Depression, Anxiety, and Stress Among Chiropractors in South Africa During the Early COVID-19 Pandemic

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ABSTRACT

Objective: The purpose of this study was to assess the self-reported depression, anxiety, and stress responses of chiropractors in South Africa during the first year of the COVID-19 pandemic.

Methods: This was an explorative cross-sectional survey. The survey was distributed to 884 chiropractors through the membership databases of the Chiropractic Association of South Africa and the Allied Health Professions Council of South Africa from July 9, 2020, until August 4, 2020. The study was conducted through Google Forms and included the Depression, Anxiety, and Stress Scale questionnaire. Data were analyzed using the Kolmogorov-Smirnov and Shapiro-Wilk tests and comparatively using the Mann-Whitney U and Kruskal-Wallis tests.

Results: The response rate was 17%. The chiropractor scores for depression, anxiety, and stress were within the normal range (7.35, 5.42, and 11.58, respectively). Female chiropractors under the age of 40 years old were found to be affected to a greater degree than the other participants in this study (9.87, 7.56, and 14.14).

Conclusion: Self-reported levels for stress, anxiety, and depression among chiropractors in South Africa were found to be within normal limits during the initial phase of the COVID-19 pandemic. (J Chiropr Humanit 2022;29;37-43)

Key Indexing Terms: Coronavirus; Psychological; Chiropractic; Depression; Stress, Psychological; Anxiety; South Africa

INTRODUCTION

Health is defined as the physical, mental, and social well-being of an individual and not simply the absence of ailments or diseases. The mental health of health care workers is often overlooked under ordinary circumstances. During the coronavirus disease 2019 (COVID-19) pandemic, the mental health of health care workers has been made a priority. For example, a multinational study conducted in Singapore and India found that health care workers experienced various levels of moderate to severe depression, anxiety, and stress. The World Health Organization declared COVID-19 to be an infectious pandemic. This infection causes mild to moderate respiratory illness that may result in complications such as secondary bacterial infections, respiratory distress syndrome and cardiac injury, or fatality. The first recognized case in South Africa was reported on March 5, 2020, after which the president of South Africa declared a level 5 national lockdown at midnight on March 26, 2020. This lockdown mandated that every citizen in South Africa stay home, with only essential workers being allowed to work. Level 4 was implemented on May 1, during which chiropractors were advised only to treat emergency patients. A more lenient level 3 was implemented on June 8, level 2 was implemented on August 18, and level 1 on September 2, only for level 3 to be reinstated on December 3, 2020. The lockdown levels were implemented to curb the spread of the virus, as the mode of transmission was found to be from human to human through oral and respiratory aerosols and droplets.

The role of chiropractic professionals is as a primary-contact physical-medicine health care provider whose focus is to diagnose and treat conditions of neuromusculoskeletal origin; therefore their services were suspended during level 5. Almost 50% of chiropractors in South Africa practice in solo practice, with the remainder either in a multidisciplinary practice or practicing with other chiropractors. As a result of the restrictions caused by the pandemic, chiropractors changed their methods of practice. This included canceling appointments, resorting to telemedicine consultations, or discontinuing their practice completely due to the lockdown restrictions placed upon them. Although helpful, telemedicine consultations brought about their own challenges, including technological barriers such as connectivity issues, organizational and financial barriers,
policy and regulatory issues, and cultural barriers such as language difficulties, which some practitioners deemed not worth the effort.13

Though it was found that there was a decline in the mental health of the general population in South Africa, it was unknown if changes in practice affected chiropractors’ mental health.14 Therefore, the purpose of this study was to investigate the psychological responses of chiropractors in South Africa during the COVID-19 pandemic. The research questions were as follows: (1) What was the psychological status (in terms of depression, anxiety, and stress levels) of chiropractors in South Africa during the COVID-19 pandemic? (2) Did age, sex, marital status, and economic status have an association with the psychological symptoms?

**Methods**

**Study Design**

This study was an explorative cross-sectional survey of chiropractors in South Africa. The survey explored the stress, anxiety, and depression levels as measured by the Depression, Anxiety, and Stress Scale (DASS). Demographic information was added to the survey for comparative and statistical purposes (see supplemental file). As such, the participants were required to indicate their age, sex, economic status, and marital status.15

**Sample Selection and Inclusion Criteria**

According to a census, at the time of the study, there were 884 actively practicing chiropractors in South Africa. An email link to the DASS survey and an information letter was distributed to all registered chiropractors using the membership databases of the Allied Health Professions Council of South Africa, as well as the Chiropractic Association of South Africa, which is a voluntary professional body for chiropractors in the country. The study was conducted as a self-administered online survey using Google Forms. Inclusion required that the chiropractor was registered with the Allied Health Professions Council of South Africa and had to be actively practicing within South Africa.

**Ethical Considerations**

This study was approved by the Research Ethics Committee (NHREC REG: REC-559-2020) of the University of Johannesburg’s Health Sciences Faculty on June 25, 2020. The participants were informed via the information letter that their participation was strictly voluntary and could withdraw at any time. The information letter indicated that by clicking the link to the survey, they were giving their consent to be part of the research.

The information letter assured the participants of their anonymity and explained that there was no way of tracing each response back to the relevant participant. The data obtained from the study were kept in a password-protected document saved on a password-protected laptop and will be stored for 1 year after the study. The participants were informed that their participation was strictly voluntary. Participants could only withdraw from the study before submission owing to the anonymous nature of the responses. The participants were also provided with the contact details of the researcher, whom they could contact should they have any further questions. The information letter outlined the name of the researcher, the purpose of the study, and any risks or benefits involved.

There were no direct risks or benefits to this group of participants. The researcher had no access to the participants’ personal information; thus, anonymity was maintained. The researcher only had access to the raw data collected from the survey and, therefore, confidentiality and anonymity were assured. The researcher received permission from both the Department of Higher Degrees Committee as well as the Research Ethics Committee to conduct this study.

**Survey**

The survey was sent on July 9, 2020, and a reminder to complete the survey was sent out on July 28, 2020. The survey remained active until August 4, 2020. The data were collected using the DASS survey, which is a 42-item self-administered questionnaire. It is a universally used, reliable, and validated screening examination tool that assesses the symptoms of anxiety, depression, and stress.15 It was developed to discriminate between depression and anxiety and is used to express an individual’s psychological status.16

The DASS survey comprises the following 3 subsections: the depression subsection, which measures low self-esteem, low positive effect, and hopelessness; the anxiety subsection, which measures situational anxiety, autonomic arousal, and the subjective response of anxious arousal, as well as musculoskeletal symptoms; and the stress subsection, which measures agitation, tension, and negative effect.15 A respondent indicates on a 4-point scale to what extent each of the 42 statements can be said to have applied over the previous week. A printed overlay is then used to obtain total scores for each subscale. Higher scores on each subscale indicate higher levels of depression, stress, and anxiety, respectively.17 Demographic information added to the survey included age, sex, self-perceived economic status, and marital status.

**Data Analysis**

It was determined that the minimum response rate needed for meaningful statistical analysis was 100.18 The data were collected and analyzed by the researcher with the assistance of a statistician from STATKON at the
University of Johannesburg on 15 September 2020 using the IBM SPSS Statistics 26 program (IBM Corp). Data analysis consisted of the use of frequencies and descriptive statistics. Frequencies describe the categorical data to determine how often each specific answer was received. Descriptive statistics comprise mean, median, mode, interquartile range, standard deviation, and minimum and maximum values to describe the continuous data.

Normality tests were performed, including the Kolmogorov-Smirnov test and the Shapiro-Wilk test, to determine if the data were normally distributed. Comparison tests were done using the Kruskal-Wallis test to determine any statistical differences between the 3 age groups. Post hoc tests were then done using the Mann-Whitney U test, with the significance levels adjusted using the Bonferroni adjustment/correction. These tests were used to determine differences in responses according to age, sex, marital status, and economic status. Economic status was a subjective question of which the data were then grouped to be large enough and similar in size to be comparable.

RESULTS

Responses

All respondents to the survey were included in the study. A total of 151 responses (response rate 17%) were obtained.

Demographic characteristics

The demographic information is reported in Table 1. The sample was divided into age groups of 20 to 30, 31 to 40, and older than 40 in order to keep the groups equal and comparable.

DASS

The mean scores obtained for depression, anxiety, and stress are reported in Table 2. The DASS mean values fall within the range of “normal” for each construct.15

The majority of constructs that were measured using the Kolmogorov-Smirnov and Shapiro-Wilk tests had a statistically significant P value and a small degree deviation (Table 3). The 2 exceptions were anxiety and stress in the cohabiting participants.

The Kolmogorov-Smirnov test was found to be statistically significant with small degrees of deviation (Table 4).

Results of the Comparison Tests

The Kruskal-Wallis test for the relationships between age and depression and between age and anxiety and age and stress revealed that there was a statistically significant difference with regards to the levels of depression, H (2) = 7.96, P = .019, and anxiety experienced, H (2) = 11.267, P = .004, among different age groups. The age of the participants did not have a statistically significant, H (2) = 2.033, P = .362, relationship with stress.

The Mann-Whitney U test was used to determine differences. The following Bonferroni adjustment/correction was applied: the smallest P value of each variable was tested against a significance level of .05 (.05/1 = .05). The Mann-Whitney U test revealed that there was no significant difference between the 2 age groups of 20 to 30 years and 31 to 40 years in terms of depression (P = .359) or anxiety experienced (P = .062). The Mann-Whitney U test revealed that there was a statistically significant difference between the age groups of 20 to 30 years and >40 years in terms of depression (P = .021) and anxiety (P = .001) experienced. Participants between the ages of 20 to 30 years experienced a greater degree of depression and anxiety compared to participants over the age of 40. The Mann-Whitney U test 3 revealed that there was a statistically significant difference between the age groups of 31 to 40 years and >40 years in terms of depression experienced (P = .015) but no statistical significance with regards to anxiety (P = .049). Participants between the ages of 31 to 40 years old experienced a greater degree of depression compared to participants over the age of 40. The Mann-Whitney U test revealed a statistically significant difference between the sexes in terms of depression, anxiety, and stress revealed that there was a statistically significant difference with regards to the levels of depression, H (2) = 11.267, P = .004, among different age groups. The age of the participants did not have a statistically significant, H (2) = 2.033, P = .362, relationship with stress.

The Mann-Whitney U test 2 revealed that there was a statistically significant difference between the age groups of 20 to 30 years and >40 years in terms of depression (P = .021) and anxiety (P = .001) experienced. Participants between the ages of 20 to 30 years experienced a greater degree of depression and anxiety compared to participants over the age of 40. The Mann-Whitney U test 3 revealed that there was a statistically significant difference between the age groups of 31 to 40 years and >40 years in terms of depression experienced (P = .015) but no statistical significance with regards to anxiety (P = .049). Participants between the ages of 31 to 40 years old experienced a greater degree of depression compared to participants over the age of 40. The Mann-Whitney U test revealed a statistically significant difference between the sexes in terms of depression, anxiety,

Table 1. Sex, Age, Marital Status, and Self-Perceived Economic Status

| Demographic Characteristic, n (%) | Frequency |
|----------------------------------|-----------|
| Male chiropractors               | 66 (43.7) |
| Female chiropractors             | 85 (56.3) |
| 20−30 (y)                       | 41 (27.2) |
| 31−40 (y)                       | 58 (38.4) |
| >40 (y)                         | 52 (34.4) |
| Married                         | 92 (60.9) |
| Single                          | 31 (20.5) |
| Divorced                        | 5 (3.3)   |
| Widowed                         | 1 (0.7)   |
| Cohabiting                      | 22 (14.6) |
| Below average to average economic status | 77 (51) |
| Above average to affluent economic status | 74 (49) |
and stress experienced. The test found that female participants experienced a greater degree of depression, anxiety, and stress compared to male participants \((P = .000)\). The Mann-Whitney \(U\) test also revealed that economic status had no significant relationship with depression \((P = .165)\), anxiety \((P = .307)\), or stress \((P = .485)\). No statistical tests for significant differences with regard to marital status were done as the group sizes were not similar.

### Discussion

The findings of this research study have provided the health sector with much-needed information regarding the psychological impact of the COVID-19 pandemic on chiropractic professionals. This information may offer relevant insight into what could be expected in the future as a result of the pandemic on the psychological well-being of health care professionals. This discussion addresses the research questions mentioned.

#### Depression, Anxiety, and Stress Levels of Chiropractors in South Africa

Stress scores were higher than depression and anxiety. When compared to the DASS severity ratings, however, the mean values fell within the normal range for each

**Table 2. Descriptive Statistics for Depression, Anxiety, and Stress**

|                | Mean | Median | Standard Deviation | Minimum | Maximum |
|----------------|------|--------|--------------------|---------|---------|
| Depression     | 7.35 | 4.00   | ±8.73              | 0.00    | 42.00   |
| Anxiety        | 5.42 | 3.00   | ±6.86              | 0.00    | 40.00   |
| Stress         | 11.58| 9.00   | ±10.07             | 0.00    | 42.00   |

Depression normal range = 0 to 9, anxiety normal range = 0 to 7, stress normal range 0 to 14.

#### Table 3. Normality Tests for Age and Marital Status

|                | Kolmogorov-Smirnov* | df  | Sig   | Shapiro-Wilk | df  | Sig   | Mean |
|----------------|---------------------|-----|-------|--------------|-----|-------|------|
| Depression     |                      |     |       |              |     |       |      |
| 20-30 y        | 0.862               | 41  | 0.000 | 9.88         |
| 31-40 y        | 0.191               | 58  | 0.000 | 7.66         |
| Older than 40 y| 0.247               | 52  | 0.000 | 5.02         |
| Anxiety        | 0.883               | 41  | 0.001 | 7.51         |
| 31-40 y        | 0.248               | 58  | 0.000 | 5.47         |
| Older than 40 y| 0.272               | 52  | 0.000 | 3.73         |
| Stress         | 0.913               | 41  | 0.004 | 13.24        |
| 31-40 y        | 0.158               | 58  | 0.001 | 12.07        |
| Older than 40 y| 0.131               | 52  | 0.026 | 9.73         |
| Depression     | 0.227               | 92  | 0.000 | 7.03         |
| Married        | 0.826               | 31  | 0.000 | 7.94         |
| Single         | 0.824               | 22  | 0.001 | 7.5          |
| Cohabiting (living together) | 0.824 | 22 | 0.001 | 7.5 |
| Anxiety        | 0.237               | 92  | 0.000 | 5.63         |
| Married        | 0.837               | 31  | 0.000 | 4.32         |
| Single         | 0.922               | 22  | 0.083 | 6.41         |
| Cohabiting (living together) | 0.922 | 22 | 0.083 | 6.41 |
| Stress         | 0.133               | 92  | 0.000 | 12.08        |
| Married        | 0.885               | 31  | 0.003 | 9.39         |
| Single         | 0.927               | 22  | 0.106 | 11.82        |

* Lilliefors significance correction.
Demographics and Depression, Anxiety, and Stress

The age of the participants had a statistically significant relationship with the amount of depression the participants experienced but not with the amount of anxiety and stress experienced. Participants between the ages of 20 to 30 years and 31 to 40 years experienced higher levels of depression compared to participants over the age of 40. These findings are similar to another study during the COVID-19 pandemic, which found that health care workers younger than 30 years of age experienced higher levels of depression, anxiety, and stress, which may be due to younger people having less life experience upon which to draw during challenging times.3,19 Another study found that social support and utilization of support affected depression and anxiety among participants, with unmarried health care workers receiving less social support and reporting higher levels of depression and anxiety.20

Female participants in our sample reported higher levels of depression, anxiety, and stress compared to male participants. These findings again support those of Spoorthy et al and García-Alvarez et al who found that female health care workers experienced higher levels of depression, anxiety, and stress than their male counterparts.3,19 Female health care workers have been shown to use social support more often, which coincides with the fact that women have been reported to be more caring in nature and thus may seek more care in return.3,19,20,21 Spoorthy proposed a possible reason for the increase in the levels of depression, anxiety, and stress reported by women may be because those with higher levels of stress may be more likely to complete such questionnaires to seek information on skills to self-rescue or because they realize they need urgent psychiatric or psychological help.3

In terms of marital status, there was no statistically significant difference among the married, single, and cohabiting participants in terms of reported depression, anxiety, and stress. This finding contrasts with another study on the psychosocial effects of COVID-19 on health care workers that single participants were at a higher risk of developing negative psychological effects.21 There was no statistically significant difference between those with a below-average to average economic status and those with an above-average to affluent economic status in terms of the amount of depression, anxiety, and stress experienced.

Future Studies

We found that the DASS scores were, on average, in the normal range, and, therefore, we suggest that there is no need for intervention strategies for South African chiropractors in general at this time. However, a similar study suggested that further research may be necessary to determine the long-term effect of the COVID-19 pandemic on the psychological health of chiropractors, including those in South Africa, and to determine the psychosocial interventions strategies needed to improve the participants’ mental health at a later stage.22 Based upon our study findings, a future study using a larger sample size could yield more accurate and reliable results. This study focused on the psychological effects of COVID-19 on chiropractors in South Africa. Further research could include chiropractors from other countries. Second, further exploration into the long-term effects of the COVID-19 pandemic on the psychological health of chiropractors should be conducted.

Limitations

The first limitation of this study was the response rate. Although the response rate of 17.08% yielded statistically

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Table 4. Normality Tests for Sex and Self-Perceived Economic Status

|                  | Statistic | df    | Sig   | Mean  |
|------------------|-----------|-------|-------|-------|
| Depression Male  | 0.269     | 66    | 0.000 | 4.11  |
| Depression Female| 0.153     | 85    | 0.000 | 9.87  |
| Anxiety Male     | 0.273     | 66    | 0.000 | 2.67  |
| Anxiety Female   | 0.161     | 85    | 0.000 | 7.56  |
| Stress Male      | 0.161     | 66    | 0.000 | 8.29  |
| Stress Female    | 0.141     | 85    | 0.000 | 14.14 |

\[\text{df}, \text{degrees of freedom}; \text{Sig}, \text{significance.} \]

\[\text{**a** Lilliefors significance correction.} \]
meaningful results (7.27% margin of error and a 95% confidence level), it was low when compared to other studies done around the world on health care workers. A reason why for this low response rate could have been because people with mental health problems may be more likely to complete these types of questionnaires, and since this study was done quite early in the pandemic, the target group had not yet really experienced symptoms of depression, anxiety, or stress. The second limitation of this study was that an online survey was used for data collection, and, therefore, the respondents were not necessarily a fair representation of all chiropractors within South Africa. The study was conducted on chiropractors in South Africa; therefore, the findings of this study are limited to this region. For this reason, the results of the study should be interpreted with caution. This study was conducted very soon after the COVID-19 outbreak (July 9, 2020, to August 4, 2020), and thus the findings could represent preexisting mental health conditions. Thus, it is not known if the COVID-19 pandemic had an effect on those participating in this study. The results about female chiropractors need to be interpreted with caution as the stress level of those participants was not known before the pandemic started. The fourth limitation of this study is that the researcher needed to make use of a third party for the dissemination of the survey and therefore did not have direct access to all the participants of the study. Fifth, questions on whether the chiropractors themselves or their loved ones had COVID-19-related illnesses could have enriched the analysis of the results. Lastly, the data were considered as a group and not individually. It is possible that a subset of chiropractors fell outside of the normal range and had high depression, anxiety, or stress, even though the average of the group was in the normal range.

CONCLUSION

This study revealed that the average levels of depression, anxiety, and stress experienced by chiropractors were within the normal range during the early phases of the pandemic. We found that female chiropractors were affected to a greater degree with regard to anxiety, depression, and stress, even though they still fell within the normal range. According to the results obtained in this study, no significant psychological impairment was noted. However, further research is necessary to determine the long-term effect of the COVID-19 pandemic on the psychological health of chiropractors in South Africa.

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CONTRIBUTORSHIP INFORMATION

Concept development (provided idea for the research): D. M.L., A.S.
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Critical review (revised manuscript for intellectual content, this does not relate to spelling and grammar checking): D. M. L., C. P.

Practical Applications

- This cross-sectional survey assessed the self-reported depression, anxiety, and stress responses of chiropractors in South Africa during the first year of the COVID-19 pandemic.
- The ranges of reported depression, anxiety, and stress were in the normal range for our study sample.
- Although still in the normal range, female chiropractors under the age of 40 years old were found to be affected to a greater degree than the other participants.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.echu.2022.08.001.

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