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ORIGINAL ARTICLE

Stress self-perception and burnout in chiropractic students in a lockdown situation due to COVID-19: A cross-sectional and comparative study

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ABSTRACT

Objective: The purpose of this study was to investigate if COVID-19 lockdown affected stress-perception and burnout in chiropractic students from our institution.
Methods: Stress and burnout in students were assessed using the Perceived Stress Scale and the Maslach Burnout Inventory. The surveys were sent out electronically in March 2020 to chiropractic students enrolled at our college. Data were analyzed with descriptive statistics and *t* test or analysis of variance to determine statistically significant differences between variables. Data were compared with that obtained in 2018, under no lockdown conditions.
Results: The survey had an overall response rate of 48.94%. Women presented statistically significant higher values for stress ($p = .002$) and exhaustion ($p = .007$). Younger students tended to suffer more stress than their older peers. When comparing lockdown data with that of 2018, students presented significantly lower stress levels but higher cynicism.
Conclusion: Women presented higher values for stress and exhaustion than the men. When comparing data with a prior study in 2018 with no lockdown situation, current students appeared to have lower levels of stress but increased cynicism.

Key Indexing Terms: Chiropractic; Competency-Based Education; Health Occupation Students; Professional Burnout; Psychological Stress; COVID-19

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INTRODUCTION

The 2019 novel coronavirus acute respiratory disease, referenced by the World Health Organization as COVID-19, is caused by the coronavirus, officially named SARS-CoV-2.[1] It rapidly became a global public health threat, endangering the well-being and health of all humankind.[2–4] In response to the emergency situation, from the 9th to the 13th of March, 2020, the Spanish government decreed a progressive closure of academic institutions and privately owned businesses. On March 14th, a nationwide state of alert was declared in Spain, and a population lockdown was imposed 2 days later.[5] The Barcelona College of Chiropractic (BCC) changed the way the program was delivered from face-to-face to online classes.

The COVID-19 epidemic has created a high-stress environment and a notable emotional impact on medical workers and the general population of the affected countries. Studies have identified a notable increase of anxiety, stress, and depression amongst health care professionals.[6] Although the overall impact on education and mental health of the university environment is not well known, the impact is estimated to be very significant.[7,8]

Stress is a natural adaptive reaction of human beings, which allows us to effectively perform in many areas of life against potentially harmful stimuli to enhance our chance for our survival. However, prolonged, or sustained stress exposure is known to cause maladaptation of homeostatic mechanisms, causing impairment of processes within the human body. This can ultimately precipitate physical and psychological disorders.[9] Individual differences in stress reactivity have been linked to physiological and psychological functioning, such as anxiety, fatigue, sleep quality, physical complaints, negative health behaviors, depression, and increased cortisol response to psychosocial stress.[10]

High stress during education can lead to mental distress and negatively impact cognitive function and learning, and it has been associated with decreased academic success, well-being, and quality of life.[11] In the last decade, there has been a significant increase (from approximately 3% to almost 50%) in mental health issues reported in students in

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higher education. The most significant indicators of educational stress include a reduction in academic performance and learning, increased alcohol consumption, smoking, and an increased tendency to think about suicide.[12]

Chiropractic students, like other health care profession students, often have high levels of stress that can lead to decreased health status and depression.[13] This may negatively affect students' ability and capacity to effectively care for patients upon completion of the academic program. It is important for institutions to teach students how to cope with high levels of stress and burnout. Failing to deal with this problem may have a negative impact on students' health, interfering in the development of qualities sought after in a health care professional.[14] This is critical for society, as this individual will later become a key member of the health care service.

One previous study in 2018 measured the stress and burnout levels in chiropractic students from different chiropractic colleges, including the BCC, during "normal" conditions.[15] The main objective of the present study is to evaluate and assess the stress level of the BCC students during the outbreak of the COVID-19 pandemic. These results were compared with findings from the prior study to identify if the lockdown may have affected students' psychological well-being.

METHODS

Subjects

The subjects of this study were chiropractic students in all academic years from the BCC during the academic year of 2019–2020 (September to June). The Maslach Burnout Inventory–Student Survey (MBI-SS) and the Perceived Stress Scale 10 (PSS-10) questionnaires were administered from March 30th through April 14th during the complete lockdown period in Spain. The surveys remained open to students during a time period of 2 weeks, and multiple reminders were sent before closing access to the surveys.

The inclusion criteria for this study were the following: (a) BCC chiropractic students from all cohorts over the age of 18; (b) subjects who had read and accepted the terms of engagement of the study; (c) participants who were confined in Spain. Subjects who failed to meet the criteria were automatically discarded from participation.

This study was reviewed and approved by the Research Committee and the Ethics Committee of the BCC. Participants of the study were sent an email with links to the surveys (PSS-10 and MBI-SS) along with an informed consent, where the study and the terms of engagement were described in detail. Participation was voluntary, and there was no monetary compensation; answering the survey implied that the student had read the informed consent and complied with the terms of agreement. No personal data were collected.

Data Collection Instruments

The instruments used to establish the prevalence of stress consisted of the MBI-SS and PSS-10. All questionnaires were submitted in Spanish and English. At the beginning of the questionnaires, students were asked several questions to obtain demographic information in relation to sex, age range, academic year, and European region.

Maslach Burnout Inventory–Student Survey

Since 1981 when it was released, the MBI has become the leading tool to assess burnout, used in well over 1000 studies.[16] The MBI-SS is a questionnaire specifically designed to assess burnout in college students. It takes approximately 8 to 10 minutes to complete and looks at 3 core aspects of burnout: exhaustion, cynicism, and academic efficacy. There are 16 questions that are scored on a 7-point Likert scale ranging from 0 (*never*) to 7 (*every day*), and students indicate their level of agreement with each item.[16]

The MBI-SS addresses 3 different concepts separated in their respective subscales. The exhaustion subscale measures the feeling of being emotionally overextended by the academic workload. The cynicism subscale measures an indifferent, distant, and negative attitude toward the studies. The professional efficacy subscale measures feelings of competence and accomplishments at the college. In the first 2 subscales, higher values correspond to greater experience burnout levels, whereas in the last subscale results are inverted.

The psychometric properties of the MBI-SS have been researched in the last decade, demonstrating adequate internal consistency for all subscales.[15–17] This study uses and refers to the MBI manual as a guideline and includes all original items of the questionnaire.

The method chosen for statistical analysis was method 2 (according to MBI manual guidelines), where an average can be extracted from each subscale of the MBI. Together, the subscales of the MBI-SS provide a 3-dimensional perspective on burnout, for which high scores on exhaustion and cynicism demonstrate high degrees of burnout, and low scores on academic efficacy (inverse relationship) also establishes a higher degree of burnout.[16] The total score of *low*, *medium*, or *high* burnout is categorized according to the lower, medium, and upper quartiles of the score distribution.[17]

Perceived Stress Scale

The PSS-10 is the most widely used psychological instrument to assess the degree to which an individual perceives life situations as stressful. It is a simple and straightforward questionnaire, where high scores indicate a perception of high levels of stress.[11,18] The PSS is a questionnaire composed of 10 items that assess the perception of stress. It is a 5-point Likert scale, where the occurrence of stress is rated from 0 (*never*) to 4 (*very often*).[18]

The psychometric properties of the PSS have been validated in numerous studies, with values above .70 for the Cronbach α, indicating adequate internal consistency.[19] The total scores are obtained by adding the values of each question (with special attention to questions 4, 5, 7, and 8, where the scores are reversed). Results can range from 0 to 40, where a higher score means a higher

Table 1 - Demographic Characteristics of the Study

	n (%)
Sex	
Male	35 (50.73)
Female	34 (49.27)
Age range, y	
18–22	25 (36.23)
23–29	27 (39.13v
30–50	17 (24.64)
Nationality	
Central Europe	5 (7.25)
North Europe	10 (14.49)
South Europe	25 (36.23)
West Europe	18 (26.09)
Rest of the world	11 (15.94)
Academic Year	
1st year	15 (21.74v
2nd year	9 (13.04)
3rd year	12 (17.39)
4th year	13 (18.84)
5th year	20 (28.99)

perceived stress. According to Kizhakkeveettil et al,[11] PSS scores from 0 to 10 indicate low stress, from 11 to 15 indicate mild stress, from 15 to 20 indicate moderate stress, and above 20 indicate severe stress.

Data Analysis

After collecting data with the surveys, the information was pooled into Microsoft Excel (Microsoft Corp, Redmond, WA). Global scores for PSS-10[20] and scale scores for MBI-SS exhaustion, cynicism, and professional efficacy[16] were calculated according to authors' instructions. All data were analyzed using Statistical Package of Social Sciences (SPSS 23.0; IBM Corp, Armonk, NY). Age groups (18 to 22, 23 to 29, 30-50 years) were selected following the divisions used in previous articles.[15] Participant allocation to regions was done according to the European subregions defined by EuroVoc.[21]

Internal reliability of the PSS-10 and the 3 MBI subscales was measured using the Cronbach α. Descriptive statistics (mean and SD) and frequency distributions of data were obtained for all the surveys. Normality of samples was determined by calculating skewness and kurtosis. Whenever all groups were distributed normally, parametric tests were used (*t* test or analysis of variance [ANOVA]). If at least 1 of the groups did not conform to a normal distribution, nonparametric tests were used (Mann-Whitney U or Kruskal-Wallis test). In order to compare the same cohorts, the original data were kindly provided by the authors of the previous study.[15] These data were limited in this study to BCC college only. Cohorts were identified by current academic year. Group comparison was performed using the same criteria described above. To compare the study population stress and burnout levels, we performed 1 sample *t* test using previously published results.[16,20] Significant differences were considered if $p < .05$.

Table 2 - General Comparison of PSS-10 and MBI-SS Results With Normal Values

	Mean ± SD	*p* Value
PSS-10		
Women	19.06 ± 6.66	<.001
Men	14.20 ± 5.60	.033
MBI-SS		
Exhaustion	2.44 ± 1.43	.070
Cynicism	2.07 ± 1.24	.026
Professional efficacy	4.01 ± 1.00	.007

Values are presented as the mean scores ± SD. All comparisons were performed using 1 sample t *test versus published normal values.*

RESULTS

The survey was completed by a total of 69 students out of 141 (response rate = 48.9%). When having a look at the general demographic characteristics of participation (Table 1), men and women had similar participation rates. More than half of the students who participated in the study were below the age of 30 years. Most participants were from regions of Southern Europe, whereas the lowest participation came from central European countries. Responses per academic year were well distributed, except for the 5th year cohort, which had slightly higher participation.

Students showed higher levels of stress, as well as higher cynicism and lower professional efficacy compared with the general population. They also showed higher exhaustion levels, although this was not statistically significant (Table 2).

The most significant differences between mean scores and SDs were found between men and women. The stress levels of the PSS were 19.06 (6.66) for women and 14.20 (5.60) for men, with a statistically significant *p* value of $p < .002$. The other statistically significant difference was found within the exhaustion subscale of the MBI-SS, with a result of 2.90 (1.43) for women and 1.99 (0.97) for men. The rest of the men to women comparisons were not significant (Table 3). The stress and burnout compared between age groups, academic year, and by European region of the students did not show any significant differences.

Significant differences were found between cohorts when comparing data from 2018 and 2020 (Table 4). The PSS was statistically significant for 3rd to 5th year cohorts, with a reduction in stress levels. Meanwhile cynicism levels were higher with statistical difference between the 2018 3rd year cohort compared to same cohort in 2020. There were similar findings with sex (Table 6), with women and men showing notably lower stress levels in comparison to 2018, while women had higher cynicism levels in 2020. Last, stress levels were lower in the younger students (ages 18–34 years) compared with their older peers; however, as with sex, they seemed to have become more cynical as well (Table 6).

DISCUSSION

Principal Findings

Although in the last decades there are a few studies that have researched stress in chiropractic students, to the

Table 3 - General Characteristics of the PSS and MBI-SS Values

		MBI-SS		
	PSS	Exhaustion	Cynicism	Professional Efficacy
Cronbach α	.866	.904	.783	.794
Mean ± SD	16.59 ± 6.57	2.44 ± 1.43	2.07 ± 1.24	4.01 ± 1.00
Sex				
Female	19.06 ± 6.66	2.90 ± 1.43	2.18 ± 1.47	3.98 ± 0.88
Male	14.20 ± 5.60	1.99 ± 1.30	1.97 ± 0.97	4.03 ± 1.12
p value[a]	.002	.007	.495	.812
Age group, y				
18–24	17.53 ± 6.28	2.55 ± 1.46	2.05 ± 1.25	3.93 ± 0.94
25–35	15.96 ± 7.50	2.19 ± 1.41	2.13 ± 1.34	4.13 ± 1.14
35–60	12.83 ± 2.48	2.67 ± 1.46	2.03 ± 0.87	4.03 ± 1.03
p value[b]	.227	.595	.964	.751
Year				
1	16.87 ± 7.57	2.33 ± 1.46	1.47 ± 1.06	4.36 ± 0.95
2	18.78 ± 6.59	2.76 ± 1.87	1.98 ± 1.56	3.83 ± 1.13
3	15.33 ± 5.93	2.28 ± 1.26	2.42 ± 0.92	3.75 ± 0.75
4	16.00 ± 6.38	3.19 ± 1.27	2.39 ± 1.00	4.05 ± 0.86
5	16.55 ± 6.66	1.98 ± 1.30	2.16 ± 1.43	3.94 ± 1.21
p value[c]	.824	.180	.240	.574
Region				
Central Europe	19.00 ± 2.83	2.96 ± 1.67	2.20 ± 1.79	3.57 ± 1.85
North Europe	12.50 ± 2.99	1.76 ± 1.40	1.92 ± 1.30	4.33 ± 0.92
South Europe	17.76 ± 9.17	2.46 ± 1.62	2.15 ± 1.23	4.05 ± 0.93
West Europe	16.33 ± 4.88	2.37 ± 1.17	2.33 ± 1.03	3.81 ± 0.84
Rest of the world	17.00 ± 4.07	2.89 ± 1.26	1.55 ± 1.29	4.12 ± 1.08
p value[c]	.250	.406	.550	.579

Values are presented as the mean scores ± SD. Differences were considered statistically significant if $p < .05$.
[a] Groups comparison using *t* test.
[b] Groups comparison using ANOVA.
[c] Groups comparison using Kruskal-Wallis test.

authors' knowledge this is the first study to establish prevalence of burnout and stress among chiropractic students during a complete lockdown state owing to the COVID-19 pandemic.

Table 4 - Comparison of Values of the Same Cohort Between 2018 and 2020

	Cohort (2020)	2018 Study	2020 Study
PSS	3	19.93 ± 4.51	15.33 ± 5.93[a]
	4	20.67 ± 4.53	16.00 ± 6.38[a]
	5	23.00 ± 6.88	16.55 ± 6.66[a]
Exhaustion	3	1.86 ± 1.31	2.28 ± 1.26
	4	3.11 ± 1.37	3.19 ± 1.27
	5	2.60 ± 0.52	1.98 ± 1.30
Cynicism	3	1.25 ± 0.98	2.42 ± 0.92[a]
	4	1.98 ± 1.56	2.39 ± 1.00
	5	1.07 ± 0.70	2.16 ± 1.43
Professional efficacy	3	3.68 ± 1.11	3.75 ± 0.75
	4	3.73 ± 0.85	4.05 ± 0.86
	5	3.60 ± 1.18	3.94 ± 1.21

Statistical significance was determined using nonparametric Mann-Whitney U test.
[a] Significant, $p < .05$.

The results of this study were obtained using 2 validated and recognized psychometric tools: the PSS and MBI. The results revealed that in the general student population, women presented higher values for stress ($p < .002$) and exhaustion ($p < .007$) than men. The PSS scores obtained in this study was *moderate stress* for women with a PSS score of 19.06 (6.66) and *low stress* for men with a score of 14.20 (5.60).[11,22] Scientific literature often finds women to present higher stress and fatigue scores than men.[11,22] Bamuhair et al[18] have suggested that women

Table 5 - Comparison of Values by Sex of the Same Cohort Between 2018 and 2020

	Sex	2018 Study	2020 Study
PSS	Female	21.80 ± 5.10	17.67 ± 7.63[a]
	Male	19.94 ± 5.08	14.67 ± 4.49[a]
Exhaustion	Female	2.66 ± 1.15	2.81 ± 1.56
	Male	2.19 ± 1.44	2.06 ± 1.05
Cynicism	Female	1.14 ± 0.79	2.45 ± 1.41[a]
	Male	1.74 ± 1.44	2.16 ± 0.93
Professional efficacy	Female	4.00 ± 0.76	4.06 ± 0.83
	Male	3.36 ± 1.15	3.80 ± 1.12

Statistical significance was determined using t *test*.
[a] Significant, $p < .05$.

Table 6 - Comparison of Values by Age Groups of the Same Cohort Between 2018 and 2020

	Age, y	2018 Study	2020 Study
PSS	18–24	20.90 ± 4.20	16.76 ± 5.07[a]
	25–34	23.00 ± 6.33	16.06 ± 8.20[a]
	35+	16.75 ± 5.85	11.75 ± 2.36
Exhaustion	18–24	2.60 ± 1.36	2.68 ± 1.29
	25–34	2.10 ± 1.35	2.04 ± 1.38
	35+	2.35 ± 1.08	2.20 ± 1.60
Cynicism	18–24	1.34 ± 0.91	2.26 ± 1.12[a]
	25–34	1.10 ± 1.42	2.36 ± 1.37[a]
	35+	2.55 ± 1.28	2.25 ± 0.92
Professional efficacy	18–24	3.70 ± 1.16	3.84 ± 0.94
	25–34	3.53 ± 0.71	4.11 ± 1.16
	35+	3.90 ± 1.07	3.67 ± 0.68

Statistical significance was determined using nonparametric Mann-Whitney U test.

[a] Significant, $p < .05$.

may have more stressors in their lives. Meanwhile, another article from lockdown state in Austria found that stress levels tend to be higher in young adults (<35 years), women, people without work, and those with low income.[23] A recent study about the psychological variables during lockdown state in Spain found that women tend to have a more pessimistic attitude. Women also show more stress and less self-esteem, hence the psychological impact, especially during adverse events such as pandemics, tends to be worse.[24] Comparing 2018[15] and 2020 results reveals that during the lockdown state, chiropractic students were not particularly stressed; in fact, stress levels reduced significantly. However, it should be noted that these levels are still higher than values of a normal population.

The reason behind this reduction in stress levels is unclear; to date, there are few studies that cover this topic. Nonetheless, in a quasi-experimental study done by Lazarevic and Bentz (2021), students taking online courses compared with other students taking the same course by a traditional learning methodology presented decreased stress levels.[25] Their explanations for this phenomenon were related to more time for studying, greater access to learning material, reduced social stress, and lower expectations from friends and family. In regard to BCC, not all 4 determinants may be applicable, but students did have more flexibility to study and reorganize their schedule. Also, the fact that students did not have to commute may have increased their time for studies and for their personal life (which could allow for more self-care). Learning material was accessible though the BCC learning management system. Most of the delivery was done synchronously, although many teachers also recorded extra material to be reviewed by students at their convenience.

The importance of social stress is intriguing. The reduction of this stress has been attributed to the fact that students who choose online learning are mostly goal oriented. In the case of the students analyzed in this study, they did not choose an online course since it had to be mandated in order to comply with the COVID situation. However, in other studies, it has been described that limited social interaction resulted in lower levels of stress as an unexpected positive result.[26]

It is clear that remote learning presents its advantages. According to 1 study, online learning generally results in high student satisfaction, as it is manageable and comfortable. Students can conveniently access teachers and teaching materials. It also reduces the use of traveling resources and other expenses while easing administrative tasks and marking attendance. Both the students and teachers concluded that online learning modalities have encouraged student-centeredness during lockdown situations; students have become self-directed learners, and they learn asynchronously at any time of day.[27] This could be a factor that contributed to the reduction of stress in our chiropractic students, as online teaching was instituted from March 31 (2 weeks after complete lockdown was declared) through the rest of the academic year.

Some recent articles have been published regarding burnout of medical students during the pandemic. It has been described that mental health deteriorated and cynicism level increased amongst medical students during the COVID-19 lockdown.[28] The liaison between emotion and burnout was recently explored by Moreno-Fernandez et al.[29] The authors observed that during lockdown period, student demonstrated high levels of burnout and cynicism. Although BCC students demonstrated reduced stress levels, they did present higher cynicism levels.

Plausible reasons for elevated scores of cynicism could reside in feelings of loneliness and insecurity as many students were living abroad, far away from friends and family. The possibility of the university studies being suspended, getting infected by the coronavirus, and the uncertainty of the lockdown situation could have affected students' cynicism. In other words, the unease created by COVID as to the foreseeable future could have been a key contributor to the increased levels in cynicism.

Although the results are unexpected regarding the decreased stress levels, students still present higher levels than in the population, and this is known to have a negative impact in students' health and academic performance.[12] With the COVID-19 crisis, it is crucial to analyze their experience in order to monitor and develop the right measures to help students through this situation and help mitigate the possible adverse effects on education, work, and mental health.

The importance of this study is that it establishes a prevalence of stress and burnout in the field of chiropractic specific to the lockdown period. Examining the scope of stress and burnout is necessary to aid future development of curricula to try to lower the burden on students and prevent them from suffering burnout and high stress by the time they get into practice. Furthermore, stress and burnout in university students should be carefully monitored so that universities can provide and implement psychological interventions and services oriented and adapted to mitigate the emotional and psychological impact among students.

Limitations

This is a cross-sectional study carried out during a specific time of the COVID-19 pandemic. It is difficult to ascertain which of the studied characteristics will still be applicable as the pandemic develops, or when colleges can return to normality. Although some of the results may be due to the online teaching, it is not possible to separate them from the effects of the imposed lockdown.

The previous study done by Perelló et al[18] was conducted in 4 different colleges across Europe. In this study, the questionnaire was limited to the BCC. This allowed us to compare the same cohort of students between face-to-face and online conditions. Yet, this study does not address the different response internationally and is more limited in scope to the previous study.

Many higher education institutions have been obliged to rethink their learning methodology because of the COVID-19–associated restrictions. It is quite likely that many institutions may not return to a fully traditional method of delivery, but they may incorporate some of the lessons learned during this pandemic, especially if this results in some benefits, such as reducing student stress levels. A longitudinal study following the students over the development of restrictions and the return to a new normality will provide a clearer picture. Moreover, it will be most important to explore possible specific stressors and coping mechanisms by qualitative as well as quantitative studies to gain a deeper insight about stress and burnout for future students under face-to-face or distant learning conditions.

The answers to the surveys are subject to recall and reporting bias. The response rate to this study was fair, with a 49.9%, given that the overall response date of online administered surveys tends to be around 32.6%.[30] Students more affected by stress and burnout may have felt more inclined to respond. Nevertheless, it must be considered that stress levels were decreased when compared with a normal, face-to-face situation.

CONCLUSIONS

To conclude, the results revealed that in BCC chiropractic students, women presented higher values for stress and exhaustion than men. When comparing data with a prior study done in 2018 with no lockdown situation, students in the present study appeared to have lower levels of stress. However, their cynicism levels were higher. The psychological impacts may be a result of a pandemic emergency as well as to a change in the teaching model that is more oriented to online classroom. The COVID-19 lockdown will continue for an indefinite time. Although we describe a decrease in students' stress levels, it should be noted that their stress levels are still above the normal population average, especially for women.

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Author Contributions

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