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ORIGINAL ARTICLE

Depression, anxiety, and sleep attributes: A cross-sectional study of chiropractic college students

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ABSTRACT

Objective: To measure degree of depression, anxiety, and hours of sleep of chiropractic college students through an anonymous paper survey.

Methods: A convenience sample of 164 chiropractic college students completed a Major Depression Inventory (MDI) survey, a 2-item Generalized Anxiety Disorder (GAD-2) survey, and were asked the number of hours of sleep they had per night and demographic questions. The survey was distributed to trimester 1–6 students 4 weeks into their 15-week semester.

Results: Chiropractic students had an average MDI score of 18.1 ± 10.6 (mean ± SD), indicating the average chiropractic college student did not display depression. However, subset analysis revealed 18.9% of students had MDI scores over 30, which is associated with possible severe depression. Of students who demonstrated possible severe depression, 80.6% were female. Body mass index demonstrated no correlation with the number of respondents at risk for severe depression. Average GAD-2 score was 3.0 ± 1.9; male students scored 2.4 ± 1.8 and female 3.6 ± 1.8, indicating female students expressed anxiety more. Last, survey respondents reported they averaged 6.3 ± 1.1 hours of sleep per night with females reporting approximately 30 minutes less sleep per night than males.

Conclusion: Chiropractic students, on average, did not display depression. However, a subset of female students near the age of 26 were at an increased risk of severe depression. Chiropractic students displayed a rate of anxiety greater than that of undergraduate college students based on existing data sets and reported approximately 6 hours of sleep per night.

Key Indexing Terms: Chiropractic; Students; Health Occupations; Mental Health; Depression; Anxiety; Sleep

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INTRODUCTION

Depression rates are increasing across the world, an issue that has been magnified in recent years due to the stress brought on by the COVID-19 pandemic.[1] Experiencing major depression is the strongest risk factor for a person to commit suicide.[2,3] It is common for individuals suffering from depression to be untreated.[4,5] One factor that is a barrier to treatment is financial resources, an issue that can prevent college students from seeking appropriate care.[6] Point prevalence suggests 26.5% of college students suffer from depression at clinically significant levels with 9% of them requiring clinical attention.[7]

Undergraduate college student depression and anxiety levels are shown to negatively impact learning.[8] Overall, college student anxiety prevalence is 32%.[9] Furthermore, research on medical school students demonstrates that increased stress levels negatively impact their academic performance.[10,11] Medical students who are highly stressed are shown to be more cynical,[12] display decreased empathy,[13,14] and have a lower desire to provide care to chronically ill patients.[15] Some sources of stress for medical school students are workload,[16,17] academic pressure,[11] sleep deprivation,[16] and financial concerns.[16] All of these factors are likely experienced by chiropractic college students to some degree.

Chiropractic programs are academically and physically stressful.[18] Meckamalil et al[19] found that there was a 19.0% prevalence of depression and 32.6% prevalence of anxiety among undergraduate students at Canadian Memorial Chiropractic College. Similar to other researchers, Kinsinger et al[20] found that chiropractic students had elevated levels of depression with female students having higher rates of symptoms.[19,20] Spegman et al[18] found that the higher reported stress level of a chiropractic student, the more likely the student would feel less confident as an intern. Many lifestyle factors besides academic stress level can impact a chiropractic student's health to include alcohol consumption, exercise level, caffeine consumption, and the use of tobacco products. Evidence demonstrates that the average chiropractic college student reports drinking alcohol,[21,22] engaging in regular exercise,[22] and not smoking.[22] Alcohol consumption sometimes is used as an unhealthy stress-coping mechanism by college

students. Furthermore, the proportion of chiropractic students that report eating junk food and consuming 1 or more servings of caffeinated beverages a day is shown to increase during a chiropractic program.[22] This is especially true during exam weeks when students are under higher levels of stress.[23]

Another variable that can impact mental well-being is body mass index (BMI). Individuals categorized as overweight or obese on BMI charts are shown to have increased rates of depression in some studies.[24–26] However, this relationship is not seen in all studies[27–29] and, therefore, warrants additional data collection to help aid in the development of future review articles.

There is little published research on the rate of depression and anxiety among chiropractic college students.[20,22,30,31] Therefore, the objective of this study was to develop a better understanding of depression, anxiety, and sleep habits of chiropractic college students.

METHODS

This research study was reviewed and approved by the Texas Chiropractic College Institutional Review Board for human subjects in accordance with the Declaration of Helsinki. Multiple existing surveys were reviewed in an effort to develop a 1-page maximum anonymous paper survey that would capture data on student depression, anxiety, hours of sleep per night, and a few respondent questions regarding age, biological sex, height, and weight. The limit of 1 page was intended to reduce survey question fatigue and increase the likelihood that respondents answered all of the questions. The survey was distributed in September 2022, 4 weeks into the 15-week trimester for students in trimesters 1–6 of a chiropractic doctoral program.

Existing surveys on depression and anxiety were screened to be concise, publicly available (not requiring permission for use), and free of charge and such that they had been used in prior research studies. Surveys reviewed and screened against these criteria were the Warwick-Edinburgh Mental Well-being Scale,[32] Major Depression Inventory (MDI),[33] World Health Organization-5 Well-Being Index,[34] Oxford Happiness Questionnaire,[35] Everyday Feelings Questionnaire,[36] Mental Health Continuum Short Form,[37] Satisfaction with Life Scale,[38] Center for Epidemiologic Studies Depression Scale,[39] Generalized Anxiety Disorder 2-item (GAD-2),[40] Generalized Anxiety Disorder 7-item,[41] and Patient Health Questionnaire-9.[42] From these surveys, researchers chose the MDI; GAD-2; a question about how many hours of sleep the student received per night on average; and the aforementioned questions on age, biologic sex, height, and weight. The MDI response options and scoring for each question are as follows: *all of the time* (5), *most of the time* (4), *more than half of the time* (3), *less than half of the time* (2), *some of the time* (1), and *none of the time* (0). The MDI is composed of 12 questions in total (1–7, 8a, 8b, 9, 10a, 10b) with 10 being graded (using the highest score out of questions 8a and 8b as well as highest out of 10a and 10b). A total score of <20 = *no or doubtful depression*, 20–24 = *mild depression*, 25–29 = *moderate depression*, and 30+ = *severe depression*.[43] The MDI is shown to have a sensitivity between 86% and 92% and specificity between 82% and 86% for diagnosis of major depression.[44] The GAD-2 response options and scoring for each question are as follows: *not at all* (0), *several days* (1), *more than half the days* (2), and *nearly every day* (3). The GAD-2 is composed of 2 questions. A score of 0–3 indicates no to mild anxiety and 4–6 indicates severe anxiety. For scores exceeding 3, the GAD-2 has a sensitivity of 86% and specificity of 83% for diagnosis of generalized anxiety disorder.[45]

The MDI and GAD-2 asked the students to answer based on how they had been feeling over the preceding 2 weeks.

The lead investigator for the research study distributed the survey to 6 different trimester groups of chiropractic students (trimesters 1–6). This was done by coordinating in advance with 1 of their instructors per trimester to attend and distribute the survey during the first 15 minutes of class. Participants were told that completing the survey was entirely voluntary and that, if they completed it, they were giving their implied consent for its use in data analysis. Data were only collected for the purpose of this study and not part of a larger college survey. Students were given the 1-page anonymous survey in class along with a blank cover sheet to shield their answers from their peers. Respondents completed the anonymous survey and then placed the survey and cover sheet in a drop box at the front of the classroom. Once all surveys had been collected across multiple classes, they were transposed to Excel (Microsoft Office).

Statistics

Excel data were analyzed using SPSS version 20.0 (IBM). Results were reported as mean ± SD unless otherwise specified. Pearson correlation was used to analyze the relationship between BMI and MDI score. Spearman correlation was used to analyze the relationship between trimester number and MDI score.

RESULTS

There were 81 female respondents with the following attributes: 26.4 ± 5.1 years, 1.66 ± 0.07 m, 73.8 ± 15.4 kg, and 6.0 ± 1.2 hours of reported sleep per night. There were 83 male respondents with the following attributes: 26.3 ± 4.8 years, 1.78 ± 0.06 m, 89.2 ± 17.0 kg, and 6.6 ± 0.9 hours of reported sleep per night.

Tables 1 and 2 illustrate the survey results per question. Chiropractic students averaged an MDI score of 18.1 ± 10.6 out of a maximum score of 50, indicating the average chiropractic college student did not display depression. However, 18.9% of students were scored to have possible severe depression according to MDI scores. Of students that demonstrated possible severe depression, 80.6% were female. The average age of the female students that displayed possible severe depression was 25.9 years of age. The 2 MDI questions with the highest response scores were "Have you suffered from increased appetite?" with a score of 2.52 ± 1.09 and "Have you felt lacking in energy and strength?" with a score of 2.40 ± 1.35. The MDI question with the lowest response score was "Have you felt that life wasn't worth living?" with a score of 0.54 ± 1.11.

Based on BMI, the average chiropractic college student in this study was overweight (27.4 ± 5.1). Survey respondents at risk for severe depression based on their MDI score possessed the following BMI categories: healthy weight (18.5–24.9 BMI, $n = 15$), overweight (25.0–29.9 BMI, $n = 10$), and obese (30.0+ BMI, $n = 6$). Pearson correlation between BMI and

Table 1 - Major Depression Inventory Results

How Much of the Time . . .	Student Average Score on a Scale of 0–5	0	1	2	3	4	5
1. Have you felt in low spirits or sad?	1.81 + 1.10	9.8%	33.5%	29.9%	20.7%	4.9%	1.2%
2. Have you lost interest in your daily activities?	1.66 + 1.35	22.6%	30.5%	19.5%	15.2%	10.4%	1.8%
3. Have you felt lacking in energy and strength?	2.40 + 1.35	6.7%	22.6%	25.0%	22.0%	17.7%	6.1%
4. Have you felt less self-confident?	1.91 + 1.47	17.1%	31.7%	16.5%	18.3%	10.4%	6.1%
5. Have you had a bad conscience or feelings of guilt?	1.27 + 1.43	42.7%	21.3%	14.0%	12.8%	6.1%	3.1%
6. Have you felt that life wasn't worth living?	0.54 + 1.11	75.0%	9.8%	6.1%	4.9%	3.7%	0.6%
7. Have you had difficulty in concentrating, eg, when reading the newspaper or watching television?	2.10 + 1.53	16.5%	27.4%	14.0%	21.3%	13.4%	7.3%
8a. Have you felt very restless?	2.34 + 1.57	16.5%	20.1%	17.1%	20.1%	17.7%	8.5%
8b. Have you felt subdued?	1.57 + 1.44	39.0%	23.8%	20.7%	9.8%	3.7%	3.1%
9. Have you had trouble sleeping at night?	2.23 + 1.59	21.3%	26.8%	18.9%	14.0%	8.5%	10.4%
10a. Have you suffered from reduced appetite?	1.85 + 1.65	39.0%	25.0%	11.0%	11.0%	7.9%	6.1%
10b. Have you suffered from increased appetite?	2.52 + 1.09	46.3%	20.7%	14.6%	11.6%	6.1%	0.6%

The included survey questions asked about how the student had been feeling over the preceding 2 weeks. Student average score data listed as mean ± SD for the question, followed by the relative frequency percentage of each response option on the right columns out of 100% (0 = none of the time, 5= all of the time, etc.). The highest scoring question (10b) was students reporting increased appetite.

MDI scores of individuals categorized as likely having severe depression demonstrated no correlation ($r(31) = .142$, $p = .447$); thus, higher BMI did not mean a higher MDI score.

MDI scores per trimester were tri-1 = 17.9 ± 10.0, tri-2 = 17.9 ± 10.5, tri-3 = 17.1 ± 10.7, tri-4 = 19.0 ± 10.2, tri-5 = 16.4 ± 11.9, and tri-6 = 20.0 ± 11.6. Spearman did not demonstrate a correlation between trimester number and MDI score among participants categorized as likely severely depressed ($r(31) = -.250$, $p = .175$). Thus, no trend was seen in which students in earlier trimesters had high MDI levels and students in higher trimesters possessed lower MDI levels possibly due to any type of adaptation to academic load. Students were taking the following number of hours on average per trimester: trimester 1: 24 hours, trimester 2: 30 hours, trimester 3: 25 hours, trimester 4: 29 hours, trimester 5: 28 hours, and trimester 6: 26 hours.

Average GAD-2 score was 3.0 ± 1.9 indicative that the average chiropractic college student did display some degree of generalized anxiety. The proportion of respondents that displayed generalized anxiety was 53.7%. Upon further sub-analysis of GAD-2 score by sex, males demonstrated a score of 2.4 ± 1.8 and females a score of 3.6 ± 1.8 with female respondents demonstrating anxiety. Chiropractic students averaged 6.3 ± 1.1 hours of sleep per night with females reporting approximately 30 minutes less sleep than males on average.

DISCUSSION

After the data were analyzed, students in each trimester class were reminded that the college offers free online counseling services to students in case they ever feel anxiety and/or depression. For perspective, depression rates for the general U.S. population are 7%.[46] Medical school students typically have an MDI between 15 and 16, which is less than what was demonstrated by students in this study.[47,48] Usually, medical school students have an undergraduate grade point average of nearly 3.75 and are accustomed to elevated levels of academic stress.[49] The typical grade point average of a student entering into a U.S. chiropractic college is about 3.15.[50] Perhaps chiropractic students may have a decreased ability to cope with life stress compared with medical school students. This point should be further considered when looking at the MDI score of general undergraduate students. Undergraduate college students demonstrate an MDI score of 17.3[51] with the students in this study still scoring higher than that.

Female chiropractic college students were more likely to have higher scores on the MDI scale than male students. Studies of nursing, medical, and chiropractic college school students similarly demonstrate that female students are more likely to suffer from depression.[20,48,52–54] Some of the factors suggested in research to be responsible for females demonstrating higher rates of depression are genetics, increased need for social support, and pressures of family life.[55]

The results of this study demonstrate that the average chiropractic college student was not suffering from depression but that a proportion of the overall student population was. In Kinsinger's work on the same topic, he found that 22%–25% of chiropractic students were suffering from some degree of mild-to-severe depression in any given year in a chiropractic program.[20] These numbers are significantly higher than what are seen in general and postsecondary colleges.[56] Countermeasures to aid chiropractic students who may be suffering from depression should be pursued.

Table 2 - Generalized Anxiety Disorder-2 Results

Statements	Student Average Score on a Scale of 0–3
1. Feeling nervous, anxious, or on edge.	1.58 + 0.98
2. Not being able to stop or control worrying.	1.38 + 1.05

In this study, the students surveyed scored higher on the anxiety scale than average undergraduate college students with a score of 3.0 ± 1.9. Average undergraduate students demonstrate a GAD-2 score of 2.76.[57] The GAD-2 question with the highest score was about "feeling nervous, anxious, or on edge?" with a score of 1.58 ± 0.98. These findings of elevated anxiety among chiropractic college students were similar to what Spegman et al[18] found in their research on this topic. The Spegman study demonstrated that chiropractic students had a comparable anxiety level to medical school students.[18]

Based on BMI, the average chiropractic student in this study was overweight. The degree to which college students entering into chiropractic programs are overweight and their progression of possibly gaining weight warrants further study. DuMonthier et al[30] demonstrate that, due to the stressful academic nature of chiropractic programs, students report having less time for physical activity, which can be a risk factor for gaining weight. Additional attributes that may impact weight gain throughout a chiropractic program are the consumption of junk food as well as alcohol as unhealthy means of dealing with stress.[58] In this study, BMI was not shown to be linked to an increased rate of depression.

The health habits and methods of chiropractic students of dealing with their own level of anxiety and depression is paramount to how they will interact with their future patients. Studies suggest that, if a chiropractic student has less effective internal coping mechanisms, they will be less likely to promote healthy behaviors to their patients.[22] This is seen in the study by DuMonthier et al[30] in which obese chiropractic students were less likely to assign importance to role modeling and patient education for their patients. Chiropractic programs should consider what mechanisms they have in place to aid their students in dealing with stress and anxiety because it will have a subsequent, trickle-down impact on their future patients.

Chiropractic students in this study averaged 6.3 + 1.1 hours of sleep per night. This value is similar to that reported by medical school students, which ranges between 5.9 ± 1.6 hours and 6.9 ± 1.1 hours of sleep per night.[59–61]

Possible future directions for this study would be to (1) perform a similar study at other chiropractic college campuses to see if the rates of severe depression and anxiety are similar, (2) determine if the rate of depression and anxiety improves as students progress through a chiropractic program to the end, and (3) measure weight gain of students as they progress through a chiropractic program related to stress eating. Family support and personalized interventions are shown to aid college students in decreasing their level of depression.[62] Although colleges may not be able to impact family support, they could incorporate more organized physical fitness and social activities on campuses that could impact depression and/or anxiety levels.

Strengths and Limitations

A strength of this study is the use of validated survey instruments to measure depression and anxiety degree.[63,64] This will make it easier for future researchers to replicate portions of this study and compare their results through a standardized method.

A limitation of this study is that it did not track a cohort of students as they progressed through the chiropractic program. Doing this could more effectively show if students are able to adapt to their stress level over time. This point was actually demonstrated by Ward et al[22] and Kinsinger et al,[20] who show a decrease in the number of students reporting depressive symptoms by the end of the chiropractic program, which is in contrast to what is seen among medical school students.[53,65,66]

A second limitation of this study is that it was performed at 1 chiropractic college on a small group of students, which limits external validity. As more studies are performed at multiple chiropractic colleges, a more definitive understanding of the mental health of chiropractic students will be gained.

This study did not measure alcohol use and its relationship with depression. Alcohol can be used as a coping mechanism by students in high-stress college programs.[67] Alcohol use as a student is also predictive of alcohol use as a future health care provider, which could impact care of patients.[68]

Another limitation of this study is that it occurred post-COVID, and that could impact the results and their interpretation in relation to preexisting data sets on depression and anxiety rates of college students. COVID had a significant impact on student mental health.[69–71] The degree to which students in this study may have been dealing with the lingering effects of the worldwide COVID-19 pandemic in September of 2022 is unclear.

CONCLUSION

Chiropractic students, on average, did not display depression. The students did score higher on the MDI scale than undergraduate college students and medical school students. Future studies should determine if these findings can be corroborated and explore why the differences exist. Chiropractic college students did display a rate of anxiety greater than that of typical undergraduate college students. Chiropractic college programs involve students taking on more hours per week than the typical undergraduate student, and this may partially account for the increase in student anxiety level seen in this study.

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