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Research paper

Symptoms of depression and anxiety in young people in El Salvador: Associations with peer and family relationships, artistic activities and health behaviours during the COVID-19 pandemic

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ABSTRACT

Background: Little is known regarding the correlates of mental health, during the COVID-19 pandemic, in lower income countries. Using data from almost the entire population of graduating high school students in El Salvador, we examine the associations between depression and anxiety symptoms and potentially protective factors including peer and family relationships, health behaviours and artistic leisure activities.

Methods: Data comes from the AVANZO survey conducted in El Salvador with 42,314 graduating high school students aged 15–21 in November 2020. Participants completed the Revised Child Anxiety and Depression Scale and Socioemotional Skills Scale. Using a structural equation modelling framework, we tested the associations between these variables and whether these associations varied by sex.

Results: Participants who experienced more positive family relationships reported fewer symptoms of depression ($\beta = -0.304$, $p < .001$) and anxiety ($\beta = -0.103$, $p < .001$). Similar results were found between health behaviours and symptoms of depression ($\beta = -0.398$, $p < .001$), and anxiety ($\beta = -0.312$, $p < .001$). Peer relationships were non-significantly associated with depression and anxiety symptoms. Associations were similar for boys and girls.

Limitations: Students undertook the mental health survey as part of an academic test, which might have increased mental stress. The Socioemotional Skills Scales is newly developed, and results are cross-sectional.

Conclusions: Our findings provide insight into the experiences of an understudied population during the pandemic and identify positive family relationships and health behaviours as important correlates of mental health during this time.

1. Background

On March 17th, 2020, El Salvador went into lockdown due to the COVID-19 pandemic, the measures included restricting public movement, shutting down educational institutions and closing all but essential services. Approximately 1.4 million students in El Salvador were affected by the shutdown of the educational system. El Salvador is classified by the World Bank as a lower-middle-income country (World Bank, 2021). In 2019, only 13.7 % households in the country with students younger than 18 years old, reported having access to means of attending online classes: mobile phones, computers and Internet (Dirección General de Estadísticas y Censos de El Salvador [DIGESTYC], 2019). Studies on mental health during the COVID-19 pandemic have mostly included participants from high-income countries. Much less is known about the mental health experiences during the pandemic in less developed countries such as El Salvador (Kola et al., 2021). This research gap is important because experiences of the pandemic in lower- and middle-income countries are likely to differ from those in more developed nations. Factors including access to health care, vaccines, financial support, and the Internet, as well as access to mental health support systems (e.g. policies, mental health allocated resources), training to address mental health issues (e.g. number of professionals, infrastructure, skills), and levels of mental health stigma (Rathod et al., 2017), are likely to contribute to these potential differences. Using data from El Salvador's first countrywide assessment of adolescent mental health, we firstly report the prevalence of anxiety and depression in this

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population during the initial COVID-19 lockdown, and secondly examine the potential protective factors (family and peer social support, health behaviours and artistic leisure activities) for mental health during this time.

There is consistent evidence that the COVID-19 pandemic has had a negative impact on mental health. A longitudinal population-based study in Iceland reported an increase in depressive symptoms and reduced mental wellbeing in adolescents when compared to their pre-pandemic reports; these effects were more pronounced in adolescent girls (Thorisdottir et al., 2021). In fact, increases in depression and anxiety symptoms and general worsening of mental health in adolescents during the pandemic has been reported in the USA (Bowen et al., 2022; Watson et al., 2023), Norway (Hafstad et al., 2021), and the UK (Mansfield et al., 2022). With adolescent girls consistently showing more symptoms than their male counterparts. Moreover, a meta-analysis on depression and anxiety symptoms showed that one in four adolescents experienced elevated depression symptoms and one in five experienced elevated anxiety symptoms, which is double that of pre-pandemic levels; with higher symptoms being reported by girls (Racine et al., 2021). Such negative mental health consequences might be explained by a range of experiences (spanning individual, family, environmental and social domains; Hoare et al., 2020). For instance, adverse life events are considered risk factors for depression because of the pessimistic thinking they are likely to generate (Burns et al., 2002). In this sense, the COVID-19 pandemic could increase the likelihood of adverse events such as contracting the disease, having someone close contract the disease or pass away because of it, financial issues in the household or loss of access to education (Ding et al., 2020; Mazza et al., 2020). Further, enforced social distancing and home quarantine reduced opportunities for peer social interactions and support – experiences known to benefit mental health (Rueger et al., 2016; Suresh et al., 2021).

Despite the challenges brought about by the pandemic, there are social experiences and activities that might buffer or reduce its negative mental health consequences. Firstly, while there were few opportunities for connecting with peers, adolescents likely spent more time with their families, because of home quarantine rules. The quality of these relationships could have important mental health consequences. In fact, previous research conducted before the pandemic indicates that support from family members is a stronger protective factor against poor mental health for adolescents than support from close friends and teachers (Rueger et al., 2016). In addition, as young adolescents mature, general peer support becomes a weaker predictor of depression whereas family support remains a consistent one (Rueger et al., 2016), with some studies reporting a lack of association between peer support and levels of depression (Liu et al., 2020). Relationships with family members may be particularly salient in the context of El Salvador considering the importance of familism in Latin America (Carlo et al., 2007).

In examining the prevalence of depression and anxiety and the contribution of the potentially protective factors outlined above, it is important to consider the influence of sex differences. The finding that women and girls are at higher risk of mood and anxiety disorders than their male counterparts is well established (and consistent with observations during the pandemic, as described above; McLean et al., 2011; Salk et al., 2017). Researchers have identified potential drivers of these differences including biological susceptibility, lower self-esteem and increased exposure to interpersonal stressors (Riecher-Rössler, 2017). Furthermore, research suggests that the protective effect of social support could vary by sex: studies have shown that the negative association between social support (from parents or peers) and symptoms of depression or mental distress is stronger in girls than boys (Johansen et al., 2021; Needham, 2008) (although findings on this topic have been mixed with others reporting no sex differences; Rueger et al., 2016). Thus, the association between peer and family support and symptoms of anxiety and depression could vary by sex, with potentially stronger associations being observed for girls.

In addition to social support, activities such as exercise routines can help improve general mental well-being (Bu et al., 2021; Kiernan et al., 2021), especially depression (Carr, 2008; Romans et al., 2011). Similarly, engaging in large amounts of sedentary behaviour is known to be associated with higher levels of depression and anxiety (Gibson et al., 2017). During the pandemic, artistic activities such as listening to music, singing and dancing were found to be effective in regulating emotion (Kiernan et al., 2021). Other activities such as visual arts, creative expression and expressive writing have also been linked with positive effects on mental health in studies conducted before the pandemic (Stuckey and Nobel, 2010), and may represent further means of coping with the challenges of the pandemic as adolescents spend more time indoors.

Building on this literature and applying it to the pandemic experience in El Salvador, the present study makes several important contributions. Firstly, using data from almost the entire population of graduating high school students in El Salvador, we report the prevalence of depression and anxiety during the first COVID-19 lockdown. Secondly, we report the impact of the pandemic and lockdown restrictions on peer and family relationships in this population. Thirdly, we test whether positive family and peer relationships, health behaviours (physical activity, sleep quality and diet) and artistic leisure activities (painting, writing for enjoyment, reading books and magazines and listening to music) were associated with fewer symptoms of depression or anxiety. Finally, we tested whether the associations listed above, varied by sex. It was hypothesized that: (a) more positive peer and family relationships would be associated with fewer symptoms of depression and anxiety, (b) health behaviours and artistic leisure activities would be associated with fewer symptoms of depression and anxiety., and (c) the association between peer and social relationships and depression and anxiety symptoms would be stronger in girls than in boys

2. Method

2.1. Study design and participants

This cross-sectional study used data from the AVANZO survey of academic skills and mental health for graduating high school students in El Salvador. The year 2020 was the first time the AVANZO survey was implemented, it captures academic and other self-reported data (including symptoms of depression and anxiety, the impact of the pandemic on peer and family relationships, artistic leisure activities and health behaviours) of every graduating student in an online survey. The El Salvador government collected data from 10th to 13th November 2020. The students either took the survey at school or at home.

The AVANZO survey was taken by 69,708 participants. Depression and anxiety symptoms were assessed by the 25-item short version of the Revised Children's Anxiety and Depression Scale (RCADS) (Young et al., 2020). This scale was only validated for people up to 21 years old in El Salvador so the respondents older than 21 years old were excluded from the analysis ($n = 5108$). Since El Salvador is a developing country and strives to educate its whole population, it is common for individuals older than 21 years old to graduate from high school. Due to missing data, 22,286 participants were excluded (Fig. 1). The remaining were 42,314 participants (age $M = 17.8$, $SD = 1.01$) of which 19,919 (47.1 %) were boys (for more details about the participants, see Table 1). A mean comparison of the variables of interest between the included and excluded group can be seen in Supplementary Material Table 1; included group values for peer and family relationships are about 10 % higher, and 10 % smaller for depression symptoms.

2.2. Measures

Symptoms of depression and anxiety were assessed using the RCADS-25 Spanish adapted version for El Salvador (Young et al., 2020). The RCADS-25 is a 25-item self-report scale that assesses symptoms of

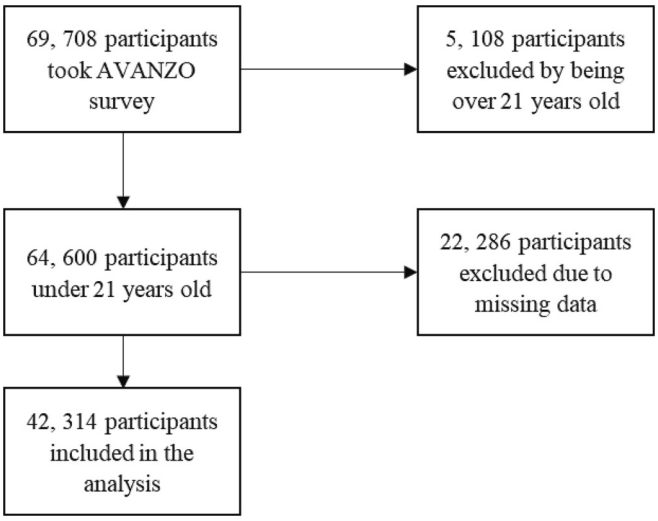

Fig. 1. Flow-chart selection of participants in the analytical sample.

Table 1
Descriptive statistics for depression and anxiety symptoms, peer and family relationships, artistic activities and health behaviours.

	Student population	Girls (52.9 %)	Boys (47.1 %)
Depression symptoms	8.50 (4.89)	9.17 (4.97)	7.78 (4.68)
Anxiety symptoms	15.92 (6.73)	17.36 (6.84)	14.30 (6.21)
Peer relationships	6.92 (1.63)	6.98 (1.62)	6.85 (1.68)
Family relationships	7.23 (1.64)	7.27 (1.62)	7.19 (1.66)
Artistic activities	2.74 (0.98)	2.83 (0.96)	2.64 (1.01)
Health behaviours	2.19 (0.91)	2.13 (0.93)	2.26 (0.89)

Depression symptoms	Non-clinical (88.8 %)	Borderline (3.1 %)	Potentially clinical (8.1 %)
Anxiety symptoms	14.94 (6.08)	21.10 (6.06)	24.56 (6.67)
Peer relationships	7.02 (1.56)	6.35 (1.84)	6.09 (1.98)
Family relationships	7.36 (1.53)	6.47 (1.96)	6.06 (2.09)
Artistic activities	2.76 (0.98)	2.60 (0.99)	2.62 (1.03)
Health behaviours	2.30 (0.849)	1.56 (0.94)	1.27 (0.93)

Anxiety symptoms	Non-clinical (65.7 %)	Borderline (11.8 %)	Potentially clinical (22.5 %)
Depression symptoms	6.91 (3.86)	9.95 (4.32)	12.42 (5.40)
Peer relationships	6.96 (1.59)	6.90 (1.63)	6.84 (1.74)
Family relationships	7.28 (1.59)	7.19 (1.63)	7.10 (1.79)
Artistic activities	2.74 (0.98)	2.75 (0.96)	2.76 (1.00)
Health behaviours	2.30 (0.86)	2.09 (0.94)	1.93 (0.98)

Note: Means (SD) of depression and anxiety symptoms, family and peer relationships, artistic activities and health behaviours by sex, and in the categories of depression and anxiety severity.

depression and anxiety as a two-factor structure. Symptoms of depression were measured by 10 items on a scale from 0 (*Never*) to 3 (*Always*) (e.g., "*I feel sad and empty*") and had a minimum score of 0 and a maximum score of 30. The symptoms of anxiety were measured with 15 items on the same scale (e.g., "*I worry when I think I didn't do well on something*") with a minimum score of 0 and a maximum score of 45. Higher values indicate more symptoms of depression and anxiety.

The impact of the pandemic on peer and family relationships, artistic leisure activities and health behaviours was assessed using the Socio-emotional Skills Scale developed by Fundación Pro Educación de El Salvador (FUNPRES). This was the first time the 25-item scale was used so there is currently no published information regarding the validation process (more information on the original scale, including individual items and response anchors, can be seen in Supplementary Table 2). We identified three items in this scale that correlated most strongly with each other to assess the impact of the pandemic on participants' family relationships (henceforth family relationships; see Supplementary Material Table 3). Three items were identified using the same approach for the impact of the pandemic on peer relationships (henceforth peer relationships; Supplementary Material Table 4). Table 2 shows the items used in these scales. Items were measured on a scale of 0–3, ranging from 0 (*totally disagree*) to 3 (*totally agree*). The family and peer relationship scores ranged between 0 and 9. Higher values indicate better quality of interactions with families and/or peers during the lockdown. Participants reported whether they took part in a list of artistic leisure activities (0 = *No* and 1 = *Yes*) including drawing/painting, writing, reading or listening to music. These responses were summed to form an overall score ranging from 0 to 4. Health behaviours were measured by 3 items. Students reported (0 = *No* and 1 = *Yes*) whether they had been exercising, following a healthy diet, and sleeping enough during the pandemic. Responses were summed to form an overall score ranging from 0 to 3. Higher values on both artistic and health behaviour variables indicate greater engagement in those activities.

2.3. Statistical analysis

The analysis was carried out in R version 4.04 (R Project, 2021) paired with RStudio Desktop version 1.4.1717 (Rstudio, 2021). The analysis plan was preregistered (https://osf.io/d5tsm). However, we made some modifications to obtain more information about the types of activities associated with positive mental health: treating health behaviours and artistic activities as separate variables and as independent predictors of depression and anxiety symptoms.

We firstly report the means and standard deviations of the main variables by sex (symptoms of depression and anxiety, peer and family relationships, health behaviours and artistic leisure activities). We also calculated the means and standard deviations of symptom severity of depression and anxiety. These separate categories were obtained by following the RCADS-25 authors' equations to calculate symptom severity based on sex, grade, and score of each participant (for more information see: https://help.greenspacehealth.com/article/50-child-depression-and-anxiety-rcads-25) (Greenspace, 2021). The associations of sex with other covariates on the main variables were conducted separately.

The application of structural equation modelling (SEM) allowed us to estimate latent variables and several outcome or dependent variables simultaneously and thus reduce the risk of potential error in our results. Before running the main SEM, we ran separate confirmatory factor analysis (CFA) models for each latent variable (symptoms of depression and anxiety, peer and family relationships) where constrained loadings and thresholds models were compared to unconstrained models (see Supplementary Material Table 5) to check for differences by sex in the measurement model. Factor scaling, and identification was achieved by fixing the loading of the first item to one. The weighted least squares means and variance adjusted (WLSMV) estimator was used and factor indicators were treated as categorical (Flora and Curran, 2004) as this approach has been shown to provide a better fit for the RCADS-25 response patterns (Flora and Curran, 2004; Young et al., 2020). If any of the initial factors had a poor fit, modification indices were checked and theoretically plausible changes to the model were made. For each outcome (symptoms of depression and anxiety, peer and family relationships), measurement invariance by sex was tested with the semTools package (Jorgensen et al., 2021) by comparing the fit of an unconstrained model to a model with constrained thresholds and then comparing the fit of that model to one with constrained thresholds and loadings (Svetina et al., 2020). We used the measurement models'

Table 2
Response distributions and percentages for peer and family relationships items.

Factor	Socioemotional skills scale items	Strongly disagree	Disagree	Agree	Strongly agree
Peer relationships	1. Quarantine has allowed me to confirm that my friends are important	1459 (3.4 %)	2795 (6.6 %)	15,803 (37.3 %)	22,257 (52.6 %)
	2. Although during the quarantine I could not leave the house, I found ways to share with other people (through video calls, phone calls, sending messages or others)	808 (1.9 %)	1699 (4.0 %)	13,390 (31.6 %)	26, 317 (62.4 %)
	3. I have collaborated with the needs of my neighbors or community during the pandemic and quarantine (listening to them, giving support, sharing food or other)	3514 (8.3 %)	6848 (16.2 %)	18,705 (44.2 %)	13,247 (31.3 %)
Family relationships	1. Due to the pandemic and quarantine, I have shared and gotten closer to the people I live with at home	1317 (3.1 %)	3633 (8.6 %)	16,009 (37.8 %)	21,355 (50.5 %)
	2. The pandemic and quarantine have allowed me to confirm that my family is important	658 (1.6 %)	812 (1.9 %)	8790 (20.8 %)	32,054 (75.8 %)
	3. During the pandemic and quarantine, rules of coexistence at home were defined and the responsibilities of the members were distributed	1858 (4.4 %)	5058 (12.0 %)	19,585 (46.3 %)	15,813 (37.4 %)

Note: Official translations are not available. These were translated by the Francisco Calderón, the corresponding author.

individual fit indices for these comparisons as suggested by Little (2013) – a decrease in the comparative fit index (CFI) of >0.01 was considered to indicate non-invariance. We did not use the conventional chi-square test because it is highly susceptible to large sample sizes (Maede et al., 2008).

After confirming invariance by sex of the individual measurement models for symptoms of depression and anxiety and peer and family relationships, we ran several iterations of the main SEM using the lavaan package (Rosseel, 2012); in each model, the latent variables symptoms of depression and anxiety were each predicted by the latent variables family and peer relationships, as well as the observed variables health behaviours and artistic activities, additionally, peer and family relationships were allowed to covary with each other and individually with artistic and health behaviours, depression and anxiety symptoms were also allowed to covary with each other, and artistic activities and health behaviours were also allowed to covary with each other. Model 1 included sex as a group variable and allowed the path estimates to vary by sex. The fit of Model 1 was compared to Model 2 which constrained thresholds, loadings and regression paths (i.e. associations between peer and family relationships, health behaviours and artistic activities and depression and anxiety symptoms) to be equal for boys and girls. Following the finding that these path estimates were similar for boys and girls, we dropped sex as a group variable in Model 3. Lastly in Model 4 (which, like Model 3, did not include sex as a group variable) we accounted for additional covariates by regressing family and peer relationships, and symptoms of depression and anxiety on school type (private/public), school location (urban/rural), and age while accounting for clustering within schools using the lavaan.survey package (Oberski, 2014). Supplementary Fig. 1 provides an illustration of Models 1–4.

Models were considered to fit well if root mean square error of approximation (RMSEA) and standardized root mean squared residual (SRMR) were <0.05 (MacCallum et al., 1996; Schermelleh-Engel et al., 2003) and Tucker-Lewis index (TLI) and CFI were >0.95 (Hu and Bentler, 1999). Models were acceptable if CFI and TLI were >0.90 and RMSEA and SRMR were <0.08 (Little, 2013). Estimates were considered significant if *p*-value was <0.05. We used Benjamini-Hochberg correction to correct for multiple comparisons (Benjamini and Hochberg, 1995).

3. Results

3.1. Descriptive results

The means and standard deviations of the main variables divided by sex, and, separately by categories indicating severity of depression and anxiety symptoms are shown in Table 1. Girls had higher mean depression and anxiety scores than boys, whereas peer and family relationships and artistic activities and health behaviours were similar between sexes. Most of the surveyed students fell within non-clinical ranges for both depression (88.8 %) and anxiety (65.7 %). The prevalence of both borderline (11.8 %), and potentially clinical symptoms (22.5 %) of anxiety were about three times higher than that of borderline (3.1 %) and potentially clinical symptoms (8.1 %) of depression.

The count and percentages by the response options of the three items measuring peer and family relationships were shown in Table 2. Overall, the majority of participants reported improvements and positive relationships with their family and peers during the pandemic with 62 % of participants were able to stay in contact with others by phone or other means. Notably, 76 % indicated that the pandemic had reaffirmed the importance of their family. Only a small minority (between 2 and 8 %) reported a strongly negative experiences with their family or peers.

To account for possible effects of covariates, a moderation analysis was used to examine the interaction between age, school type, and school location with sex on all the main variables. Moderation results showed low effect sizes or no statistical relationship with most variables. Except for depression symptoms showing negative association for older females ($\beta = -0.103$, $SE = 0.047$, $p = .027$) and females from rural area ($\beta = -0.287$, $SE = 0.134$, $p = .032$), but a positive association to females in private schools ($\beta = 0.230$, $SE = 0.106$, $p = .031$). Moderation results can be seen in Supplementary Material Table 6.

3.2. Measurement models

Individual CFA models for depression and anxiety symptoms showed acceptable fit after adjustments, the models for family and peer relationships were just-identified. For the depression and anxiety CFA models, adjustments with the highest modification indices were considered and added sequentially until adequate fit measures were reached or further additions did not make theoretical sense (e.g. the items "I worry what others think of me" and "I feel afraid that I will make a fool of myself in front of people" describe very similar symptoms and so were allowed to covary; however, the item "I suddenly become dizzy or faint when there is no reason for this" was not allow to covary with the above items as it describes a different type of symptom). Cut-offs were not used in this process as it could lead to overfitting of models, however it is important to note these additions were not hypothesized and potential bias can be introduced. Each CFA model passed tests of metric and scalar invariance by sex (see Supplementary Material Table 5). No partial invariance adjustments were made during this process.

3.3. Main analysis

After confirming invariance in the measurement model, the model comparisons of Models 1 and 2 showed that constraining the structural model of the SEM did not significantly change the model fit measures (Table 3). This indicates that the strength of associations between the

Table 3
The Fit Statistics of all Models.

SEM models	CFI	TLI	RMSEA	SRMR
Model 1	0.920	0.910	0.047	0.047
Model 2	0.916	0.914	0.045	0.048
Model 3	0.923	0.914	0.046	0.047
Model 4	0.904	0.891	0.035	0.037

Note: Model 1 consists of the latent variables' symptoms of depression and anxiety each predicted by the latent variables' family and peer relationships, and the observed variables health behaviours and artistic activities all divided by sex. Model 2 constrains all loadings, thresholds and regression paths to be equal for both sexes. Model 3 drops the division of SEM by sex. Model 4 additionally regresses family and peer relationships, symptoms of depression and anxiety, and artistic and health behaviours on school type (private/public), school location (urban/rural), and age while accounting for clustering within schools as covariates. A decrease in CFI of >0.01 was considered to indicate non-invariance.

four predictor variables (family and peer relationships, health behaviours, and artistic activities) and symptoms of depression and anxiety did not significantly vary between boys and girls. Sex as a grouping variable was therefore dropped from the subsequent Models 3 and 4. In a model without any sex division (Model 3), we found that peer relationships ($\beta = 0.095$, $SE = 0.025$, $p < .001$) and artistic activities ($\beta = 0.047$, $SE = 0.006$, $p < .001$) were positive predictors of depression symptoms while family relationships ($\beta = -0.373$, $SE = 0.024$, $p < .001$), and health behaviours ($\beta = -0.377$, $SE = 0.005$, $p < .001$) were both negative predictors. Some similar results were found for anxiety symptoms as artistic activities was a positive predictor ($\beta = 0.079$, $SE = 0.006$, $p = .004$), but peer relationship was not significantly associated ($\beta = 0.034$, $SE = 0.027$, $p = .206$); family relationships ($\beta = -0.074$, $SE = 0.026$, $p = .001$) and health behaviours ($\beta = -0.291$, $SE = 0.006$, $p < .001$) were both negative predictors of anxiety symptoms. After including the covariates in Model 4, peer relationships was no longer a significant predictor of depression ($\beta = 0.020$, $SE = 0.025$, $p = .431$) and anxiety symptoms ($\beta = 0.037$, $SE = 0.026$, $p = .155$). The direction and statistical significance of the remaining associations remained the same with relatively similar effect sizes (see Table 4 and Fig. 2).

4. Discussion

This is the first study to report on the mental health and social relationships of El Salvador's graduating high school students during the pandemic. Using the AVANZO dataset, we examined whether more positive peer and family relationships, engagement in artistic activities or health behaviours were potentially protective for mental health during the pandemic and whether these associations simultaneously varied by sex. About one in ten students reported potentially clinical levels of depression and one in five reported potentially clinical levels of anxiety. Overall, most students reported positive relationships with their family and peers during the pandemic. The strength of associations between the predictor (peer and family relationships, health behaviours and artistic activities) and the outcome variables (symptoms of depression and anxiety) were similar for boys and girls. Our results indicated that participants who experienced more positive relationships with their family or engaged in more health protective behaviours during the pandemic tended to report fewer symptoms of anxiety and depression. These associations remained significant after accounting for age, school location, school type, and school clustering covariates. In the fully-adjusted model, having more positive relationships with peers during the pandemic was not associated with anxiety or depression symptoms, and engaging in artistic activities remained associated with a very slight increase in symptoms of depression and anxiety.

The prevalence of potentially clinical depression in our study was

Table 4
Standardized estimates, standard errors and *P*-values in models 3 and 4.

Model	Predicted variable	Predictor	Standardized estimate	Standard error	*p*-value
Model 3	Depression~	Peer relationships	0.095	0.025	<0.001
		Family relationships	−0.373	0.024	<0.001
		Artistic activities	0.047	0.006	<0.001
		Health behaviours	−0.377	0.005	<0.001
	Anxiety~	Peer relationships	0.034	0.027	0.206
		Family relationships	−0.074	0.026	0.004
		Artistic activities	0.079	0.006	<0.001
		Health behaviours	−0.291	0.006	<0.001
Model 4	Depression~	Peer relationships	0.020	0.025	0.431
		Family relationships	−0.304	0.023	<0.001
		Artistic activities	0.054	0.006	<0.001
		Health behaviours	−0.398	0.005	<0.001
		School location	−0.004	0.005	0.466
		Age	−0.012	0.005	0.017
		School type	−0.018	0.007	0.017
	Anxiety~	Peer relationships	0.037	0.026	0.155
		Family relationships	−0.103	0.023	<0.001
		Artistic activities	0.074	0.007	<0.001
		Health behaviours	−0.312	0.006	<0.001
		School location	0.023	0.008	0.003
		Age	−0.026	0.006	<0.001
		School type	−0.090	0.011	<0.001
	Peer relationships~	School location	0.060	0.011	<0.001
		Age	0.052	0.007	<0.001
		School type	−0.071	0.014	<0.001
	Family relationships~	School location	0.046	0.010	<0.001
		Age	0.038	0.006	<0.001
		School type	−0.089	0.013	<0.001
	Artistic activities~	School location	0.039	0.008	<0.001
		Age	−0.022	0.005	<0.001
		School type	−0.051	0.008	<0.001
	Health behaviours~	School location	0.048	0.010	<0.001
		Age	0.008	0.006	0.150
		School type	−0.081	0.011	<0.001

Note: The type of school participants attended is coded as 1 (*public*) and 2 (*private*). The type of school location is coded as 1 (*urban*) and 2 (*rural*).

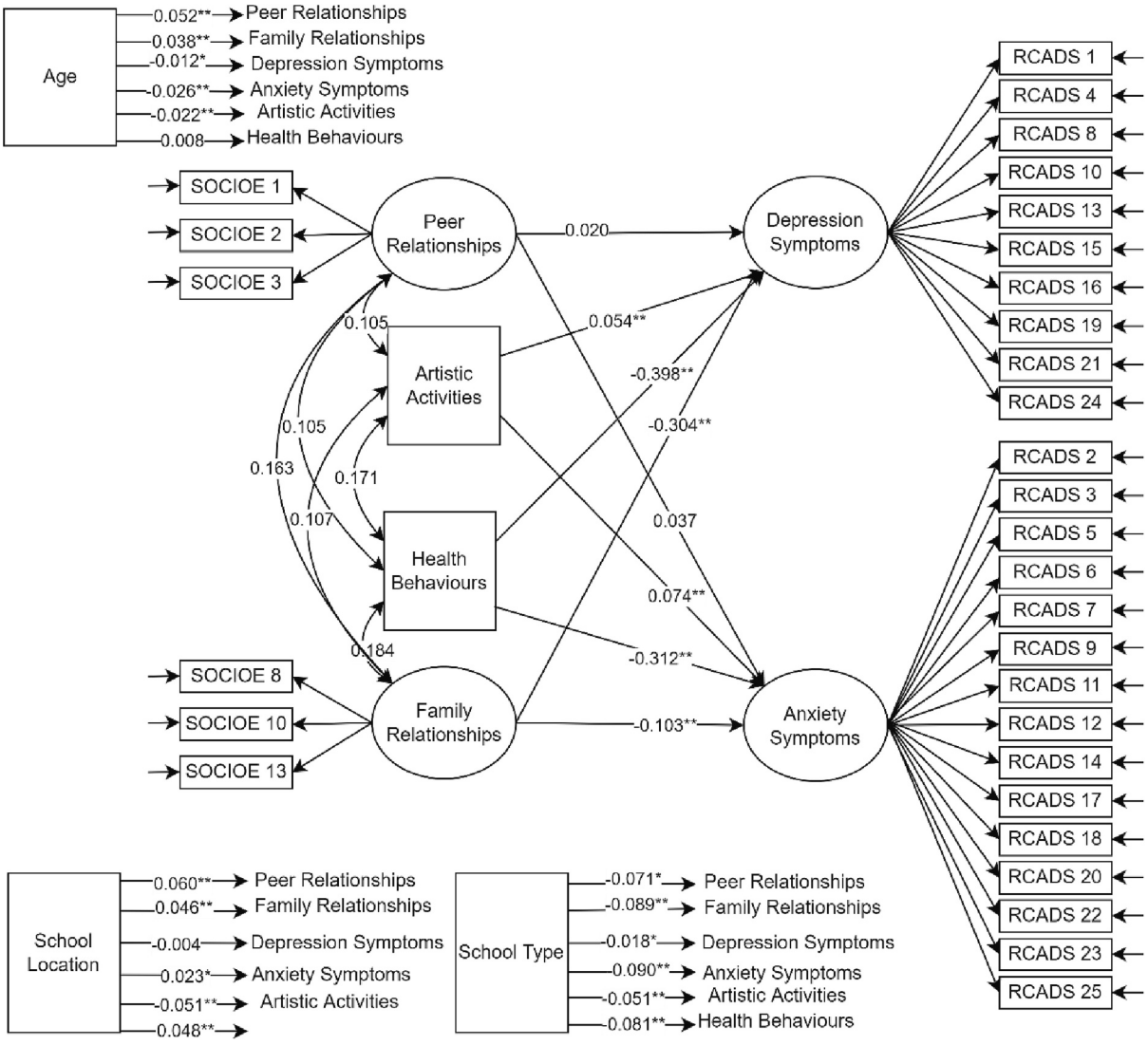

Fig. 2. SEM diagram of model 4 with standardized regression path estimates. *Note:* ** $p < .001$, * $p < .05$. The type of school was coded as 1 (*public*) and 2 (*private*), and the type of school location was coded as 1 (*urban*) and 2 (*rural*).

lower than the prevalence reported in a meta-analysis of studies with children and adolescents (mostly from North America, Europe and East Asia) during the first year of the pandemic (8.1 % vs. 25.2 %). This could be related to the importance of familism in Latin America with adolescents getting to spend more time with their families, and as families tend to be extended/bigger not feeling as isolated as teenagers in more developed countries (Carlo et al., 2007). Another explanation could be the stigmatization of mental health leading to underreporting as it tends to be less accepted or publicly discussed in lower income countries (Rathod et al., 2017), However, without longitudinal data before or after pandemic, it is not possible to gauge the increase or decrease in the prevalence. On the other hand, the prevalence of potentially clinical anxiety in our study was more similar to the prevalence reported in that meta-analysis (22.5 % vs 20.5 %) (Racine et al., 2021). The rates of potentially clinical depression in our sample, are more in line with pre-pandemic levels reported in the USA, ranging from 8.7 % in early adolescences to 11.3 % in young adults (Mojtabai et al., 2016). It should be noted that the underrepresentation of low- and middle-income countries in studies reporting the prevalence of depression and anxiety during the pandemic might not give a representative view of mental health problems worldwide.

Due to a lack of previous large-scale studies with adolescents in El Salvador, it is unclear whether the levels of depression and anxiety observed in our study are higher than those before the pandemic. One previous small-scale study with Salvadorian adolescents (27 boys and 56 girls) of the same age as our participant sample (and using the same RCADS-25 scale) conducted before the pandemic (Young et al., 2020), reported a mean level of depression symptoms for boys that was higher than in our sample ($M = 10.58$ vs $M = 7.78$) and a mean level of anxiety symptoms that was lower than in our sample for girls ($M = 14.86$ vs $M = 17.36$) and boys ($M = 12.26$ vs $M = 14.30$). However, due to the small sample size in Young et al. (2020), these comparisons should be interpreted with caution. Future studies investigating the Salvadorian population could use the present results to test for increases or decreases in symptoms of depression and anxiety post-pandemic. Further work is also needed to understand mental health differences in lower compared with higher income countries.

It is also important to consider the timing of data collection in our study (nearly eight months into the lockdown) relative to others, as there is evidence that the prevalence of mental health problems changed during the course of the pandemic. A German longitudinal COVID-19 study reported that the adverse impact of the pandemic on health behaviour and mental health reduced three months into the pandemic (Mata et al., 2021), similarly Daly et al. (2020) reported in the UK a

distinct increase in prevalence of mental health problems from 2019 to 2020 which was already in decline by May 2020. However, a study in the USA points to a sudden increase in symptoms at the beginning of the pandemic, followed by sustained higher symptoms 8 months into the pandemic (Liu et al., 2022). It is possible that our participant sample would report higher levels of depression and anxiety had the study been conducted at an earlier stage of lockdown. Nevertheless, our results provide a valuable snapshot of Salvadorian adolescents' mental health and social experiences during a particular stage of the pandemic.

The negative association between family relationships and depression symptoms matches findings from previous studies, conducted both before and during the pandemic, with young and older adolescents (Liu et al., 2020; Needham, 2008; Rueger et al., 2016). More positive family relationships were also associated with fewer symptoms of anxiety in our study, however, the effect size for this association ($\beta = -0.103$, $SE = 0.023$, $p < .001$) was smaller than that for family relationships and depression ($\beta = -0.304$, $SE = 0.023$, $p < .001$). By contrast, positive relationships with peers, were not associated with reduced symptoms of depression or anxiety in our sample. This result contrasts with some previous research, conducted during the pandemic, which reported a negative association between perceived social support and symptoms of depression, in young people (aged 18–24) (Grey et al., 2020). However, some studies conducted before and during the pandemic support the notion that for older adolescents, social support from peers, partners, or the community is not as strongly associated with mental health as family support (Liu et al., 2020; Rueger et al., 2016). Our results should encourage future researchers to separate the different actors that provide any type of social support as well as consider the context in which it is received (e.g. a crisis period like the pandemic as opposed to everyday life stressors such as attending school), which could account for varying results.

In line with previous research (Gibson et al., 2017; Kiernan et al., 2021), engaging in more health protective behaviours during lockdown was associated with fewer symptoms of depression and anxiety; these were the strongest associations observed in our study. While these findings might point to health behaviours as potentially beneficial for mental health, it is also known that poor sleep quality and diet are common symptoms of depression (Carr, 2008) and a bi-directional association has been reported between physical activity (Jerstad et al., 2010) and depression symptoms. Thus, further longitudinal work is needed to identify the direction(s) of these associations.

Unexpectedly, greater engagement in artistic activities was associated with a slight increase in depression and anxiety symptoms. We emphasise the effect of this association was very small; however, it is an intriguing result. Artistic related activities may not have homogeneous effects on mental health, and the pandemic context might also incentivize some activities more than others (Kiernan et al., 2021). Students struggling with mental health might look to these activities as means of coping. Further research is needed to better understand the relationships between different types of artistic activities and depression and anxiety symptoms.

Consistent with previous reports, (Grey et al., 2020; Kujawa et al., 2020; Mazza et al., 2020; Salari et al., 2020), girls in our study tended to report more symptoms of depression and anxiety than boys. However, we observed similar associations between family and peer relationships and symptoms of anxiety and depression among boys and girls. This result contrasts with the findings from some previous studies (Needham, 2008; Liu et al., 2022) that found the associations between peer or family support and symptoms of depression to be more pronounced among girls than boys. It is suggested that peer and family relationships are more salient for girls because they are more social or vulnerable to stress than boys (Bu et al., 2020; Liu et al., 2022). However, another study conducted during the pandemic reported results more similar to ours (Liu et al., 2020). These inconsistent results might come from how peer and family support are measured and defined, and cultural differences, differences in the data (cross-sectional vs. longitudinal) and analysis (between- vs. within-individual analysis), as well as the statistical methods used. The use of SEM allowed us to compare a system of interacting variables using multiple outcomes while accounting for more error from the measurement models. Sex results suggested through the finds account for all inputted variables which could generate different results from direct interactions frequently conducted through linear modelling. As part of the methodological contribution, the ability to test more complex variable interactions through the use of SEM could enhance our understanding of the field.

5. Limitations

The main strength of this study lies in the power of the analysis as the dataset includes data from almost all graduating high school students in El Salvador. Therefore, the results would well represent this population. The use of SEM allowed us to model multiple associations, while controlling for age, school type, and school location and clustering by school. The results from a lesser-known population such as El Salvador's could contribute to our further understanding of the social and mental health consequences of the pandemic. However, there are several potential sources of bias in our study sample. Firstly, it is likely that limited access to the Internet (DIGESTYC, 2019) in El Salvador presented a barrier to participation in the study for some students; however, this was somewhat mitigated by the option of completing the survey at school. Secondly, the most economically affected/vulnerable students may have had to drop out of school during the pandemic, before the academic test and survey were conducted. Thirdly, as the mental health data was collected as part of the AVANZO academic test, it is possible that the students had more stress/anxiety than usual. Fourthly, this being a cross-sectional study limits the conclusions, in terms of direction of association, we can infer from the results. Fifthly, important potentially confounding variables such as family income, and home environment were not assessed and therefore could not be controlled for in our analysis. Finally, peer and family relationships were assessed using a newly developed scale, this might account for the differences between our findings and those reported in some previous studies.

6. Conclusions

Our findings suggest that, among Salvadorian adolescents, more positive family relationships are potentially protective for depression symptoms and to a lesser degree anxiety symptoms. Health behaviours are strongly associated with reduced depression and anxiety symptoms, while associations with artistic activities are weaker. These results do not vary by sex. Further longitudinal research is needed to tease out the directions of effect between these variables. However, supporting adolescents to build positive family relationships and healthy habits might provide a mean of improving mental health for future interventions.

CRediT authorship contribution statement

FC developed the study proposal under supervision of JO. FC was responsible for liaising with FUNPRES to have access to the data, answer follow-up questions regarding data collection and general metadata. FC and JO were responsible for initial reviews for the data. FC was in charge of conducting all analysis. JO reviewed results, syntax and contributed to gaps and improvements to the analysis syntax. FC wrote the initial draft, which was later reviewed by JO and YL. YL further contributed as an expert on mental health in adolescent development stage to refine the literature review.

Declaration of competing interest

All authors declare no conflicts of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jad.2023.07.024.

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