Psychological responses associated with stress during pandemic by COVID-19 in Colombian

and Mexican adolescents

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Abstract

The COVID-19 pandemic has not only resulted in high morbidity and mortality rates across the globe but has caused significant changes to the ways in which people live their lives and their perceptions of pandemic conditions. The aim of this study was to examine the association between stress indicators with psychological responses related to individual, family and school factors (e.g., school pressure, family dynamics, relaxation and leisure, changes in routine, preventive behaviours) in Colombian and Mexican adolescents during confinement due to COVID-19. We administered a COVID-19 youth perception survey and an informed consent on-line, with the help of teachers, school counsellors, and school social workers, to 464 adolescents aged 13 to 24 years from secondary-schools, high- schools and higher-education institutions of Colombia and Mexico. MANOVAs revealed perceptions and psychological responses were similar in Colombian and Mexican adolescents, although there were some differences overall by gender. Stress indicators were positively associated with fear and worries, school pressures, family dynamics, and changes in routine. A hierarchical multiple regression analyses showed that changes in routine, fears and worries, family dynamics, and school pressures were predictors of stress indicators that together explained 47% of the total variance in Colombian adolescents and 43% of the variance in Mexican adolescents. Findings show that personal, family and school factors, combined, can increase stress responses in both samples despite potential contextual differences. These results could be used to planning preventive and selective interventions during and after the pandemic to promote resilience in youth.

Keywords: COVID-19, adolescents, stress, confinement, predictive model

Introduction

In December of 2019, in Wuhan, China, an infectious acute respiratory disease called SARS-COV-19 (COVID-19) was detected, caused by a new type of coronavirus (Wang et al., 2020). Due to sudden outbreak, its high infection and contagion rates, and its simultaneous dissemination across the globe, the World Health Organization (WHO, 2020) declared it a pandemic health emergency and suggested a series of prevention and control measures which created life-altering, critical scenarios (The Lancet, 2020). These cautionary measures are mainly concerned with self-care and care for others by avoiding unsanitary risks, specially through social distancing; this meant that schools were one of the first public places to close. These youth and children were forced into lockdown or confinement, which strongly contrasts with the high level of energy and peer interaction experienced at school, in the neighborhood, and during extracurricular activities, such as sports, which are a feature of adolescence and a protective factor for mental health (Lee, 2020; Stage et al., 2020).

Pandemics are highly adverse natural events that affect individuals, families, and communities because they disturb the physical and mental health of a large part of the population (Chen & Bonanno, 2020). Exposure to these types of events is frequently associated with negative consequences for people's emotional health and well-being including feelings of anxiety and depression; drug abuse; post-traumatic stress syndrome; and other stress reactions in people (Golberstein et al., 2020). According to the transactional stress theory of Lazarus and Folkman (1984), stress involves both the situation or source of stress and its response, mediated by the subjective assessment that the individual makes of the situation. Stress arises when an individual perceives a situation as threatening. In

adolescence, stress involve a wide variability of psychophysiological responses such as anxiety, depression, or anger depending on the appraisal of the situation and the interplay of internal and external factors (Compas & Wagner, 2017; Larson & Asmussen, 2017).

Adolescence is a transitional period of cycle life typically referred to as the years between 10 and 19 years (WHO, 2021); however, its duration has been extended due to several contextual (e.g., social, economic, and cultural) factors. Therefore, the terms adolescence and youth, sometimes have been used interchangeably for adolescents and youth aged 10 to 24, who are characterised by high levels of energy, impulsivity, relative independence from the family, and high socialisation with peers (Hornberger, 2006; Lerner, 2018), but also with vulnerability (Pan American Health Organization [PAHO], 2021). Youth in adverse situations (e.g., earthquakes, hurricanes) like the current pandemic can display high levels of stress and symptoms associated with depressive symptoms, anxiety, and indicators of post-traumatic stress, with the younger ones being more vulnerable (Dyregrov et al., 2018; Jacobs & Harville, 2015). From a perspective of resilience and with a combination of risk-protective factors, adolescents can adapt positively to adverse contexts when they perceived family support is present and they use functional coping strategies (Chen & Bonanno, 2020; Rogowska et al., 2020). An adverse and critical event such as the current pandemic is unprecedented in the last 100 years at least and it is expected that adolescents might experience some adverse health effects (Golberstein et al., 2020; Imran et al., 2020). It is important therefore to explore these possible effects in different populations and contexts.

The first findings on the consequences of the pandemic on the physical and mental health of adolescents come from research in China (Zhong, 2020: Zhou, Zhang, et al., 2020) and European countries (Buzzi, 2000; Ramazzi et al., 2020; Stage et al., 2020) which reported a wide

variability of responses. Xie et al. (2020) observed that in Wuhan and Huangshi around half of students in social isolation showed high levels of depressive and anxiety symptoms versus a low optimistic attitude about COVID-19, as a risk-protective factor. Liu et al. (2020) evaluated adolescents' psychological status and its association with the level of concern and fear for COVID-19 and preventive behaviours. They found a relationship between fear and concern about being infected with generalized anxiety, phobias, depression, and other psychological changes; however, they also noticed that more than 95% of adolescents were implementing preventive behaviours such as hand washing, use of masks, and maintaining social distance. Other studies have also observed panic, anger, and fear (Lei et al. 2020) as well as fears and preoccupation (Saurabh & Ranjan, 2020). Sleep disturbances were reported due to changes in habits and social isolation (Zhou, Wang et al., 2020). In contrast, studies in Argentina and Italy (Bazán et al., 2020; Buzzi et al., 2000) noticed positive attitudes towards quarantine and preventive behaviours, maintaining a relatively "healthy" behaviours and a general good mental health, better than expected. Another study in Hubei (Zhong et al., 2020) evaluating knowledge and attitudes towards COVID-19 in the general population aged 16 years and older, identified positive attitudes and high levels of knowledge among the group of 16 to 29 year, concluding that age may be a predictor of adherence to sanitary measures as well the mental health.

Following the recommendations of the WHO (2020) and given the rapid spread of COVID-19 in Colombia and Mexico, in mid-March, the students were confined to their homes with their families (Secretaria de Salud, 2020; Secretaria de Salud Distrital de Bogotá, 2020). This confinement was an abrupt change to their lifestyles and challenged their ability to adapt to a novel situation. Research to understand attitudes, perceptions, and psychological responses during social isolation is needed due to the clinical implications for the implementation of evidence-based intervention programs during and after the

pandemic, as well as preparing people to return to activities within a framework called "new normality". Mental health actions are required to maintain and improve physical and mental health in youth (Midtbust et al., 2018), from an individual, family and community level (Oosterhoff et al., 2020; Remuzzi, & Giuseppe, 2020).

In summary, there many studies from China and European countries, but scant research in Latin America particularly that aimed at adolescents (e.g., Bazán et al., 2020). Therefore, the aim of this study was to examine the association between stress indicators and psychological responses of Colombian and Mexican adolescents during confinement due to COVID-19 in relation to school pressure, family dynamics, fears and worries, relaxation and leisure, changes of routine, virtual socialization, and preventive behaviours. The specific aims were to compare the perceptions and psychological responses of Colombian and Mexican adolescents during social isolation, according to gender and age; analyse the relationship between psychological responses and stress indicators in Colombian and Mexican adolescents; and test predictive models of stress in each sample, based on the perceptions and psychological responses in different factors assessed by the COVID-19 Youth Perception Survey (COVID-19 YPS).

METHOD

Design

An exploratory, cross-sectional, comparative research was carried out with two independent samples and a 2x2x3 design (Kerlinger & Lee, 2001) with three variables tested: country (Colombia-Mexico), gender (male-female), age group (13 - 16 years, 17 - 20 years, and 21 - 24 years).

Participants

    Inclusion criteria: being student aged 13 to 24 years old; residing in the metropolitan areas of Bogota City or Mexico City, who provided informed consent to participate in the study.

    A non-probabilistic convenience sample of 464 adolescents aged 13 to 24 years (M_{age} = 18.88; SD = 2.8), from Colombia (n = 203; M_{age} = 19.62 years; SD = 2.08) and Mexico (n = 261; M_{age} = 18.30 years; SD = 3.24) was collected. All participants were secondary school, high school, and higher education students recruited from educational institutions of City of Bogotá, Colombia and Mexico City, Mexico.

Instruments

    The COVID-19 Youth Perception Survey - Short Version (COVID-19 YPS: Barcelata & Rodríguez, in press), explores contextual variables related to the pandemic and the perception and responses of adolescents and youngsters aged 13 to 24 during the COVID-19 pandemic. It has three sections: one consists of 12 items related to sociodemographic data such as gender, age, marital status, educational level, place of residence, features of the household, and family income; a second section consists of 14 dichotomous (Yes / No) items that explore contextual variables related to conditions during the pandemic such as contagion, illness and / or death of a relative from COVID-19 (e.g. *One of my parents (mother / father) is infected and sick; We have enough money to deal with COVID-19* in *case someone gets sick*); and the third part consists of 37 item (rated on a 5-point Likert scale from 1 = *never* to 5 = *always*), which explore perceptions and psychological responses during COVID-19-related to confinement. This sections has eight factors: 1. Fear and worries, which explores fear of getting infected or getting sick, or someone of family member got sick (e.g., *I am afraid to go outside*); 2. Stress indicators, identifies

psychological responses (e.g., emotional, cognitive, behavioural) such as anxiety, sadness, anger (e.g., *I feel angry or moody about being locked in*); 3. School pressures, assesses feelings of being overwhelm due to school demands during   to (e.g., *I have difficulties doing my schoolwork*); 4. Preventive behaviours, which identifies the monitoring of self-care sanitary measures on a personal level when going outside, such as the use of face masks, amongst others (e.g., *I change my footwear upon returning from being outside*); 5. Changes in routine, identifies changes of daily routines or habits, as, sleep, eating and routine changes and disturbances (e.g., *I have had difficulty falling asleep at night*); 6. Family dynamics, explores the family dynamic, such as communication, discussions with parents, siblings (e.g., *I think my direct and indirect family is more united lately*); 7. Relaxation and leisure, explores the forms of distraction and relaxation that young people use during confinement (e.g., *I try to relax by watching funny movies or programs on television*); and 8. Virtual socialisation, which explores the means, ways and people with whom adolescents communicate using digital media (e.g., *I have chatted with my friends on Skype, WhatsApp video call, Zoom, etc*.). Internal reliability across these factors is reasonable ($\alpha = .678$).

Procedure

The authors made contact with secondary schools, high schools and higher education teachers, as well as school counsellors and school social workers, using the snowball recruiting method, seeking their permission and collaboration to access students in their institutions. Eight schools in Mexico and six schools in Colombia agreed to participate. Students were then recruited by e-mail and WhatsApp by their teachers, school counsellors, and school social workers who sent them an invitation to the study and a link to the website.

The front page of survey included data on the researchers, institutions, and sponsor involved in the research, as well as the purpose and significance of the survey. According to ethical recommendations (American Psychological Association, 2010) before answering the questions on the survey, participants were asked to provide informed consent for their participation.

Participation was voluntary and anonymous, and no identification data were requested. An e-mail addresses for relevant support services in each country was provided at the beginning and end of the online survey. So, adolescents could receive support and information about mental health care institutions. The COVID-19 YPS was accessible online (Google Forms®) to young students who were invited to answer the survey via e-mail and WhatsApp by the collaboration of secondary school, high school and higher education teachers and using the snowball recruiting method. The survey data in this study were collected between May 15th to Jun 31st of 2020. For this study, data from the third part of COVID-19 YPS were only analysed.

Data analyses

SPSS 25 (IBM, 2017) was used to conduct frequency analyses and measures of central tendency for sociodemographic variables, and the psychological responses that explore on COVID-19 YPS. A test for normality using Kolmogorov-Smirnov method (*D*) was conducted. A 2x2x3 MANOVA was carried out to evaluate possible statistically significant differences between the adolescents' perceptions and psychological responses evaluating the eight factors of COVID-19 YPS, testing main effect by country (Colombia-Mexico), by gender (male-female), and by age (age group), the latter considering the possible variations among the groups, given the wide age range of the participants (13 to 16 years; 17 to 20 years; 21 to 24 years) and to determinate interaction effects between country, gender, and age group, a Tukey post hoc from

ANOVA analysis was also carried out. Pearson's Product Moment analyses were conducted to explore the relationship among all factors of COVID-19 YPS, followed by hierarchical regression analysis, with fear and worries, family dynamics, school pressures, and changes in routine as predictors of stress indicators.

RESULTS

General description of the participants

The sample of 464 participants consisted of 70% females (Colombia = 63.5% and Mexico = 75.1%) and 30% males (Colombia = 36.5.5%; Mexico = 24.9%). By age, the sample was distributed by age groups: 13-16 years (Colombia = 3.9%; Mexico = 36%), 17 to 20 years (Colombia = 69%; Mexico = 33.7%), and 20-24 years (Colombia = 27.1%; Mexico 30.3%).

Approximately half (51.2%) of the Colombian sample and Mexican sample (54.1%) were studying or had completed their secondary school and high school and 42.9% of Colombians and 35.9% of Mexicans were studying high education or had finishing college education. Around 44.8% of the Colombian adolescents and 47.5% of the Mexican participants lived with their parents and siblings. About a quarter of both Colombians (27.6%) and Mexicans (22.9%) came from single-parent households, and 3% of Colombian participants and 15.3% of Mexicans were living with their extended families (relatives other than parents and siblings). Finally, 55.7% of the Colombians and 59.4% of the Mexicans reported being Catholic, 5.9% of the Colombians and 8.8% of the Mexicans said they were Christians or Protestants, and 32% of the Colombians and 27.2% of the Mexicans reported no religious association.

Comparative results by country, gender, and age group

A comparison of the perceptions and psychological responses between Colombian and Mexican adolescents are presented in Table 1. Significant differences were found between Colombia and Mexico on most of factors of COVID-19 YPS.

Table 1.

Means differences by factors of COVID-19 YPS between Colombia and Mexico

Factor	Country	N	M	SD	t (462)	d Cohen
Fear and worries	México	261	3.31	0.85	2.68**	0.26
	Colombia	203	3.09	0.87		
Stress indicators	México	261	3.39	0.82	0.92	0.08
	Colombia	203	3.32	0.81		
Preventive behaviours	México	261	2.83	1.19	11.45**	1.08
	Colombia	203	3.99	0.93		
School pressures	México	261	3.38	0.89	2.66**	0.26
	Colombia	203	3.15	0.91		
Family dynamics	México	261	2.14	1.07	0.24	0.03
	Colombia	203	2.11	0.99		
Changes in routine	México	261	4.06	0.87	4.84**	0.45
	Colombia	203	3.64	0.99		
Relaxation and leisure	México	261	3.52	0.78	0.41	0.03
	Colombia	203	3.50	0.71		
Virtual socialisation	México	261	3.36	0.92	2.98**	0.28
	Colombia	203	3.60	0.82		

*N = 464, * p< .05; ** p< .0.5*

The Mexican group scored significantly higher on Fear and worries, and on Changes in routine, but significantly lower than the Colombian group on Preventive behaviours and Virtual socialisation.

Table 2 presents the results for the eight domains or factors by gender by country. In samples from countries, females scored significantly higher than males on Fears and worries, Stress indicators, School pressures, and Changes in routine. In the Colombian sample females also scored higher than males on Virtual socialisation. There were no gender differences on the other domains.

Table 2.

Means differences by factors of COVID-19 YPS between males and females

Factor	Country	Sex				t	d Cohen
		Male **n=139**		**Female** **n=325**		(259)	
		M	**SD**	**M**	**SD**		
Fear and worries	México	2.80	0.87	3.48	0.82	5.85***	0.80
	Colombia	2.59	0.76	3.38	0.79	6.90***	1.02
Stress indicators	México	3.06	0.70	3.50	0.82	3.84***	0.58
	Colombia	3.03	0.79	3.48	0.78	3.91***	0.58
Preventive behaviours	México	2.79	1.09	2.84	1.22	0.34	0.04
	Colombia	3.84	0.99	4.08	0.88	1.77	0.24
School pressures	México	3.10	0.94	3.47	0.85	2.94**	0.25
	Colombia	2.94	0.89	3.27	0.90	2.55*	0.37
Family dynamics	México	1.95	0.90	2.20	1.12	1.60	0.25
	Colombia	2.02	0.91	2.16	1.02	1.01	0.14
Changes in routine	México	3.83	0.80	4.14	0.88	2.51*	0.37
	Colombia	3.44	1,03	3.79	0.95	2.27*	3.44
Relaxation and leisure	México	3.40	0.63	3.57	0.82	1.49	0.23
	Colombia	3.39	0.67	3.56	0.73	1.66	0.24
Virtual socialisation	México	3.20	0.81	3.41	0.95	1.65	0.16
	Colombia	3.38	0.93	3.74	0.72	3.07**	0.43

*N = 464, * p< .05; ** p< .01; *** p< .001*

Age was categorized into three groups: participants aged 13 to 16 years, 17 to 20 years, and 21 to 24 years. Table 3 presents the results of an ANOVA for the eight factors or domains by age groups, and the Tukey' Index of differences among groups.

Table 3.

Means differences by factors of COVID-19 YPS among age groups

Factor	Country	Age Group						$F_{(2, 258)}$	HDS Tukey
		13 to 16 years n=102		17 to 20 years n=228		21 to 24 years n=134			
		M	SD	M	SD	M	SD		
Fear and worries	México	4.45	0.81	3.28	0.88	3.17	0.86	2.49	ns
	Colombia	2.71	1.00	3.18	0.82	2.93	0.96	2.48	ns
Stress indicators	México	3.50	0.86	3.46	0.81	3.46	0.81	3.98*	0.32*
	Colombia	3.45	0.61	3.33	0.77	3.26	0.94	0.23	ns
Preventive behaviours	México	2.79	1.15	2.82	1.19	2.83	1.25	0.17	ns
	Colombia	3.81	0.92	4.10	0.86	3.74	1.07	3.22*	0.36*
School pressures	México	3.74	0.78	3.27	0.87	3.06	0.88	14.76**	0.46*
	Colombia	2.98	1.03	3.30	0.86	2.81	0.93	6.27**	0.49*
Family dynamics	México	2.44	1.21	2.03	1.03	1.89	0.85	6.55**	0.67*
	Colombia	3.00	1.21	2.06	0.98	2.16	1.02	3.55*	0.94*
Changes in routine	México	4.18	0.81	4.01	0.91	3.98	0.88	1.40	ns
	Colombia	3.54	1.10	3.66	0.99	3.61	0.99	0.11	ns
Relaxation and leisure	México	3.69	0.76	3.60	0.74	3.24	0.78	8.01**	0.78*
	Colombia	3.92	0.79	3.54	0.71	3.33	0.66	3.27*	0.54*
Virtual socialisation	México	3.39	0.88	3.39	0.96	3.28	0.94	0.42	ns
	Colombia	4.38	0.65	3.61	0.77	3.47	0.91	4.37*	0.37*

N = 464, * p< .05; ** p< .0.5. Note. HSD=Tukey's honestly significant difference
ns = not significant

We conducted a multivariate analysis by gender, age group, and country of the perceptions and psychological responses on all eight factors. The only significant interaction effects were observed in Changes in routine: gender*age ($T_{Hotelling}$ = 2.18, F = 3.37, p =.035, η2 = .015); gender*country ($T_{Holleling}$ = 1.29, F = 4.20, p =.041, η2 = .009);

and Gender*Age*County ($T_{Hotelling}$ = 1.93; F = 3.88; p =.021, η2 = .017). No significant

interaction effects were found in any other domains.

Predictive analyses of stress indicators in the samples

Table 4 presents the results of Pearson correlations for the different domains in

both samples. The coefficients were similar in both groups. The highest correlations were

found between Stress indicators and Changes in routine in both samples, Stress indicators

and School pressures in Colombia, and Stress indicators and Fear and worries in the

Mexican group.

Table 4

Correlations among factors of COVID-19 YPS in Colombia and Mexico

Factors	1	2	3	4	5	6	7	8
1. Stress indicators	1	.48**	-.30	.51**	.38**	.53**	.15*	.19**
2. Fear and worries	.45**	1	.24**	.39**	.17*	.40**	.20**	.29**
3. Preventive behaviours	.01	.27**	1	-.06	.04	-.01	.16*	.07
4. School pressures	.42**	.39**	.02	1	.33**	.36**	.13	.12
5. Family dynamics	.44**	.22**	-.17**	.37**	1	.21**	- .02	.14*
6. Changes in routine	.48**	.28**	-.05	.27**	.23**	1	.26**	.25**
7. Relaxartion and leisure	.14*	.10	.03	.02	.09	.16**	1	.23**
8. Virtual socialisation	.02	.19**	.19**	.22**	-.09	.15*	.19**	1

* p< .05; ** p< .01. *Note.*The coefficients in bold above the diagonal are the Colombian sample
(n = 203) and the rest are the Mexican sample (n = 261).

A hierarchical regression analysis was conducted to determine whether Changes in

Routine, Fear and worries, Family dynamic and School pressures (independent variables)

would predict stress (dependent variable) in young participants from Colombia and

Mexico. Table 5 shows that in both samples all four predictor variables were entered step by step in predicting stress increasing the variance at each step. The predictors in these models jointly accounted for 47% and 43%s stress respectively in the Mexican and Colombian samples.

Table 5.

Prediction models of stress in the Colombian and Mexican samples

	Predictors	B	SEB	β	95% CI	R^2	ΔR^2
Colombia = 203	Step 1					.	
	Changes in routine	.43	.05	.53**	[.873-1.146]	28*	
	Step 2						
	Fear and worries	.32	.06	.33**	[.814-1.228]	.37*	.11**
	Step 3						
	Family dynamics	.22	.04	.29**	[.839-1.192]	.43*	.06**
	Step 4						
	School pressures	.21	.05	24**	[.784-1.337]	.47*	.04**
México =261	Step 1						
	Changes of routine	.46	.05	.48**	[.784-1-275]	23*	
	Step 2						
	Fear and worries	.32	.05	.34**	[.772-1.296]	.34*	.11**
	Step 3						
	Family dynamics	.22	.04	.29**	[.883-1.139]	.42*	.08**
	Step 4						
	School pressures	.13	.05	.14**	[.738-1.355]	.43*	.01**

*N = 464 * p< .05; ** p< .0.5*

DISCUSSION AND CONCLUSION

COVID-19 is an unprecedented global event which has put the physical and mental health of adolescents and young people at risk due to its high potential to produce stress (Golberstein et al., 2020; Lee, 2020). It is important to understand how adolescents and young people perceive and face the confinement introduced as a measure to limit exposure to COVID-19, given the possible negative consequences on their psychological wellbeing during and after experiencing adverse situations as impactful as this pandemic

(Imran et al., 2020; Lee, 2020). In addition, designing evidence-based interventions to promote resilience in adolescents and young people is a priority in order to contribute to the reduction of harmful effects on their health (PAHO, 2021; WHO, 2021) which has not been fully explored (Remuzzi, & Giuseppe, 2020). Within this context, the aim of this study was to examine the association between stress indicators with the perceptions and psychological responses of Colombian and Mexican adolescents during confinement due to COVID-19 in relation to school pressure, family dynamics, fears and worries, relaxation and leisure, changes of routine, virtual socialization, and preventive behaviours.

Data indicate that perceptions and psychological responses of adolescents in Colombia and Mexico are similar. In both countries, as previously reported (Liu et al., 2020; Zhou, Wang et al., 2020), changes in habits seem to be an important factor and young people seem to be showing significant levels of stress (Lei et al., 2020; Saurabh, & Ranjan, 2020. They also show indicators of potential resources for resilience, such as behaviours aimed to prevent COVID-19, like self-care, taking preventive measures, and engaging in leisure activities during the confinement much like other adolescents from other countries (Bazán et al., 2020; Buzzi et al., 2000; Cao et al., 2020). Analyses by gender show that Colombian and Mexican females have higher scores than males in several factors of the COVID-19 YPS, which partially support previous evidence regarding fear of contagion or fear and worries (Liu et al., 2020; Xie et al., 2020; Zhou, Zhang et al., 2020), and indicators of stress such as sadness, (Chen et al., 2020; Xie et al., 2020), anger (Lei et al., 2020; Saurabh & Ranjan, 2020), and fear (Saurabh, & Ranjan, 2020).

Likewise, participants in both samples reported school pressures and changes in habits or routine (that in this survey included changes in sleep) as shown in previous reports (Liu et al.,

2020; Zhou, Wang et al., 2020) which, in this study were significantly higher for female. On the other hand, Colombian females tended to use virtual media more to socialize during isolation significantly more than males and also reported greater use of preventive measures (e.g., Zhong et al., 2020), while Mexican females reported more changes in routines than male did, as well as the rest of adolescents, with potential risk to mental and physical health as highlight in previous study (Zhou, Wang et al., 2020).

The results suggest that, regardless of age, the differences were in Fear and worries and Changes in routine factors. Mexican adolescents aged 13-16 years and Colombian adolescents aged 17-20 years were the most worried and fearful of being infected, however, no significant difference was observed between the 17-20 years and 21-24 years groups of Mexicans, nor with the 13-16 years and 21-24 years groups in the case of Colombians. These results could be due to youngest adolescents could be less informed about COVID-19 and they could be also less able to adapt to the new conditions imposed by the pandemic, as previous studies report (e.g., Zhong et al., 2020). Colombian adolescents tend to present similar scores in stress indicators, youngest adolescents also report more symptoms of stress. On the other hand, Colombian and Mexican adolescents aged 17 to 20 reported using preventive measures, especially the former, who also showed significant differences with the 21 to 24-year-old group. Regarding school pressures, important differences were observed: first, Colombian participants aged 17 to 20 years report being the most pressured and the most concerned about academic strains, while the adolescents most pressured in Mexico were those aged 13 to 16 years (e.g., Chen et al., 2020). Likewise, the 21-24 years group in both samples perceived more family difficulties than the other age groups. Changes in routines or habits as a result of being in lockdown during the pandemic seemed to affect all participants in the same way. However, the younger Mexican adolescents seemed to have experienced more routine changes, which agrees, in part, with Bazán et al. (2020), who

reported more changes in routines (especially school-related) in boys aged 10 to 14 years old. The Colombian adolescents between 17 and 20 years old are the ones who perceived more pressures like the 18 to 21 group reported by Bazán et al. (2020).

These results are comparable to those of the group aged 16 to 29 reported by Zhong et al. (2020), although their age range was older. In contrast, younger adolescents also indicated some leisure and relaxation activities, as well as virtual socialisation behaviours, such as listening to music, watching television, and using social networks more frequently to communicate with peers and extended family (some issues evaluated by the COVID-19 YPS). These behaviours could be functioning as protective factors of stress as suggest previous studies (e.g., Bazán et al., 2020; Buzzi et al., 2020), given that the level of indicator of stress in adolescentes of the current study was slightly above average. Finally, the interaction analyses were only significant for Changes in routine, which suggests that younger Mexican adolescents might be the most affected by the changes of habits and routines and are the most vulnerable (e.g., Zhou, Zhang et al., 2020).

Correlational analyses were similar in both samples. Stress indicators were related to the other COVID-19 YPS factors, except for Preventive Behaviours in the Colombian and Virtual socialisation in the Mexican samples. The strongest relationship was between Stress indicators and Changes in routine (Zhong et al., 2020). Family dynamics, reflecting difficulties, also shows a strong positive correlation with stress indicators or symptoms, particularly in the Mexican sample, which draws attention given the importance of the family as a source of support in adverse situations (Cao et al., 2020). Stress indicators are related to School pressures in the Colombian sample and to Fear and worries in the Mexican one. In addition, predictive models of stress indicators were tested for each one of them, with Changes of routine, Fear and worries, Family dynamics and School pressures being the hierarchical steps in the model, to check for

variations in their behaviour. Results suggest that this set of variables contribute similarly to variance explained of stress in both samples, however, the contribution of School pressure is minimal, and the percentage of variability was greater in the Colombian than Mexican adolescents.

Findings regarding age support some assumptions from developmental theories that indicate differences in behaviour and the responses to stress depend on age or age ranges or adolescence periods, for example, early, middle, late adolescence and post-adolescence (Compas & Wagner, 2017; Larson & Asmussen, 2017; Lerner, 2018). The perceptions and psychological responses of Colombian and Mexican adolescents are similar, although there are some differences by gender and age. Mexican females aged 13-16 years scored highest, which suggests that they should be considered a vulnerable group (Zhou, Zhang et al., 2020).

In sum, from a risk-protection model of resilience (Chen & Bonano, 2020); some risk factors were identified during the confinement of adolescents, such as fear and worries related to being infected or some relatives getting sick, change of habits or routines, family functioning, and school strains according to the index of association with stress indicators or symptoms (e.g., Zhong et al., 2020). Common protective factors were observed for Colombian and Mexican adolescents such as following preventive measures, engaging in relaxing activities, and socializing on-line or virtual communication with peer and family, which can be functioning as ways of productive coping during pandemic, and were found to be associated to less depression and anxiety indicators in previous reports (Liu et al., 2000; Rogowska et al., 2020; Xie et al., 2000). These findings show more similarities than differences between both, Colombian and Mexican adolescents.

We must point out some limitations of this study which restricts the generalization of the results such as the small size and distribution of the total sample in the two countries samples.

The unequal distribution of gender and age, and the data collection method, might also represent a limitation that should be taken into account in future studies. Mental health of adolescents (e.g., depressive, anxiety) was not assessed. The protective and risk role of the study variables was also not evaluated, so future research could examine this issue using structural equation modelling.

Despite these limitations, these preliminary results could contribute to designing short and medium-term interventions with brief intervention models to promote protective factors in different settings, taking gender and age differences into account. Actions aimed at strengthening family communication (e.g., Midtbust et al., 2018), reinforcing information for adolescents about COVID-19, supporting them in organizing their school activities at home, could help reduce their concerns and improve precautionary measures, which should be remain even after going back to school, perhaps reducing the fear of contagion (Bazán et al., 2020; Stage et al., 2020; Zhong et al., 2020), protecting physical and mental health of adolescents. Public health policies in each country should consider in the formulation of mental health actions aimed at youth and being adapted to people's experience of this global pandemic.

Acknowledgements

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