Impact of Social Support on Perceived Stress in Latin American and Caribbean Dental Students and Dental Practitioners during Mandatory Social Isolation within the Coronavirus Pandemic in 2020

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Objective: *To determine the impact of social support on perceived stress in Latin American and Caribbean dental students and dental practitioners during mandatory social isolation within the coronavirus (COVID-19) pandemic in 2020.*
Methods: *A cross-sectional study was conducted with a sample of 1812 dental students and dental practitioners from 21 Latin American and Caribbean countries. Perceived stress was assessed using the perceived stress scale (PSS-14), and the influence of social support was addressed using the Duke-UNC-11. Additionally, sociodemographic variables, knowledge of and preventive behaviour against COVID-19 and health status were considered. A descriptive, bivariate and multivariate analysis was performed through multiple linear regression.*
Results: *In the multivariate analysis, model 4 presented R2% = 21.20 (P < 0.001), a constant of 40.049; within the model, the social support variable had a non-standardised regression coefficient (b) of −4,527 (95% CI – 5.646 to −3,408; P < 0.001), the self-perceived level of concern regarding COVID-19 was b = 1.838 (95% confidence interval [CI] 0.887 to 2.790; P < 0.001), the self-perceived health status was b = −2.191(95% CI −2.944 to −1.437; P < 0.001), the number of days in compulsory isolation was b = −0.965 (95% CI −1.908 to −0.022; P = 0.045), while the level of confinement was b = 0.923 (95%CI: 0.106-1.740; P = 0.027), age was b = −1.743 (95% CI −2.625 to −0.860; P < 0.001), sex was b = 1.324 (95% CI 0.311 to 2.337; P = 0.011) and the economic income level was b = −1.539 (95% CI −2.434 to −0.644; P = 0.001).*
Conclusion: *An association was determined between perceived stress and social support, as well as the variables of concern about the disease, self-perceived health status, number of days and level of confinement, age, sex and economic income level, based on the experience of dental practitioners and dental students in mandatory isolation.*

Key words: *coronavirus, dental practitioners, dental students, psychological stress, social support*
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The coronavirus (COVID-19) pandemic and the adoption of restrictive policies to control its spread, such as widespread quarantine, social distancing and self-isolation, modified the normal development of personal activities and habits. In addition, the increase in financial uncertainty and instability and the risk of contagion triggered, at a community level, a considerable increase in the levels of psychological stress, which may have been more prevalent in vulnerable groups such as women, unemployed people, individuals with a low socio-economic status and young adults. COVID-19 is also linked to cardiovascular and gastrointestinal diseases and depression[1-4].

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On the other hand, factors such as sex, socioeconomic level, self-acceptance, religious beliefs, culture and social support impact individuals' mental health. Social support is defined as the care and support received from third parties during challenging situations that allow the individual to modify their perception of the event; it is also an important strategy to facilitate stress reduction[5]. Likewise, during the health crisis, the population has had to experience physical distancing and faced low levels of social support; a lack of the latter is linked to reduced satisfaction with life, anxiety and depression. Social support helps to regulate stress levels and reduce work-related stress[6-8]; however, when it is not readily available, this has a negative impact on individuals' mental health[9]. As in previous epidemics, health care workers have presented high levels of stress during the current pandemic, having to deal with an increased workload and a high risk of contagion, and continued exposure to these factors could have a greater impact on mental health. As a mechanism for reducing work-related stress, social support is essential for health care workers, preventing psychological distress and psychiatric symptoms and improving their professional effectiveness[10].

Dental practitioners were also affected by the situation; their activities were interrupted drastically in the first months of the pandemic as they were restricted to performing urgent and emergency procedures to minimise possible risks of contagion, and job losses occurred; in addition, all academic and research activities were suspended; which resulted in situations of anxiety and psychological stress in this occupational group[11-13]. In contrast, in Latin America, there is little scientific evidence describing how the dental community is coping with the situation like other health professionals who have dealt with it throughout the pandemic.

As such, the objective of this study was to determine the impact of social support on perceived stress in Latin American and Caribbean dental students and practitioners during mandatory social isolation during the COVID-19 pandemic in 2020.

Materials and methods

Study design and population

A cross-sectional study was carried out by means of an anonymous survey, provided virtually to a convenience sample of dental students and professionals from 21 countries in Latin America and the Caribbean (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Uruguay and Venezuela), constituting an initial sample of 2442 respondents. Surveys with errors in the recording of information were discarded, resulting in a final sample of 1812 respondents (cooperation rate 83.4%).

Data collection techniques

Google Forms (Google, Mountain View, CA, USA) was used to design the questionnaire; subsequently, a pilot test was carried out with a sample of 30 participants to evaluate internal consistency and completion time. The time period allowed for the fieldwork was from 15 May to 26 August 2020. The online questionnaire was distributed through digital media such as Facebook groups, WhatsApp messages, emails and invitations sent to different dental schools. Additionally, the snowball technique was employed to increase the number of participants. The questionnaire collected sociodemographic data and incorporated questions about the COVID-19 pandemic and social support.

Variables

For this study, in addition to the dependent variable, four dimensions were defined to group the independent variables present in the study. For the dependent variable, the 14-item perceived stress scale (PSS-14) was applied to measure stress in participants[14]. This instrument comprises 14 items, seven of which are positive and seven are negative, rated on a five-point Likert scale (0 = not at all/never, 1 = rarely, 2 = sometimes, 3 = quite often, and 4 = very often). Positively worded statements were reverse scored prior to analysis. All items were aggregated and the total score ranged from 0 to 56 with the understanding that the higher the score, the higher the self-perceived stress.

The four dimensions for the independent variables were as follows:

- Social support: The Duke-UNC-11 Functional Social Support Questionnaire was used to assess social support received by the participants. This self-administered instrument is composed of 11 statements, using a five-point Likert-style response scale (1 = much less than I want, 2 = less than I want, 3 = neither a lot nor a little, 4 = almost as much as I want and 5 = as much as I want). This quantitative questionnaire is made up of two dimensions: confidential social support, when people receive information, advice or guidance or can share their concerns, and affective social support, defined as expressions of appreciation,

sympathy or belonging to a group[15]. A cut-off point was established at the 32-point level, suggesting that a score lower than this refers to a low level of social support whereas a score equal to or higher than this indicates an adequate level[16].

- Sociodemographic characteristics: These include the variables age, sex, type of academic training, speciality (for those who did postgraduate studies), place of origin, number of people at home during quarantine, children and older adults under responsibility during quarantine, work, academic and domestic responsibilities during quarantine, and level of economic income during quarantine.
- Knowledge and preventive behaviour variables: These comprised the number of days in mandatory isolation, level of confinement, knowledge of someone infected with COVID-19, self-perceived level of knowledge of COVID-19 and following of preventive measures for COVID-19.
- Health variables: These are made up of the variables body mass index (BMI)[17], defined as the weight of the individual in kilograms divided by their height in metres squared (kg/m^2) (underweight = BMI ≤ 18.50, normal weight = BMI between 18.50 and 24.99, overweight = BMI between 25.00 and 29.99 and obese = BMI ≥ 30.00), as well as self-perceived level of concern about COVID-19 and self-perceived health status.

Statistical analysis

A descriptive analysis was applied for the qualitative and quantitative variables; subsequently, the normality of the distribution of the dependent variable and the other quantitative variables involved in the four dimensions was determined using a Kolmogorov-Smirnov test; additionally, a non-parametric Mann-Whitney U test was applied in the case of dichotomous variables and a Kruskal-Wallis test for polytomous variables. On the other hand, a hierarchical multiple regression was developed to establish models between the independent variables and perceived stress, according to the dimensions to be analysed. It should be noted that a logarithmic transformation was first performed for the PSS-14 because it lacked a normal distribution. The confidence level in the study was 95%, and $P < 0.05$ was considered an indicator of statistical significance in all tests. SPSS v. 25.0 (IBM, Armonk, NY, USA) was used for the analysis.

Ethics

The study was approved by the Ethics Committee of the Faculty of Dentistry of the University of Antioquia, Medellin, Colombia (Act 9-2020). In accordance with international standards for online surveys, all participants in the survey completed an informed consent form on the first page of the questionnaire and had the option of declining to participate in the study. Confidentiality was assured throughout the entire research process, in accordance with the Declaration of Helsinki and the Council for International Organizations of Medical Sciences (CIOMS) norms for health research.

Results

The mean perceived stress level of the sample was 24.59 (SD 7.46); an association was observed between perceived stress level and age, biological sex, type of academic training, speciality, place of origin, number of people at home during quarantine, having children and older adults in one's care, level of work and academic responsibilities, and level of economic income during obligatory social isolation ($P < 0.05$) (Table 1). In addition, an association was found between perceived stress level and some variables that made up each of the four established dimensions, such as social support, nutritional status, self-perceived level of concern about COVID-19, self-perceived health status, level of confinement, level of knowledge about COVID-19 and adherence to recommendations to prevent COVID-19 ($P < 0.05$) (Table 2).

A multiple linear regression analysis was performed, hierarchically ordering the dimensions and their variables in four models, obtaining an R2% value of 8.00 in Model 1 ($P < 0.001$), an R2% of 15.50 in Model 2 ($P < 0.001$), an R2% of 17.20 in Model 3 ($P < 0.001$) and an R2% of 21.20 in Model 4 ($P < 0.001$); in this last model, the change in R2% was significant ($P < 0.001$) with a constant of 40.049; in addition, significance was found in self-perception of the level of concern regarding COVID-19 (unstandardised regression coefficient (b) of 1.838, 95% confidence interval (CI) 0.887 to 2.790, $P < 0.001$), self-perceived health status (b = −2.191, 95% CI −2.944 to −1.437, $P < 0.001$), number of days in mandatory isolation (b = −0.965, 95% CI −1.908 to −0.022, $P = 0.045$), level of confinement (b = 0.923, 95% CI 0.106 to 1.740, $P = 0.027$), age (b = −1.743, 95% CI −2.625 to −0.860, $P < 0.001$), sex (b = 1.324, 95% CI 0.311 to 2.337, $P = 0.011$) and level of economic income in quarantine (b = −1.539, 95% CI −2.434 to −0.644, $P = 0.001$) (Table 3).

Table 1 Perceived stress according to sociodemographic variables (N = 1812).

Variable		n (%)	Perceived stress level (PSS-14 score)		
			Mean value	Standard deviation	*P* value
Age, y	Mean ± standard deviation	32.44 ± 11.56			
	18–24	548 (30.24)	26.59	7.34	< 0.001*
	25–34	671 (37.03)	24.99	6.98	
	≥ 35	593 (32.73)	22.30	7.50	
Sex	Male	557 (30.74)	23.36	7.32	< 0.001**
	Female	1255 (69.26)	25.14	7.46	
Type of academic training	Dental student	655 (36.15)	26.64	7.18	< 0.001**
	Dental practitioner	1157 (63.85)	23.43	7.37	
Speciality?	Yes	791 (68.37)	22.96	7.46	0.001**
	No	366 (31.63)	24.47	7.06	
Place of origin	Mexico, Central America and the Caribbean	151 (8.33)	22.99	8.13	0.003**
	South America	1661 (91.67)	24.74	7.38	
Number of people at home during social isolation	Mean ± standard deviation	3.00 (1.83)			
	≤ 3	1217 (67.20)	24.30	7.43	0.019**
	> 3	594 (32.80)	25.20	7.50	
Caring for children during social isolation?	Yes	612 (33.77)	24.63	7.44	0.958**
	No	1200 (66.23)	24.57	7.47	
Caring for older adults during social isolation?	Yes	1282 (70.75)	24.52	7.41	0.593**
	No	530 (29.25)	24.76	7.60	
Work responsibilities during social isolation	Decreased	654 (45.35)	23.43	7.58	< 0.001*
	Equal	271 (18.79)	24.28	6.74	
	Increased	517 (35.85)	25.12	7.14	
Academic responsibilities during social isolation	Decreased	363 (23.93)	24.21	7.45	0.009*
	Equal	363 (23.93)	24.19	6.91	
	Increased	791 (52.14)	25.27	7.60	
Domestic (home) responsibilities during social isolation	Decreased	18 (1.00)	25.83	5.72	0.129*
	Equal	469 (26.10)	24.11	7.75	
	Increased	1310 (72.90)	24.80	7.35	
Income level during social isolation	Decreased	1018 (68.97)	24.70	7.51	0.016*
	Equal	393 (26.63)	23.40	6.91	
	Increased	65 (4.40)	25.29	6.73	
Total		1812 (100.00)	24.59	7.46	

*Kruskal-Wallis test.

**Mann-Whitney U test.

Discussion

The provisions put in place to control the spread of COVID-19 may have a negative impact on the mental health of the population, especially where situations such as loneliness and decreased social interaction are clear risk factors for some mental disorders. In addition, the emergence and persistence of concerns about one's own and one's family's health, along with anxiety about the future, could increase the risk of mental health pathologies such as anxiety, panic, stress and obsessive-compulsive disorder[18]. Health care workers are also directly affected by work circumstances such as the considerable increase in the number of cases, shortage of human resources, excessive workload and insufficient capacity to control the spread through health systems[19].

It is important to mention that the more variables incorporated into the present model, the more explanatory it was; in addition, it is evident that social support is significant in each of the models presented. A negative association was found between social support and perceived stress in dental practitioners and students during quarantine in the COVID-19 pandemic. Similarly, studies by Mak et al[20] and Ye et al[21] indicate that both in the SARS epidemic and currently in the COVID-19 pandemic, support from relatives, friends and health care workers plays a role in the ability to cope with stressful situations and the possible development of other conditions.

In relation to social support and health workers, a study conducted on paediatricians who experienced high levels of support during COVID-19 showed lower levels of stress compared to a second group[22]. With regard to the dental profession, evidence suggests that professionals who reported an excessive workload pre-

Table 2 Perceived stress level based on social support, health status and knowledge and preventive behaviours (N = 1812).

Variable			n (%)	Perceived stress level (PSS-14 score)		
				Mean value	Standard deviation	*P* value
Social support		Low	437 (24.12)	28.60	6.44	< 0.001**
		Adequate	1375 (75.88)	23.32	7.31	
Health status	BMI	Underweight	77 (4.25)	26.88	7.88	0.001*
		Normal	1123 (61.98)	24.90	7.44	
		Overweight	495 (27.32)	23.84	7.26	
		Obese	117 (6.46)	23.32	7.71	
	Self-perceived level of concern about COVID-19	Low	943 (52.04)	23.45	7.59	< 0.001**
		High	869 (47.96)	25.83	7.11	
	Self-perceived health status	Very poor	5 (0.28)	39.60	5.86	< 0.001*
		Poor	21 (1.16)	32.90	8.22	
		Fair	261 (14.40)	27.70	7.01	
		Good	1149 (63.41)	24.43	6.99	
		Excellent	376 (20.75)	22.26	7.87	
Knowledge and preventive behaviour	Number of days in mandatory social isolation	Mean ± standard deviation	60.80 ± 25.30			
		≤ 60	1010 (55.74)	24.77	7.17	0.259**
		> 60	802 (44.26)	24.37	7.81	
	Confinement level	I did not go out any day	200 (11.04)	26.16	7.61	0.016*
		I went out very little	1441 (79.53)	24.41	7.45	
		I went out frequently	95 (5.24)	24.23	7.64	
		I went out every day	76 (4.19)	24.47	6.65	
	Knowledge of someone infected with COVID-19	Yes	846 (46.69)	24.87	7.43	0.123**
		No	966 (53.31)	24.35	7.48	
	Self-perceived level of knowledge of COVID-19	Low	1449 (79.97)	24.89	7.29	< 0.001**
		High	363 (20.03)	23.39	8.02	
	Following of preventive measures for COVID-19	Never	2 (0.11)	29.00	0.00	< 0.001*
		Rarely	6 (0.33)	23.50	9.16	
		Usually	493 (27.21)	25.68	6.64	
		Sometimes	42 (2.32)	26.81	7.53	
		Always	1269 (70.03)	24.09	7.70	

*Kruskal-Wallis test.

**Mann-Whitney U test.

sented low levels of social support; Marklund et al[23] found that work-related responsibilities are key to the development of stress; however, this can be buffered by certain strategies such as social support. They also found that the different roles in the dental profession can experience different levels of stress[23].

It is evident that stress has an impact on personal health status and vice versa, coinciding with the results of the present study in which self-perceived health status and level of concern about COVID-19 show significant differences for the association between social support and perceived stress level; likewise, León-Manco et al[24] found that poor self-reported health led to an increase in perceived stress as measured using the PSS-14. In a study of nurses, Liao et al[25] stated that both physical and mental health are affected by one's degree of perceived stress, which could be regulated by means of social support and self-efficacy, since both variables are negatively correlated with stress.

Regarding knowledge of and adoption of preventive behaviour against COVID-19, the study showed that the number of days and level of isolation were factors to be considered in the association of perceived stress and social support. On the other hand, the concern and fear of infection felt by dental practitioners relegated to emergency work revealed high levels of stress in them, particularly caused by the possibility of transmitting the infection to family members, thus causing them to self-isolate for preventive reasons[26]. A previous study detailed the consequences of quarantines on the mental

Table 3 Hierarchical multiple regression models for the perceived stress scores in the study sample (N = 1812).

Variable			Determination coefficient % (R2%)	Change of R2%
Model 1	Social support		8.00	8.00
Model 2	Social support		15.50	7.50
	Health status variables	BMI		
		Self-perceived level of concern about COVID-19		
		Self-perceived health status		
Model 3	Social support		17.20	1.60
	Health status variables	BMI		
		Self-perceived level of concern about COVID-19		
		Self-perceived health status		
	Knowledge and preventive behaviours variables	Number of days in mandatory social isolation		
		Confinement level		
		Knowledge of someone infected with COVID-19		
		Self-perceived level of knowledge of COVID-19		
		Following of preventive measures for COVID-19		
Model 4	Social support		21.20	4.00
	Health status variables	BMI		
		Self-perceived level of concern about COVID-19		
		Self-perceived health status		
	Knowledge and preventive behaviours variables	Number of days in mandatory social isolation		
		Confinement level		
		Knowledge of someone infected with COVID-19		
		Self-perceived level of knowledge of COVID-19		
		Following of preventive measures for COVID-19		
	Sociodemographic variables	Age		
		Sex		
		Type of academic training		
		Speciality		
		Place of origin		
		Number of people at home during social isolation		
		Children under care during social isolation		
		Older adults under care during social isolation		
		Work responsibilities during social isolation		
		Academic responsibilities during social isolation		
		Domestic (home) responsibilities during social isolation		
		Income level during social isolation		

health of health workers, including acute stress reactions, which also relate to isolation and a lack of contact with their family[27].

On the other hand, the sociodemographic variables age, sex and level of economic income showed significant differences between social support and stress, suggesting that the more stable these factors are, the lower the perceived level of stress is. Mekhemar et al[12] noted that female dentists aged between 50 and 59 years with chronic pathologies, who worked in a private practice and who considered the COVID-19 pandemic as a financial risk obtained higher values for conditions such as depression, stress and anxiety.

Likewise, Massad et al[28] state that sex, social support and age were associated with the level of psychological stress in a sample evaluated in Jordan; because of the first aspect, the number of cases of domestic violence increased in women due to established governmental guidelines. They also note that among the aspects to be considered in the relationship between sex and anxiety,

	P value, change of R2%	Constant	Non-standardised regression coefficient (b)	Standardised regression coefficient	95% confidence interval	*P* value	*P* value model
	< 0.001	31.806	–4.840	–0.283	–5.994 to –3.685	< 0.001	< 0.001
	< 0.001	40.015	–4.377	–0.256	–5.493 to –3.261	< 0.001	< 0.001
			–0.805	–0.078	–1.477 to –0.134	0.019	
			1.925	0.135	0.991 to 2.860	< 0.001	
			–2.424	–0.215	–3.169 to –1.679	< 0.001	
	0.011	43.066	–4.327	–0.253	–5.444 to –3.210	< 0.001	< 0.001
			–0.856	–0.083	–1.531 to –0.182	0.013	
			2.143	0.150	1.197 to 3.089	< 0.001	
			–2.340	–0.208	–3.095 to –1.586	< 0.001	
			–1.011	–0.071	–1.951 to –0.071	0.035	
			0.655	0.053	–0.165 to 1.475	0.117	
			–0.333	–0.023	–1.272 to 0.605	0.486	
			–0.411	–0.025	–1.524 to 0.702	0.469	
			–0.568	–0.067	–1.137 to 0.001	0.051	
	< 0.001	40.049	–4.527	–0.265	–5.646 to –3.408	< 0.001	< 0.001
			–0.392	–0.038	–1.089 to 0.306	0.271	
			1.838	0.129	0.887 to 2.790	< 0.001	
			–2.191	–0.194	–2.944 to –1.437	< 0.001	
			–0.965	–0.067	–1.908 to –0.022	0.045	
			0.923	0.074	0.106 to 1.740	0.027	
			–0.09	–0.006	–1.028 to 0.848	0.851	
			–0.081	–0.005	–1.189 to 1.027	0.886	
			–0.401	–0.047	–0.966 to 0.164	0.164	
			–1.743	–0.137	–2.625 to –0.860	< 0.001	< 0.001
			1.324	0.088	0.311 to 2.337	0.011	
			–1.385	–0.073	–2.158 to 0.348	0.071	
			–0.215	–0.013	–1.312 to 0.882	0.700	
			–0.466	–0.022	–1.882 to 0.950	0.518	
			0.716	0.044	–0.411 to 1.843	0.213	
			0.481	0.033	–0.530 to 1.492	0.350	
			0.368	0.023	–0.698 to 1.435	0.498	
			0.563	0.072	–0.037 to 1.162	0.066	
			–0.001	0.001	–0.641 to 0.640	0.998	
			0.692	0.040	–0.453 to 1.836	0.236	
			–1.539	–0.120	–2.434 to –0.644	0.001	

social support is important, as the more members of a social network that a person has during social isolation, the lower the degree of anxiety they experience; for age, also evaluated in the study, a correlation with stress was observed during quarantine, suggesting that older people are less likely to be affected due to their greater economic and emotional stability[28].

With regard to the limitations of the present study, the possible emergence of selection bias during the recruitment of participants, carried out through digital media such as email and social networks, is important. Likewise, the participants in the study came from various different countries in Latin America and the Caribbean, meaning that each of them had experienced different cultural, economic and health contexts during the pandemic; these could have an impact on their responses to the surveys, and consequently on the results of the study. Another aspect to consider is that due to the cross-sectional nature of the study, it is not possible to define a cause-and-effect relationship

between the variable studies; thus, the findings should not be extrapolated to the general population.

It is evident that during the COVID-19 health crisis, dental practitioners and students faced complex circumstances that had an impact on their mental health, specifically on their perceived level of stress. The support, value and sense of belonging provided by those closest to them, translated as social support, which was scarce during this time due to the promotion of individualistic behaviour to preserve collective health; all this within Latin America and the Caribbean, regions that experienced crisis situations both in the health system and at an economic level.

Conclusion

The findings of this study show that social support was a factor associated with perceived stress levels in dental students and general dental practitioners during the COVID-19 quarantine period. In addition, variables such as concern about illness, self-perceived health status, number of days and level of confinement, as well as age, sex and income level, had an impact on the findings.

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Conflicts of interest

The authors declare no conflicts of interest related to this study.

Author contribution

Drs María Claudia Garcés-Elías, Roberto A. León-Manco and Andrés A. Agudelo-Suárez contributed to the conception, design, acquisition and interpretation of the data, critically reviewed the manuscript, gave final approval, and agreed to be accountable for all aspects of the work in ensuring accuracy and integrity.

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