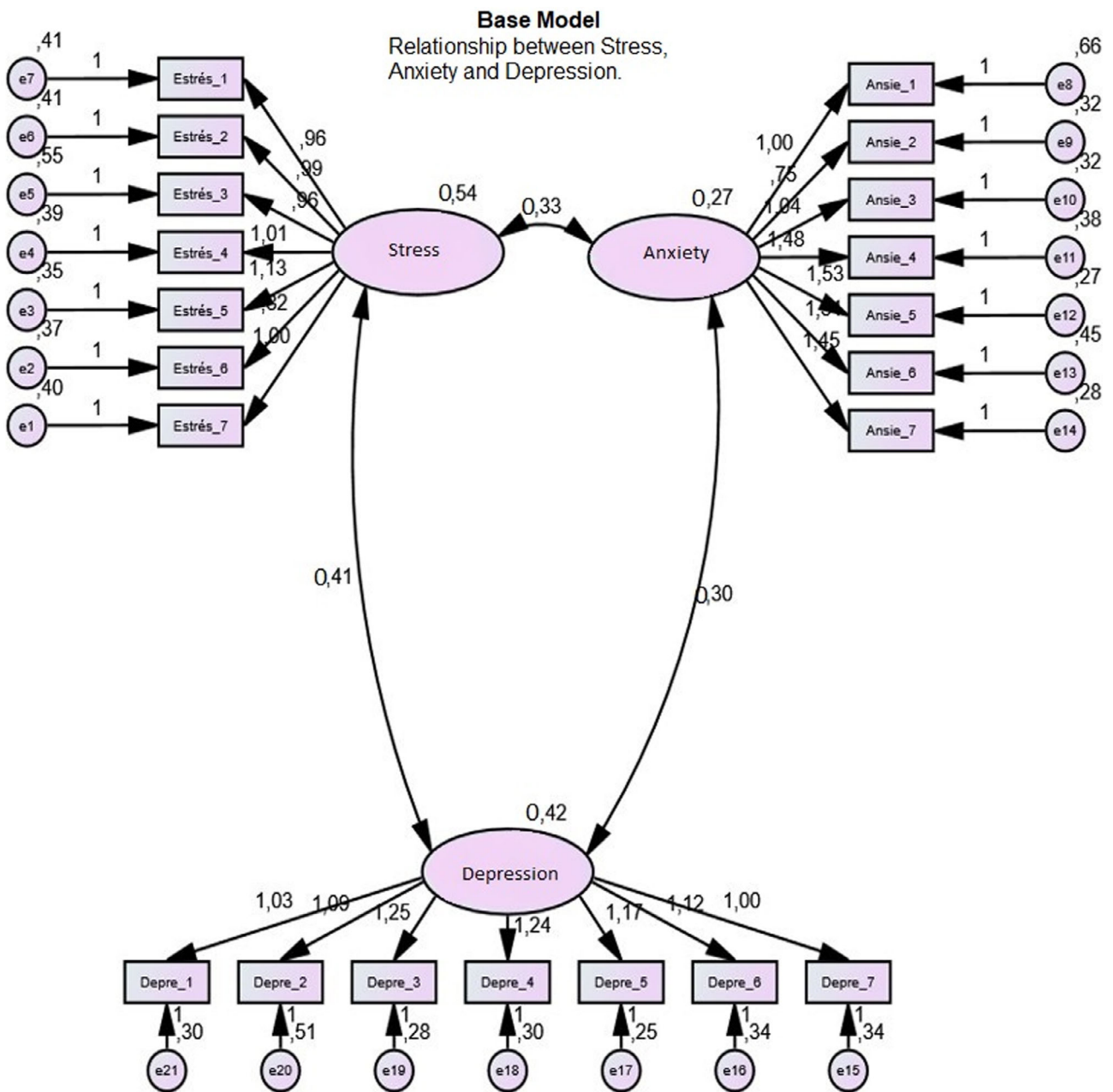


FIG. 1 Base Model. Relationship between Stress, Anxiety and Depression.

In the case of stress initiation as a gateway, some authors suggest that pandemic context may have increased situations of homeostatic imbalance due to variable changes in a sustained manner, propitiating a state of stress with long-term tendencies (Fitzpatrick *et al.* 2020; McEwen & Akil 2020). In the case of long-term stress at neuronal systems levels, this could be explained by change generation in neuronal networks,

promoting adaptive structural plasticity within interconnected brain regions, allowing brain remodelling in a neuroprotective manner, mediating a retraction of dendrites and synapse loss in areas that are highly sensitive to stress, such as the hippocampus, medial amygdala, and medial prefrontal cortex, and generating new connections (Colyn *et al.* 2019; Lau *et al.* 2016). This positive change allows residence effects when facing

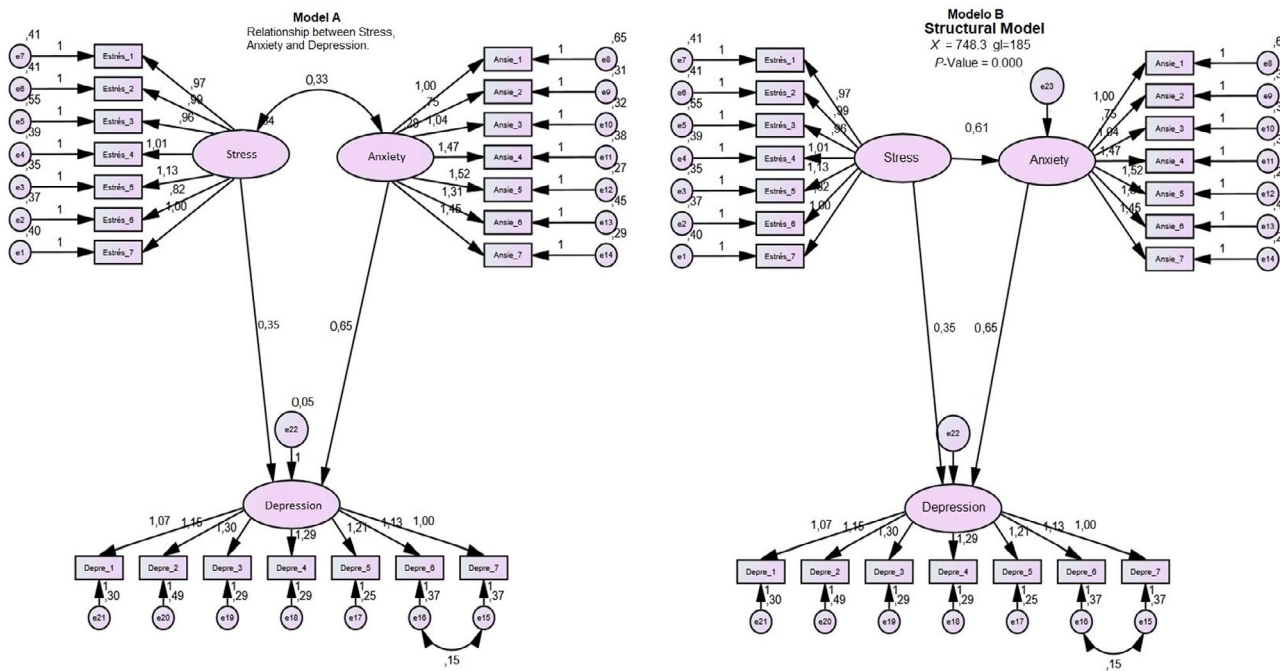
**TABLE 4** Adjustment indicators models/Relationship of dimensions model A

Goodness of fit indices								
	$\chi^2$	df	CFI	TLI	RMSEA	AIC	$R^2$	P-value
Model A	735.2	183	0.933	0.922	0.076	853 206	D 0.858	0.000
Model B	748.3	188	0.943	0.935	0.066	840 308	S/A 0.858 A/D 0.858	0.000

Relationship between dimensions in Model B							
Independent	Dependent	Estimate	Estimate standardized	SE	C.R.	P-value	
Estrés	Ansiedad	0.605	0.849	0.045	13.49	0.000	
Ansiedad	Depresión	0.647	0.546	0.074	8726	0.000	
Estrés	Depresión	0.351	0.416	0.045	7757	0.000	

A/D, Anxiety-Depression; AIC, Akaike’s Information Criterion; CFI, comparative fit index; CR, Critical Ratio; D, Depression; df, degree of freedom;  $R^2$ , coefficient of determination; RMSEA, root mean square error of approximation; S/A, Stress-Anxiety; SE, Standard Error; TLI, Tucker-Lewis Index;  $\chi^2$ , chi-square.



**FIG. 2** Model A, B. Relationship between Stress, Anxiety and Depression. gl, degrees of freedom,  $\chi^2$ , Chi-squared.

stressful situations in an adaptive way that is also seen in depression (Nasca *et al.* 2021), but the persistence after this could be detrimental, for the subsequent progressive readjustment, generating a “stuckness” of this process, failing to adequately adapt structurally and functionally even when external stressors subside, increasing the risk of symptom expression in mental illnesses (Menard *et al.* 2017; Russo *et al.* 2018). From

this explanatory line at long-term stress neuronal level and its environmental context with the COVID-19 pandemic, anxiety is presented as a natural body response to stress in a joint manner (Holland 2020); This theoretical relationship is confirmed by our study, showing a causal explanatory correlation in our study model. In the case of the causal relationship between anxiety and depression, likewise the results of our study and other



authors (Shah *et al.* 2021), a positive correlation with depression has been identified; this causal relationship according to some authors (Knowles & Olatunji 2020; Wang *et al.* 2019) could be due to cognitive biases, such as an overestimation of a threat in anxiety, increasing bodily and behavioural responses, mediating the expression of depression symptoms, in addition to generating a maintenance of psychological symptoms, given by an overloaded adaptive neural network system that maintains a lower rate of change (Menard *et al.* 2017; Russo *et al.* 2018).

The sociodemographic characteristics showed a greater presence of symptoms in female sex, with a difference  $P < 0.001$  for both stress, anxiety and depression, maintaining the international trend of emotional conditions, in mental health (Fountoulakis *et al.* 2022; Salari *et al.* 2020).

Among the associated factors, one of the relevant correlations was the perception of sleep quality, which, although it is true, has shown a certain causal relationship with mental health (Seow *et al.* 2020). In our study, it showed a low correlation (stress  $r = -0.436$ ; anxiety  $r = -0.364$ ; depression  $r = -0.383$ ;  $P < 0.05$ ); This could be due to the perception level of sleep quality among the population in this study, since the majority presented their highest percentage in the qualification of “acceptable”, while qualifications higher as a “good quality of sleep” have been shown as a protective factor in other studies (Vaingankar *et al.* 2020). In the case of confinement, a negative effect on mental well-being and emotional state was expected, as has already been proposed in other studies (Ammar *et al.* 2020; Sharma *et al.* 2020), but the confinement levels collected in this study did not show an association with mental health variables; This could be mediated by the differences in each country regarding the levels of confinement, with the strictest and longest confinements having the greatest impact on mental health.

### Limitations

The sample size allows its adequate extrapolation to the general population, but this study did not consider a multicenter sampling, allowing a greater subgroup representation to appropriately express the variability of the variables associated with this study. A longitudinal study is also recommended, which allows an improved comparison of the causal effects analysed in this study. In the case of measurement instruments and their application mode, these cannot replace the

accuracy of standardized clinical evaluations, in addition to the bias in the reliability of responses by virtual platforms and prioritization level in response times.

### CONCLUSIONS

This study allowed the generation of a conduct explanatory model of psychological behaviours during the COVID-19 pandemic, with an adequate adjustment and a high explanation of the model. It was evidenced that there was a relational chain, with a unidirectional trend. This begins with the increase in stress levels, maintained over time; which is related to the expression of alert reactions, manifested through anxiety symptoms; later establishing the symptomatology of depressive pictures. The population profile was manifested mainly in the female sex, increasing its expression at a younger age accompanied by a lower quality of sleep.

### RELEVANCE FOR CLINICAL PRACTICE

This explanatory model shows a differentiated characterization of the typical alterations presentation in psychological behaviours, especially given by the pandemic context. This could guide public health policies that focus on the initial symptomatology of stress and anxiety, as a determining factor in health prevention. This could have an impact on the decrease of psychiatric diagnoses establishment, such as depression, which presents greater dysfunction and disability. It is also considered relevant that the expression of initial symptomatic levels could generate a summative effect between disorders, causing mental illness comorbidities, which are difficult to identify and therefore, left untreated. It is believed that the relevance of mental health field studies, as the present investigation, have an important relevance in the real impact on population's quality of life, well-being and overall health.

### ACKNOWLEDGEMENTS

We thank all the participants and collaborators of this study, who generously shared their time, to participate in this study.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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