

Positive Family Environment, General Distress, Subjective Well-Being, and Academic Engagement among High School Students Before and During the COVID-19 Outbreak

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Abstract

The COVID-19 pandemic has altered the family dynamics of most people worldwide as well as the mode in which students take classes. The impact of such changes on

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students' well-being, academic engagement, and general distress remains unknown. Therefore, this study aims to test the structural relations among positive family environment (a measure of Positive Home-Based Parent Involvement [HBI]), subjective well-being (SWB), general distress, and academic engagement, focusing on Mexican high school students. A longitudinal study was conducted covering two time points: before (T1) and during (T2) the COVID-19 outbreak. A sample of 502 students answered questionnaires in T1 whereas 111 did so in T2. Analyses were conducted using Mplus software. Principal results showed that the positive and significant association between positive family environment and SWB did not substantially change from T1 to T2, whereas the relation between positive family environment and academic engagement became stronger. Data revealed that a positive family environment can play an important role in promoting academic engagement among adolescent students despite the risks brought about by sanitary lockdowns and the increase of family interactions. Results are discussed highlighting the importance of positive family environments and HBI on academic outcomes for Mexican high school students.

Keywords

general distress₁, subjective well-being₂, academic engagement₃, COVID-19₄, parent involvement₅

On March 11, 2020, the World Health Organization (WHO) declared the coronavirus disease (COVID-19) a pandemic and suggested a series of actions to mitigate its effects on the population. More than a year later, the pandemic has changed the lifestyles of millions worldwide, claiming 5,077,791 lives in the process (Johns Hopkins CSSE, 2021). The COVID-19 pandemic has affected people psychologically because of its continuous spread and unpredictable epidemiological control Akat and Karatas (2020). Adolescents appear less vulnerable to COVID-19, but they have been highly exposed to biopsychosocial stressors generated by the pandemic (de Figueiredo et al., 2021). This health emergency caused educational institutions in more than 190 countries to halt face-to-face classes (Neto et al., 2020). In Mexico, according to the Secretaría de Educación Pública [Secretary of Public Education] (SEP, 2020), a total of 5,144,673 adolescents attending high school in the in-person modality had to continue their studies at home, which radically changed their social and family interactions.

Before the pandemic, according to Indicators from the Instituto Nacional para la Evaluación de la Educación en México [National Educative System indicators] (INEE, 2019) in 2018, 5.3% of students between 15 and 17 years of age were in serious academic lag, and 20.3% were in moderate academic lag, defined as achieving below the expected grade relative to the student's age. The effectiveness of remote learning after the pandemic remains unclear; however, preliminary studies on the impacts of skipping

school for a prolonged period of time suggest that it will negatively affect student achievement (Kuhfeld et al., 2020).

School closures owing to the COVID-19 outbreak have been associated with significant lifestyle changes in students and mental health problems in older children and adolescents (Esposito et al., 2021). Adolescents are considered a vulnerable population because of the biological, cognitive, psychosocial, and emotional changes associated with this period, in which peers become central to their lives (WHO, 2014). Moreover, restrictions, such as physical distancing and stay-at-home orders, have limited their peer and social interactions while increasing their proximity to their families (Lorenzo et al., 2021). This situation has been a salient challenge to adolescents concerned about government restrictions, and a longitudinal study identified an association between these issues and reduced life satisfaction, increased anxiety, and depressive symptoms (Magson et al., 2021). A systematic review of the impact of COVID-19 on the mental health of adolescents from different countries revealed that anxiety and depression are the most common clinical problems associated with the outbreak (Jones et al., 2021). Additionally, the authors reported that medium and low levels of social support are associated with a two- to fourfold increase in depression or anxiety. Research has paid less attention to the nonclinical mental health consequences of the COVID-19 outbreak, such as distress in the general population. Distress is a manifestation of symptoms, including worry, poor concentration, irritability, and tension, associated with the effort to maintain psychosocial homeostasis when confronting life-stress circumstances (Terluin et al., 2006). In another study covering May and June 2020, a sample of Italian children and adolescents reported psychological distress (78%) and anxiety symptoms (43.9%), confirming their difficulties in adapting to quarantine measures (Segre et al., 2021). New and challenging circumstances, such as remote learning and more time spent at home could contribute to the development of stress symptoms. For instance, a study reported that the perception of stress is a key factor affecting academic performance (Pascoe et al., 2020).

Corral et al. (2019) reported comorbidity between depression and anxiety and it was measured as a construct called general distress. This means that anxiety and depression are included within a continuum of general distress (Lockett et al., 2010); although depression and anxiety can be distinguished, there is much overlap between symptoms of both disorders and general distress provides a valid index for evaluating their commonalities (Williams et al., 2021). General distress is a construct of psychological distress or negative affect and is a relevant indicator of mental health in the COVID-19 pandemic context, because of the stressors existing in that scenario, including the risk of infection and the reduction of social interactions (van Zoonen & ter Hoeven, 2021).

Academic outcomes are multifactorial, and many variables could influence students' academic achievement. For example, engagement in academic activities is strongly associated with academic success throughout the school trajectory (Pan et al., 2017), and it has been well established as a predictor of achievement for Latino adolescent students (Froiland & Worrell, 2016).

In addition to the benefits of academic engagement on academic achievement, it also predicts less marijuana and alcohol use among adolescents (Froiland et al., 2021). This is

of particular importance during COVID-19 pandemic, given the increase in alcohol and cannabis use in young people (Dumas et al., 2020).

Academic engagement is a meta-construct encompassing diverse related constructs comprising emotional (sense of belonging and feelings toward school), behavioral (observable acts or participation in extracurricular activities), and cognitive components (students' perceptions and beliefs about themselves and others) (Fernández et al., 2016; Li & Lerner, 2013).

Positive family environment, subjective well-being, and academic engagement

A meta-analysis of 69 independent studies revealed a moderately strong and positive correlation between school engagement and academic achievement, and this correlation was maintained even at the level of the behavioral, emotional, and cognitive engagement domains (Lei et al., 2018). Considering that academic engagement is shaped by contextual factors, such as parental involvement (Li et al., 2010), it is unclear how home confinement could influence young people's academic engagement. In a longitudinal study, adolescents who reported positive school engagement were more likely to perceive and report positive family environments over time (Harris et al., 2020) in a way that families that maintained positive relations, even in the context of a pandemic and sanitary restrictions, could promote academic engagement in their children.

In this context, family became the main source of support in academic activities, which is a challenging situation as students face imminent threats to their relationships, rules, and routines because of COVID-19 (Prime et al., 2020). However, not all families have the skills to cope with these changes, and an increased risk of family violence has been reported during the pandemic (WHO, 2020). Meanwhile, because of curfew restrictions, positive individual variables, such as subjective well-being (SWB) seem to decrease in young people (Soest et al., 2020). SWB is associated with academic performance and school engagement among middle school students (Wu et al., 2020). In Mexican adolescents' samples, SWB has been dependent on positive interactions with their parents (Palomar & Victorio, 2014), supporting the theoretical base that SWB is a consequence of positive family environments (Corral et al., 2014).

According to Deci and Ryan (2008), SWB is associated with hedonia and optimal psychological experience and functioning. They stated that "as an operational definition, SWB is most often interpreted as experiencing a high level of positive affect, a low level of negative affect, and a high degree of satisfaction with one's life" (p. 1). SWB is associated with health behavior and academic achievement in children and adolescents, so it is important to understand how SWB develops and which influences are related, using longitudinal samples to provide knowledge about the process (Steinmayr et al., 2019). Although many studies document the relation between SWB and academic achievement, academic engagement is also a relevant outcome given that engaged students are more likely to earn higher grades (Datu & King, 2018). Research suggests that higher levels of SWB, particularly the frequency of positive emotions, are related to better cognitive and psychological engagement in high school students (Reschly et al., 2008).

SWB and academic engagement are linked in this study, based on the broaden-and-build theory that postulates that positive emotions expand cognitive changes when they build long-term psychological, physical, and social resources (Fredrickson, 2001). Specifically, there is evidence to support that students who experience positive emotions are more engaged in school (Heffner & Antaramian, 2016).

A cross-sectional study focusing on SWB among adolescents from Verona, Milan, and Rome during the pandemic reported that one in every two students noticed a significant change in their psychological well-being, and more than one-third reported being anxious about the ongoing situation (Pigaiani et al., 2020). In addition, a regression analysis showed that adolescents who argued more easily with family members were more likely to report a subjective negative change in their psychological well-being.

Oterwise, the quality of relationships among family members could be a protective factor against stressful situations, such as the COVID-19 pandemic; good family functioning has been found to predict less perceived stress in family members (Moscardino et al., 2021). Furthermore, positive family interactions can promote mental health benefits in adolescents; that is, when positive family relationships are reported, SWB scores are higher and vice versa (Navarro et al., 2017).

A positive family is one whose members are actively involved in prosocial and affective transactions with one another as well as working together and coordinating with the physical or social environment to successfully adapt to every member's needs (Corral et al., 2014). Positive environmental theory predicts that well-being results from a positive family environment. Such an environment has also been linked with adolescents' academic engagement as part of a positive environment at school and with peers (Gaxiola et al., 2020). However, it is uncertain how changes in school modality due to the COVID-19 outbreak could affect the relation between positive family environment and academic engagement as reported previously.

Our theoretical bases agree with Froiland (2021) BEAR model (Beliefs, Expectations, Autonomy Support, and Relationships) that predicts that home-based parent involvement (HBI) is strongly related to academic engagement from preschool through high school. HBI includes actions that promote adolescent's academic success, such as, communication about school or create a learning environment at home making educational materials accessible (Hill & Tyson, 2009). For this reason, the Positive Family Environment variable is actually a measure of HBI (help with homework, teach each other, help with activities, teach new things, help each other, and learn each other). In summary, positive family environment variable includes supportive relationships, communication and competences to be successful in school and implies adolescent-parent interactions with positive communication, trust, warmth, empathy, sensitivity, and affection (Corral et al., 2014).

HBI does not always have positive effects on achievement because sometimes parents, due to excessive pressure or strict supervision, can limit students' autonomy (Froiland, 2021; Gan & Bilige, 2019). The other side of involvement, the school-based parent involvement, characterized by parents' participation in school activities regularly does not result in positive academic outcomes (Boonk et al., 2018; Fantuzzo et al., 2004). Lastly, HBI is associated with academic success in middle school across different

ethnic groups, but African-American and European-Americans, reported higher levels of HBI than did Hispanic-Americans or Asian-Americans (James et al., 2019). These findings highlight the importance of developing research in HBI across different ethnic groups or countries around the world, including adolescent Mexican students.

Positive family environment, general distress, and academic engagement

Researchers need indicators of positivity (e.g., SWB) and psychopathological symptom measures to understand an individual's psychological adjustment (Antaramian et al., 2010). In this study, psychopathological symptoms are measured by a general distress factor capturing the aspects of negative affect shared by depression and anxiety (Barry et al., 2019), while academic engagement is considered an adjustment outcome (Basharpoor et al., 2020).

Affective states not only function as independent variables to promote academic outcomes, because they also appear as dependent variables (Fiedler & Beier, 2014). It means that a student with a negative mood may have difficulty focusing on academic tasks and limit their engagement (Pekrun & Linnenbrink, 2012). This can explain why comorbidities of depression and anxiety are correlated with poor academic outcomes as academic engagement (McEwan & Downie, 2019). Secondly, general distress can be affected by other circumstances such as poor family functioning (Burnett et al., 2017).

Family environments have been shown to predict general distress, where perceptions of lower care and higher overprotection are related to greater symptomatology of depression and anxiety (Rekart et al., 2007). On the other side, adolescents' perception of conflicts in family function are related with depressive emotions, while cohesion is associated with positive emotions (Yeh et al., 2016). In the COVID-19 pandemic context, studies show that the family unit explains part of the variance of general distress in college students (Sánchez et al., 2021). In addition, positive family characteristics have a direct effect on school engagement, in line with the model of associations between contexts, engagement, and outcomes, where the family academic and motivational support is a good predictor of emotional, cognitive, and behavioral engagement on students (Basharpoor et al., 2020; Reschly & Christenson, 2012).

The present study

As described earlier, studies have examined the effects of the pandemic on academic performance of adolescents, but are yet to explore academic engagement. Moreover, it is unknown whether a positive family environment can predict SWB, general distress, and academic engagement in a longitudinal sample. In addition, the possible mediation role of SWB and general distress between a positive family environment and academic engagement for Mexican high school students is unclear.

Using structural equation modeling, this study investigates how the COVID-19 pandemic has affected structural relations between positive family environment, general distress, SWB and academic engagement among Mexican adolescents before (T1) and during (T2) the COVID-19 outbreak.

Hypotheses. To determine whether the role of positive family environment increased during the COVID-19 pandemic, the following hypotheses were tested:

- Positive family environment scores will have a stronger relation with academic engagement in Time 2 (T2) than in Time 1 (T1).
- Positive family environment scores will have a stronger relation with general distress in T2 than in T1.
- Positive family environment scores will have a stronger relation with SWB in T2 than in T1.
- General distress and SWB will have a stronger relation with academic engagement in T2 than in T1.

Theoretical model. The following model (Figure 1) contains the structural relations that will be tested in T1 and T2.

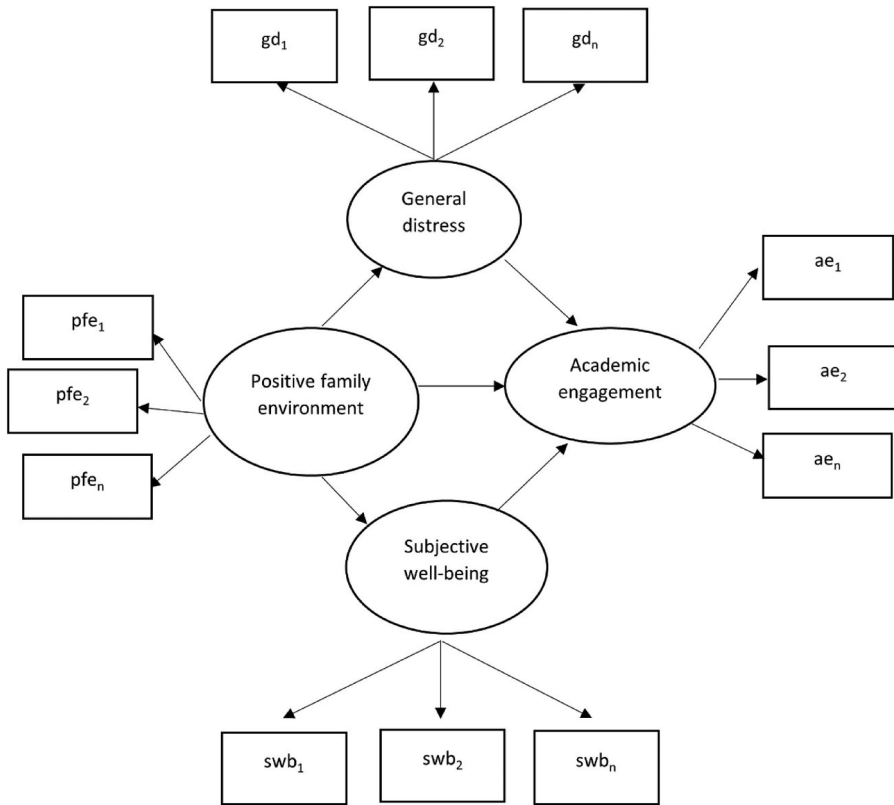


Figure 1. Theoretical model to test the study’s hypotheses. This model will be estimated twice, with responses collected before (T1) and during the COVID-19 pandemic (T2) to compare the structural relations among the factors.

Materials and method

Participants and data collection

The study sample was drawn from a longitudinal study conducted before the COVID-19 outbreak. A total of 502 Mexican students from two high schools answered paper-and-pencil questionnaires while attending school in November 2019. The participants were selected from schools with an average academic achievement according to official data from the Secretaría de Educación Pública [Secretary of Public Education] (SEP, 2017) to avoid possible bias of academic commitment. All students in their first grade of high school were invited to participate. During the curfew, a follow-up was carried out by contacting the same students through the online platform used by school staff and teachers to communicate with them. In November 2020, a total of 111 students answered the questionnaires again through an online survey platform. Table 1 shows participants characteristics.

Procedure

Since its inception, the research has obtained bioethical authorization from the university of of Sonora, approval number CEI-UNISON 11/2019. Parents of selected students signed informed consent forms because the participants were minors at the time of the research. After obtaining permission from their parents, the participants also signed an assent to participate voluntarily in the study. Trained undergraduate students developed the data collection system.

Measures

Positive family environment. A 19-item scale was used to measure different aspects of family interactions, including economic, communicative, affective, and learning interactions (e.g., “We learn new things as a family”). The response options ranged from 0

Table 1. Participant characteristics.

	n	Mean	S.D.	Min	Max	%
Age in T1	477	15.778	.547	15	18	—
Age in T2	111	16.800	.519	15	18	—
GPA in T1	440	85.368	7.933	63	100	—
GPA in T2	111	87.71	8.877	60	100	—
Females in T1	256	—	—	—	—	53.8%
Males in T1	220	—	—	—	—	46.2%
Females in T2	73	—	—	—	—	65.8%
Males in T2	38	—	—	—	—	34.2%

GPA is presented in percentage scale.

(never) to 4 (always). The authors' reported Cronbach's alpha (α) was 0.93 (Aranda et al., 2015) whereas the study's α values were 0.91 in T1 and 0.93 in T2.

Academic engagement. The Spanish version of the behavioral, emotional, and cognitive academic engagement scale (Chen, 2005) was used (Gaxiola et al., 2019). It comprises 15 items distributed across three dimensions addressing the academic engagement construct. The behavioral school engagement section has four response options ranging from 0 (never) to 4 (always) (e.g., "How often do you work hard to do well in school?"). Meanwhile, for the emotional and cognitive school engagement section, the response options range from 0 (strongly disagree) to 4 (strongly agree) (e.g., emotional: "I feel as part of my school," cognitive: "I want to learn as much as I can at school"). The Cronbach's α values reported by the authors were 0.82 for emotional engagement, 0.67 for behavioral engagement, and 0.90 for cognitive engagement. In this study, the scale had α values of 0.61 for emotional engagement, 0.55 for behavioral engagement, 0.64 for cognitive engagement, and 0.73 for the complete scale in T1. The scale had an α of 0.60 for emotional engagement, 0.42 for behavioral engagement, 0.72 for cognitive engagement, and 0.72 for the complete scale in T2.

General distress and SWB. This study employed two scales of the Spanish version of the mood and anxiety symptoms questionnaire (Corral et al., 2019), with 10 items measuring general distress ($\alpha = 0.89$; e.g., "felt confused") and 10 items evaluating SWB ($\alpha = 0.83$; e.g., "felt really happy"). For general distress, the authors reported a Cronbach's α of 0.93 whereas the study's α values were 0.78 in T1 and 0.84 in T2. For SWB, the authors' Cronbach's α values ranged from 0.69 to 0.85 whereas the study's α values were 0.82 in T1 and 0.87 in T2.

The list of questions included in the final analyses can be found in Table 2.

Data analyses

Analyses were conducted in Mplus (Muthén & Muthén, 2017) using maximum likelihood estimation with robust standard errors (Yuan & Bentler, 2000), and missing data were reconciled with the Full-Information Maximum Likelihood (FIML) method, which outperforms many other popular techniques (Enders, 2001). Missing data using FIML is considered to yield the most unbiased estimates compared with multiple imputation (Li, 2010) and listwise deletion (Enders, 2001). The Monte Carlo simulations corroborate that the observed attrition in T2 would still result in unbiased parameter estimates when using the FIML method. Similarly, the questionnaires were shortened in order to achieve measurement invariance. Results determined that changes in responses across times would not be due to changes in the measurement properties of the scales, which enables the comparison of the responses captured in different settings. The resulting scales maintained excellent psychometric properties across both measurement times, however this was done at

Table 2. List of questions retained for the final analysis.

Construct	Factor loading	T1		T2	
		Mean	S.D.	Mean	S.D.
<i>Positive family environment</i>					
We help each other when doing school work.	0.692	2.218	1.275	2.243	1.239
We teach new things amongst ourselves.	0.808	2.802	1.108	2.486	1.106
We will help any family member that is busy with an activity.	0.811	2.817	1.103	2.673	1.096
When someone learns something new, he or she will teach other members of the family.	0.801	2.456	1.207	2.324	1.194
We learn new things together as a family.	0.849	2.655	1.142	2.455	1.125
We learn from each other.	0.852	2.628	1.155	2.482	1.142
Observed score	—	2.594	0.972	2.441	0.984
Factor score	—	0.000	1.000	-0.120	1.000
<i>General distress</i>					
Felt confused	0.646	1.973	1.310	2.000	1.356
Felt irritable	0.673	1.428	1.334	1.631	1.382
Worried a lot about things	0.748	2.042	1.417	2.009	1.449
Observed score	—	1.813	1.178	1.880	1.339
Factor score	—	0.000	1.000	0.026	1.000
<i>Subjective well-being</i>					
I felt really happy	0.925	2.752	1.240	2.631	1.244
Felt like I had fun.	0.823	2.648	1.335	2.505	1.237
Felt like I had a future	0.601	2.510	1.381	2.685	1.230
Felt like I had a lot of energy	0.555	2.160	1.323	2.054	1.307
Observed score	—	2.518	1.018	2.468	1.037
Factor score	—	0.000	1.000	-0.098	1.000

(continued)

Table 2. Continued

Construct	Factor loading	T1		T2	
		Mean	S.D.	Mean	S.D.
<i>Academic engagement</i>					
Teachers will make me engaged during class discussions.	0.646	3.289	0.636	3.360	0.627
I find school work to be academically challenging	0.661	3.173	0.691	3.081	0.572
I have opportunities to be creative in my school work and school projects.	0.455	2.871	0.749	2.901	0.782
I often talk with my teacher about school work.	0.491	2.008	0.798	1.955	0.864
I receive valuable feedback from teachers about my home work and school work.	0.485	2.105	0.731	2.099	0.747
I put a high value on education	0.674	3.234	0.557	3.306	0.567
I put effort in my school work and school projects.	0.677	3.271	0.642	3.477	0.628
Schoolwork generates in me curiosity and a desire to learn new things.	0.582	3.112	0.650	3.108	0.702
Observed score	—	2.792	0.406	2.813	0.427
Factor score	—	0.000	1.000	0.145	1.000

the cost of removing several items from the original scales. This likely resulted in a narrower depiction of constructs such as general distress.

To measure the models' goodness of fit a chi-square (χ^2) test with a nonsignificant p value suggests good fit; however, since this test might reject otherwise good-fitting models in large sample sizes, a relative χ^2 test of $\chi^2/df \leq 3$ was used instead to evaluate fit. Additional criteria for fit evaluation were root mean square error of approximation (RMSEA) ≤ 0.06 , root mean square residual (SRMR) ≤ 0.09 , comparative fit index (CFI) ≥ 0.95 , and the Tucker Lewis Index (TLI) ≥ 0.95 .

To model the longitudinal nature of the variables, this study employed measurement invariance. In longitudinal studies, a key question is whether temporal changes are due to changes in an attribute's levels over time or changes in its structure or measurement. Measurement invariance is a prerequisite to determine whether an instrument measures the same construct with equal structural validity across time points (Esnaola et al., 2019). Therefore, it has been used to ensure that data collected through different means can be meaningfully compared and adequately interpreted. While measurement invariance has been used to validate the comparison of responses obtained through paper-and-pen methods and online surveys, results depend on the specific attribute/trait and measure, and invariance might be difficult to achieve (Zhang et al., 2017). The importance of this analytical strategy is highlighted by the increase in online surveys following the outbreak of COVID-19 (de Boni, 2020).

With regard to the measurement model, configural invariance requires employing the same structure, such as number of factors and pattern of item loadings, with loadings, intercepts, and residual variances estimated freely across groups/times. Metric invariance requires factor loadings to be constrained to be equal across groups/times. The same applies to scalar invariance and intercepts. Finally, strict invariance requires residual variances to be constrained as well (Rudnev et al., 2018). Each step of invariance is assessed by checking whether the model fit decreases with each set of new constraints. Recommendations for samples larger than 300 require a change of ≤ -0.010 in CFI, supplemented by a change of ≥ 0.015 in RMSEA or ≥ 0.030 in SRMR, which would indicate noninvariance (Chen, 2007).

Results

As a first step, confirmatory factor analysis was conducted to ensure adequate measurement properties and invariance. Table 3 presents the results of the measurement model.

Figure 2 shows the final results where data from all 502 participants was used. For this analysis, the model was estimated using data from both time points simultaneously. This was performed to let the analysis retain the measurement invariance constraints across all constructs as with the measurement invariance tests. While the comparison of standardized slopes across T1 and T2 only requires metric invariance (Rudnev et al., 2018), the model was estimated with strict invariance to minimize the number of free parameters. Additionally, although the equality constraints on the intercepts were maintained, strict invariance for all measures was lost, and the model was estimated with inequality of

Table 3. Measurement invariance tests.

	CFI		RMSEA		Scaling factor		χ^2		Satorra-Bendler		df	p			
	HI	H0	HI	H0	HI	H0	HI	H0	HI	H0			Scaled χ^2		
Positive Family Environment	0.986	0.988	0.002	0.034	0.030	-0.004	1.1784	1.1409	47	52	62.933	66.264	1.8269	5	0.873
vs															
metric vs scalar	0.988	0.990	0.002	0.030	0.026	-0.004	1.1409	1.1227	52	58	66.264	69.791	2.8537	6	0.827
scalar vs strict	0.990	0.985	-0.005	0.026	0.030	0.004	1.1227	1.1382	58	64	69.791	80.849	10.6115	6	0.101
Subjective well-being															
configural metric	0.970	0.966	-0.004	0.047	0.047	0.000	1.1207	1.0770	29	33	47.616	54.462	6.9620	4	0.138
vs															
metric vs scalar	0.966	0.960	-0.006	0.047	0.047	0.000	1.0770	1.0566	33	38	54.462	62.856	8.4148	5	0.135
scalar vs strict*	0.960	0.963	0.003	0.047	0.044	-0.003	1.0566	1.0759	38	41	62.856	64.415	2.1891	3	0.534
General Distress															
configural metric	0.977	0.982	0.005	0.041	0.034	-0.007	1.1763	1.1602	15	18	22.495	24.041	1.3258	3	0.723
vs															
metric vs scalar	0.982	0.981	-0.001	0.034	0.031	-0.003	1.1602	1.1253	18	22	24.041	28.306	4.0902	4	0.394
scalar vs strict	0.981	0.987	0.006	0.031	0.024	-0.007	1.1253	1.1339	22	25	28.306	29.260	1.1071	3	0.775
Academic Engagement															
configural metric	0.957	0.956	-0.001	0.022	0.022	0.000	1.0282	1.0419	153	163	175.719	186.639	11.0146	10	0.356
vs															
metric vs scalar	0.956	0.954	-0.002	0.022	0.022	0.000	1.0419	1.0386	163	172	186.639	196.424	9.7532	9	0.371
scalar vs strict	0.954	0.949	-0.005	0.022	0.022	0.000	1.0386	1.0457	172	184	196.424	211.117	14.6053	12	0.264

*Strict invariance was achieved partially.

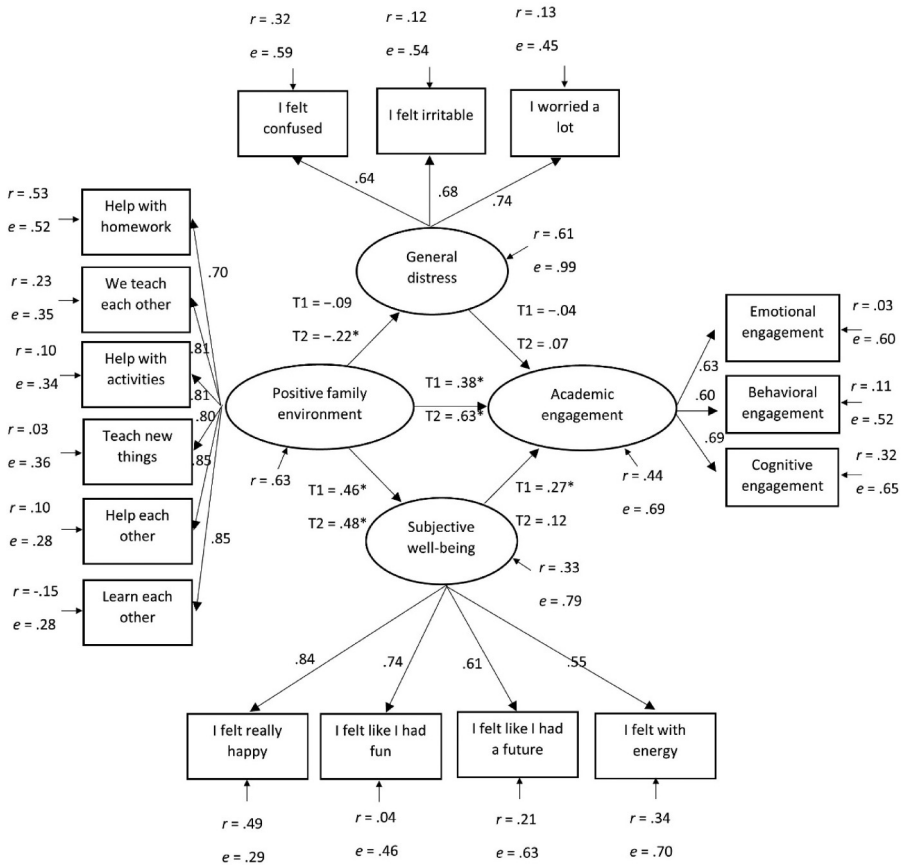


Figure 2. Model fit: $\chi^2 = 642.979$, $df = 474$, $\chi^2/df = 1.36$, RMSEA = 0.27 (90% CI [0.021, 0.032]), CFI = 0.956, TLI = 0.954, SRMR = 0.073.

Note: Responses from all the 502 participants were included in the analyses. All variables were measured in T1 and T2, and the hypothetical model in Figure 1 is estimated for T1 and T2 simultaneously with strict measurement invariance constraints. Model estimates are presented in standardized solution, with factor loadings and residual variances taken from T1. Statistically significant associations between factors are marked with asterisks (*). In the residual arrows, *e* denotes residual variance whereas *r* denotes the correlation or residual correlation of a variable in T1 and T2.

the item error terms. However, this is not an issue, given that residuals are not part of the factor.

Results suggest that a positive family environment leads to a stronger relation with academic engagement than either general distress or SWB. General distress was not significantly associated with academic engagement in T1 ($\beta = 0.04$, $p = 0.578$) or T2 ($\beta = 0.07$, $p = 0.534$). Before the pandemic, positive family environment had no significant association with general distress ($\beta = -0.09$, $p = 0.117$), but during the pandemic, a

weak and negative association was observed ($\beta = -0.22, p = 0.036$). Meanwhile, the moderate, positive, and significant association between positive family environment and SWB did not change much from T1 to T2 ($\beta = 0.46, p < 0.001$, and $\beta = 0.48, p < 0.001$, respectively). However, the strength of association between SWB and academic engagement decreased and became nonsignificant ($\beta = 0.27, p < 0.001$ in T1 and $\beta = 0.12, p < 0.001$ in T2) whereas the relation between positive family environment and academic engagement became stronger ($\beta = 0.38, p < 0.001$ in T1 and $\beta = 0.64, p < 0.001$ in T2). Accordingly, academic engagement became less dependent on students' affective state and more intertwined with family interactions.

With regard to the within-variable correlations across time, all correlations were statistically significant, and the effect sizes ranged from small to moderate. The weakest association was the residual correlation between SWB in T1 and T2 ($r = 0.33, p = 0.015$) whereas the strongest association was that of the correlation between positive family environment in T1 and T2 ($r = 0.63, p < 0.001$). This suggests that the variables were inclined to remain moderately consistent across time.

Finally, a Monte Carlo simulation was conducted. The statistical criteria determine that a specified model can be adequately estimated with a given sample size and amount of missing data having a statistical power above 80% (Muthén & Muthén, 2009). Also, are taken into account bias in the estimation of parameters and standard errors within $\pm 10\%$, and bias in the estimation of standard errors of key parameters within $\pm 5\%$ with coverage of true values by 95% confidence intervals of 91% to 98%. The model results were used as input values, the sample size was set at 502, all T2 variables were specified to have 78% of their values missing to replicate the retention rate of the study, and the number of replications was set to 10,000. Results indicated that the aforementioned criteria were almost always met except for the low statistical power for the nonsignificant structural relationships between positive family environment and general distress in T1, general distress and academic engagement in T1 and T2, and SWB and academic engagement in T2 (Table 3). In other words, one may expect both the measurement and structural aspects of the final model to contain accurate parameter estimates, but statistical power was insufficient to rule out a Type II error on the nonsignificance of the slope parameters. However, one must consider this finding in conjunction with the effect sizes of these parameters, which ranged from -0.09 to 0.12 . Compared with the other effect sizes found in the study, one might argue that the strength of association was negligible, and even with a significant p value and adequate statistical power, the practical or theoretical relevance of these relations would have been relatively less (Bakker et al., 2019).

Discussion

This research aimed to test the structural relations between positive family environment, SWB, general distress, and academic engagement among Mexican high school students before and during the COVID-19 outbreak. The results showed a direct relation between positive family environment and academic engagement, with a stronger association during the COVID-19 outbreak than before it. Dvorsky et al. (2021) argued that families

are adapting to 24/7 interactions during the COVID-19 outbreak, which represents a challenge for caregivers, daughters, and sons. In such a scenario, family interactions are expected to be more relevant in school responses, such as in an adolescent's academic engagement.

Our findings add empirical evidence to BEAR model (Froiland, 2021), because they show a positive relation between positive family environment and academic engagement in T1 and a stronger relation in T2. In addition, the relation found between positive family environment and subjective well-being supports both the BEAR model and the positive environmental theory, which suggest that subjective well-being is a result of positive family environments (Corral et al., 2014; Froiland, 2021).

Even pre-pandemic, HBI has been shown to predict all sorts of positive academic outcomes, including engagement and achievement (Froiland, 2021). HBI, as a characteristic of positive family environment, is related to successful academic competences in high school students (Gaxiola et al., 2020), further in this research showed its effects increasing student's academic engagement.

The results are in concordance with the effects of HBI on different meanings and motivations across ethnicity (Day & Dotterer, 2018). Our resulting model shows that Mexican students can improve their academic engagement due to the increase of positive family environment. This finding adds greatly to this literature indicating that positive home-based parent involvement may be an even better promoter of engagement during a pandemic and during online learning, because much of the learning process was online and completed at home (Lawrence & Fakuade, 2021).

Another important finding was that helping with homework is an effective parenting strategy for Mexican students, whereas for U.S. or Canadian students, although is an action valuable with younger children, can predict lower scholar achievement in adolescents (Froiland et al., 2013; Hill & Tyson, 2009; Patall et al., 2008). In conclusion, HBI variable measured by positive family environment promotes academic engagement during COVID-19 outbreak while practicing online learning, at least in adolescent Mexican students, who can be academically supported by their families.

In T1, a direct and positive relation was observed between positive family environment and academic engagement. These results are consistent with studies that found that a positive family is a supportive one (Gaxiola et al., 2020). Furthermore, in T1, statistically significant relations were not found between positive family environment and general distress and between general distress and academic engagement. This suggests that student-reported distress levels before the COVID-19 pandemic were not contingent on the family environment. Previous research has indicated that an individual's interactions with their family are linked with their interactions with friends, which predict psychological adjustment among the youth (Mak et al., 2018). Therefore, it is necessary to evaluate the role of friends or perceived friendships on pandemic-associated distress.

As predicted, we found a direct and moderate relation between positive family environment and SWB (Corral et al., 2014; Navarro et al., 2017), as positive family interactions can develop one's perception of security based on family support that is both received and given. In addition, in T1, a positive but weak association between SWB and academic engagement was observed because academic engagement is expected to

require some degree of student SWB for students to successfully adapt to scholarly activities and demands (Wu et al., 2020).

The results for T2 in the model differed with those for T1 because of the significant lifestyle changes that have taken place owing to the COVID-19 outbreak. The model demonstrated a negative relation between positive family environment and distress, which was not found in T1. In other words, the absence of a positive family environment may increase students' general distress. According to Magson et al. (2021), the restrictive conditions associated with lockdowns increase distress levels in adolescents. Therefore, we propose that a lesser extent of positive family interactions might play a role in such an effect.

The model showed almost the same strength of association between positive family environment and SWB in T1 and T2; however, the relation found in T1 between SWB and academic engagement disappeared in T2. This might be attributed to the heightened dependence of academic engagement on the positive family environment, but future studies must investigate this further. This could be because SWB decreased during the COVID-19 outbreak (Pigaiani et al., 2020), and the effects of positive family environment remained similar in the sample.

We are yet to know all the negative consequences of the COVID-19 pandemic on the academic engagement of high school students. However, our data showed that a positive family environment can play an important role in promoting adolescent students' academic engagement despite the risks brought about by sanitary lockdowns and the increase in family interactions. Contrarily, in the context of the COVID-19 outbreak, family violence has reported an important increase worldwide (WHO, 2020). For this reason, countries should implement programs to improve positive family interactions that could protect against distress and its academic consequences on high school students, such as offering family teletherapy treatments, if possible, with some ethical and privacy considerations (Lebow, 2020).

The limitations of this study include its sample size; even if the sample were enough to adequately estimate the model, the results would likely have benefited from a nationally representative or cross-cultural sample. Moreover, several scales showed low reliability that is odd, given they showed adequate model fit. A plausible explanation for reliability being low while model fit being excellent is that the final questionnaires were simply too short (Stanley & Edwards, 2016). Given that measurement invariance was considered to be a substantive test of validity given the study's longitudinal methods, scale respecification could not attend the low reliability issue. Additionally, given that the study began before the COVID-19 outbreak and was not intended to be conducted with curfew restrictions, the questionnaires did not measure additional changes in aspects of family interactions, which might have enhanced the interpretation of the current findings. Lastly, many participant-related factors could have influenced the change in the structural relations in the model, such as the psychological impact of taking online classes. Beyond its limitations, this study strengthens people's knowledge of how the COVID-19 pandemic affects academic engagement and helps them understand the importance of family interactions in supporting young people during this crisis (O'Reilly et al., 2021).

Ethics statement

The authors state that they followed all ethical principles for human research, including privacy, informed consent, and voluntary participation in the research. The Bio-ethics Committee of the University of Sonora approved the research that is described in this paper. Approval number CEI-UNISON 11/2019.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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